Middle School Mathematics Teachers' Perceptions of Culturally Responsive Teaching

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ABSTRACT

African American students in K-12 classrooms have struggled to achieve at the same level as their Caucasian peers in the mathematics classroom. The achievement gap between African American students and their Caucasian, Hispanic and Asian peers is a concern for administrators, teachers, and parents. Educators are being tasked to examine their pedagogy to determine how this achievement gap can be narrowed in mathematics. Middle school mathematics teachers who make academic gains with African American students have a specific skill set. The purpose of this interpretive qualitative study was to understand middle school teachers' perceptions of the role of culturally responsive teaching strategies in teaching mathematics to African American middle school students.

A qualitative study was conducted using an interpretive research design. Semi structured interviews were conducted with five middle school mathematics teachers. Key findings in the study revealed that middle school teachers demonstrating success with African American students have key pedagogical and personal characteristics in common. The data from the interviews were analyzed and yielded the following major themes: building on students' prior experiences, relationships and trust, empathetic and caring teachers, encouraging students to leverage their social capital, and reflection. Results from the qualitative analysis of interview responses showed that math teachers are engaging in a continuous cycle as they attempt to build on students' prior experiences, create relationships and trust, become empathetic and caring teachers and encourage students to leverage their social capital. Teachers of African American students do all these things while reflecting on each practice and adjusting as they work through the cycle.

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Chapter I

INTRODUCTION

Historically, the culture of classrooms in the United States has reflected society's middle-class norms (Delpit, 2006). Teachers are typically Caucasian, middle-class females and therefore the schools are a representation of their communities, interests, and experiences (Ladson-Billings, 2009). Teachers who are unfamiliar with the backgrounds of culturally diverse students may find it difficult to adapt the curriculum to meet the needs of their African American students because they are unfamiliar with how the students' cultural backgrounds have shaped their interests, beliefs, and identities (Ladson-Billings, 2009). This is especially true in the mathematics classroom, where the stereotypical image of a student with high mathematical ability is a Caucasian male with rimmed glasses (Ladson-Billings, 1997). Only a small portion of African American male students receive mathematics instruction in higher level mathematics courses (Berry, 2005). Ford (2014) mirrored the sentiments of Berry nine years later by noting that African American students continue to be denied access to rigorous coursework. Consequently, there is a disproportionate amount of African American students receiving instruction in lower-level math courses and special education (Berry, 2005). According to the National Assessment of Educational Progress (2017), the percentage of African American students in the eighth grade performing proficiently in mathematics (14%) is disproportionately lower than their Caucasian (44%), Hispanic (23%) and Asian (70%) peers. Although Berry's study was 16 years ago, it is discouraging to note the problem

continues to prevail given evidence that African American students continue to score significantly lower on mathematics proficiency assessments (NAEP, 2017). As a result of lack of access to higher-level mathematics courses, African American students have struggled to achieve at the same level as their Caucasian peers in mathematics.

In past research, African American students were labeled culturally deprived or culturally disadvantaged because their cultures were unlike their teachers' (Schmeichel, 2012). Schmeichel (2012) adds that these two terms were prevalent in research immediately following the Brown decision, which declared the separation of children in public schools by race was unconstitutional. The Brown decision ended the separate but equal era and made segregation in public schools illegal. The designation of culturally deprived or culturally disadvantaged insinuates the culture of students of color is less desirable because it is unlike the culture of mainstream society. Schmeichel (2012) notes that research written in the late 1950s through the 1970s categorized students as being either Caucasian or culturally deprived. Labeling students as culturally deprived and an over reliance on achievement data to understand kids, or what Gutierrez (2008) calls gap-gazing, has led educators to attempt to fix the students, rather than the instructional practices in the classroom (Bonner, 2014; Jackson & Wilson, 2012).

Gutiérrez and Dixon-Román (2011) said gap gazing has led to researchers placing an extreme emphasis on the gap that exists between Caucasian and minority students, while ignoring the role that power plays in the instructional practices in classrooms. Teachers will often create classroom environments that mirror their own backgrounds. The power that teachers have in the classroom influences day-to-day instructional practices as well. They go on to note that although gap gazing shows the inequities that

exist in mathematics, it does little to address what led to the inequities seen in the achievement gap, like cultural dissonance between teachers and students. Through this process of gap gazing and attempting to narrow the achievement gap, researchers are insinuating that minority students can perform "as well" as Caucasian students (Gutierrez & Dixon-Roman, 2011) without any change to the way culture is addressed in the classroom, which ignores the cultural background of minority students and creates cultural dissonance between teachers and students because teachers are not tasked with learning about and addressing the culture of their students in their classroom when gap gazing. Instead, teachers focus on attempting to fix minority students by making them just as good as their Caucasian peers.

The cultural dissonance that results from designating African American students as culturally deprived or disadvantaged is worrisome because teachers are the gatekeepers that control who gain access to rigorous math curriculum (Martin, 2009). The belief that the culture of students of color placing them at a disadvantage and should be fixed because it is unlike the culture of Caucasian, middle class students can cause African American students to be denied high quality mathematics instruction (Martin, 2012). This is evident in schools with a high enrollment of African American students, where the number of high ability classes are significantly low (Ladson-Billings, 2012).

Mathematics teachers who teach African American students need to understand the experiences of their students (Tate, 1995). Historically, many of the teacher preparation programs in the United States have not taught preservice teachers how to integrate culturally and racially diverse students into the curriculum (Siwatu, 2011). Teachers have historically been trained to use math pedagogy that employs whole class

instruction (Tate, 1995). During whole class instruction, teachers follow teaching guides and offer little attention to the individual needs of the students in the classroom. Experienced teachers engage in book studies on topics such as culturally responsive teaching; however, teachers find they remain ill equipped to meet the needs of African American students in mathematics (Ladson-Billings, 1997). Mathematics teachers use "repetition; drill; convergent right-answer thinking; and predictability (p. 699)," which are not skills that are reflective of society as a whole (Ladson-Billings, 1997). Cherry-McDaniel (2019) echoed Ladson-Billings sentiments 22 years later by noting the training received by all teacher candidates, both Caucasian and African American, remains to be ineffective in training teachers to be culturally responsive and culturally sustaining. Therefore, because of a lack of preparation and experience with the lives of African American students, many teachers do not trust themselves to integrate the culture of their African American students with their mathematics pedagogy effectively.

Teachers who believe the norm is behavior and interests found in the Caucasian, middle-class culture often have negative interactions with African American students (Schmeichel, 2012). These beliefs also help perpetuate a system of racial hierarchy in mathematics ability in which Caucasian males are viewed as more competent in mathematics (Martin, 2009). If teachers are not familiar with the cultures of the African American students they teach and have not been trained to be culturally responsive, they are not going to have the skillset to teach African American students effectively (McKoy, MacLeod, Walter, & Nolker, 2017; Siwatu, 2011). As a result, African American students have found it difficult to navigate and succeed academically in the culture of the schools they attend (Howard, 2010).

Due to the cultural conflict that exists between the students and the schools, African American scholars have recognized the need to address the cultural disconnect and provide strategies that will help teachers design a more inclusive classroom (Delpit, 1996; Gay, 2010; Ladson-Billings, 2009). Culturally responsive pedagogy is the acknowledgement of the cultural conflict that exits in the classroom and provides educators with a guideline for addressing the cultural conflict that exists between them and their students (Gay, 2010). Gay (2010) defines culturally responsive pedagogy as "using the cultural knowledge, prior experiences, frames of reference, and performance styles of ethnically diverse students to make learning encounters more relevant to and effective for them" (p. 31).

Statement of the Problem

When teachers use culturally responsive pedagogy, they tend to focus on reading and social studies because of the ease of including multicultural texts, and the already existing historical context that exists in the social studies curriculum (Ukpododu, 2011). Culturally responsive teaching is used less in math and science because these subjects come with prepackaged teaching guides that are regimented and geared towards preparing for high stakes testing (Ukpododu, 2011). Math, specifically, is considered by some to be objective, meaning it is not influenced by personal feelings and only represents the facts. Since math is viewed as a question of right and wrong, weaving culture into mathematics instruction is seen as unnecessary (Maddy, 2015). However, stereotypes of what a good math student looks like are abundant, and students not seeing themselves represented in the mathematics classroom could prevent them from living up to their true potential in math. Therefore, studies that address culturally responsive

pedagogy in middle school math and science are limited; and as a result, many teachers lack the resources needed to learn and use culturally responsive teaching strategies (Berry, 2005; Ridgeway & McGee, 2018). There is a need to study teachers who have been successful creating cultural congruency in the middle school math classroom so we can understand how they became successful with their African American students.

The problem this study addresses is that African American students continue to score below their Caucasian peers on national assessments. By eighth-grade, 87% of African American and 80% of Hispanic students are not proficient in math, as measured by the National Assessment of Educational Progress (NAEP, 2017). There is a considerable difference to the scores of Asian American (36%) and Caucasian (46%) students who are not proficient in math. Some researchers suggest that African American students are not engaged in the math classroom and struggle with the confusion of trying to learn the rules of a classroom culture that do not resemble the culture of their homes and communities (Delpit, 1996; Howard, 2010). The confusion these students feel, or cultural dissonance (Delpit, 1996), is unsettling because African American students comprise a large percentage of mathematics classrooms at the middle school level. Teachers need strategies in mathematics that validate the culture of African American students, so the cultural dissonance felt by these students is eliminated. Although it is rare to study the success stories of African American students (Ridgeway & McGee, 2018), it is important to understand the process that successful math teachers embody to become culturally responsive in their classrooms. Describing the teaching of successful math teachers who are culturally responsive will provide their first-hand accounts of experiences as they successfully teach African American students.

Purpose of the Study

The purpose of this interpretive qualitative study is to understand middle school teachers' perceptions of the role of culturally responsive teaching strategies in teaching mathematics to African American middle school students.

Significance of the Study

There has been very little work done that focuses on math and racial identity (Ridgeway and McGee, 2018). More work needs to be done to understand successful teachers of students who have typically underachieved in the classroom (Ladson-Billings, 1995). Scholars (Gay, 2010; Ladson-Billings, 1995) identified culturally responsive teaching as paradigm to be used in classrooms with students of color. Culturally responsive teachers use cultural referents to help their students succeed. These cultural referents are important because when the classroom environment parallels with the home environment students are more successful (Ladson-Billings, 1995). The idea and use of culturally responsive teaching is important because it is in direct opposition to the deficit thinking model, which blames the home life of the student for their failures. This study is significant because it portrays teachers who are embedding the culture of African American students into their classrooms and validating the racial identities of their African American students.

The findings of this study benefited middle school mathematics teachers and institutions of higher education that prepare mathematics educators and may help to address the achievement gap between African American students and Caucasian students nationally (NAEP, 2017). Many scholars focus on deficit-based thinking (Howard, 2010) when discussing the reasons for the achievement gap. Deficit-based thinking places the

blame for the underachievement of African American students on the students, their families, and their communities. Thus, teachers who applied the strategies derived from the results of this study were able to teach math to African American students using strategies that are relevant to the students. Teaching strategies that increase African American students' achievement in math increases the opportunity for more African American students to succeed in math, gain entry to advanced classrooms, and have careers that require math skills.

Conceptual Framework

This study is founded on the ideas of Critical Race Theory and Culturally Responsive Pedagogy. Critical race theory is a framework that is used to explain the inequities in the education system and structural racism. Critical race theory and culturally responsive teaching are used in this study to frame the problems that exist in schools and offer solutions to those problems.

Critical Race Theory

Henfield, Washington and Byrd (2014) defined an achievement gap as a wide margin that separates achievement level. Scholars have made note of the wide margin that separates Caucasian students and other cultural groups, such as African Americans, Hispanics, and Native Americans (Stambauch & Ford, 2015). Caucasian students typically perform higher academically than students of color (Henfield, Washington, & Byrd, 2014). Stambauch and Ford (2015) suggested that unequal opportunities create achievement gaps. Therefore, rather than having an achievement gap, we have an opportunity gap that hinders academic achievement. One theory that aligns with Stambauch and Ford's (2015) idea of unequal opportunities is the critical race theory.

Critical race theory is a theory used to analyze race and racism from a legal perspective (Gay, 2010). Although critical race theory began in the legal field, it has since spread to a variety of disciplines, such as education. One facet of critical race theory is culturally responsive pedagogy. Culturally responsive pedagogy is critical race theorists' answer to the problems that students of color face in the education setting due to unequal opportunities. Scholars of culturally responsive pedagogy seek ways to validate the race of students of color in the classroom and create equal opportunities by having the teacher use those students' cultural referents in the classroom. Culturally responsive pedagogy is viewed as the antidote to the opportunity gap.

Cultural Wealth Model

Yosso (2005) developed a framework to explain the cultural capital minority students bring to the classroom despite the inequities in the education system. Her framework is called the Community Cultural Wealth Model. Yosso (2005) asserts in her Community Cultural Wealth Model there are six types of capital that are fostered in minority students' communities and together form cultural wealth than can often go unnoticed if an educator is not using a culturally responsive teaching lens.

Aspirational Capital. Aspirational capital is defined as the resiliency students develop despite structural and institutional barriers (Yosso, 2005). Students with aspirational capital set goals and work hard to achieve them even though there may be hurdles.

Linguistic Capital. Yosso defines linguistic capital as, "the intellectual and social skills attained through communication experiences in more than one language and/or style" (2005, p. 78). Linguistic capital also includes communication across a variety of

areas, such as art, music and performance arts. Students with linguistic capital are also skilled in storytelling. According to Yosso, students of color skills in storytelling makes them exceptionally skilled at "memorization, attention to detail, dramatic pauses, comedic timing, facial affect, vocal time, volume, rhythm and rhyme" (p. 79).

Familial Capital. Familial capital refers to the development of community relationships. These relationships are often formed by shared experiences. Students with familial capital can work collaboratively with others.

Social Capital. Social capital involves being members of social networks.

Navigational Capital. Yosso (2005) describes navigational capital as a student's ability to main high achievement despite racial discrimination. Students can perform in hostile and unsupportive environments.

Resistance Capital. Yosso (2005) explains that this type of capital is achieved by having a history of fighting for social justice in their communities and families. Students are well equipped to solve challenging problems because they have resistance capital.

Culturally Responsive Pedagogy

This study requires a theoretical framework that acknowledges that cultural conflicts exist in the classroom. Culturally responsive pedagogy acknowledges the culture in classrooms does not always match the racially diverse populations of students (Howard, 2010). Ladson-Billings (2009), a key contributor to the work in culturally responsive pedagogy (CRP), described CRP as a theoretical framework that discussed the achievement of students and allowed students to reflect on their cultural identity in positive ways while critical thinking about ways to address the inequality that exists in schools and other institutions.

Therefore, the interactions in the study were analyzed using elements of CRP, as designed by Gay (2010). Culturally responsive pedagogy was used to theorize about the teacher characteristics that made each teacher successful teaching math to African American students. This theory is appropriate as of frame of reference when answering the research questions in this study because culturally responsive pedagogy provides specific teacher traits, behaviors, and classroom interactions that make teachers successful teaching African American students. Culturally responsive pedagogy was used to determine if the teachers' knowledge and integration of the cultures of African American students in the classroom helped them to become successful math teachers of African American students.

Gay (2010) notes that CRP is a response to the concerns about the racial inequality that is prevalent in the education system. She defines culturally responsive teaching as "using the cultural knowledge, prior experiences, frames of reference, and performance styles of ethnically diverse students to make learning encounters more relevant to and effective for them" (p. 31). Gay (2010) provides 18 pillars that teachers need to use consistently to be culturally responsive; however, she notes that using some of them is better than not using any of them. These 18 pillars can be used as a frame of reference for answering research questions one and two because the 18 pillars are detailed examples of what the teacher should do in the classroom and how the classroom environment should look. These components of culturally responsive pedagogy were used to explain the interaction between what the teachers are doing in the classroom and the math achievement of their African American students.

Ladson-Billings (2009) found that teachers experience success with African American students when they take part in their students' community and learn how to interact with their students in a way that is familiar to the interactions in their communities. Therefore, an understanding of their students' communities and family life is an important part of successfully teaching African American students. Culturally responsive pedagogy can be used to explain the answer to the research questions that are guiding this study.

Culturally Responsive Mathematics Teaching

Culturally responsive pedagogy, unlike the deficit-thinking model (Howard, 2010) focuses on what educators need to do to change the classroom culture dynamic and create opportunities for success for all students (Gay, 2010). Bonner and Adam's (2012) extended the work of Gay (2010) and Ladson Billings (2009) by focusing on culturally responsive teaching in the mathematics classroom. Culturally responsive mathematics teaching (CRMT) focuses on characteristics of mathematics instruction that lead to success in the mathematics classroom for students of color (Bonner & Adams, 2012). There are four cornerstones in CRMT: knowledge, communication, relationships/trust, and constant reflection and revision (Bonner & Adams, 2012). Culturally responsive mathematics teachers are knowledgeable in their content area but are also knowledgeable about their students' lives and the communities where their students live. Teachers that utilize CRMT use communication techniques that allow them to connect with their students. They understand and use the language of their students. In addition to knowledge and communication, they develop relationships and trust with their students by setting high expectations while expressing to their students that they care about them.

Lastly, culturally responsive mathematics teachers constantly reflect on the needs of their students and make revisions in the areas of knowledge, communication, and relationships and trust when necessary. Culturally responsive mathematics teaching is another layer in culturally responsive teaching and provides a framework for successfully teaching students of color.

The research questions in this study focus on the mathematics instruction of middle school teachers to discover culturally responsive mathematics teaching strategies and describe how African American students experience success. The focus of these questions requires a theoretical framework that puts student success, racial identity, and cultural congruency at the forefront. Culturally responsive pedagogy combined with culturally responsive mathematics teaching and Yosso's Community Cultural Wealth Model are the most appropriate theories to use in this study.

Table 1

18 Pillars of Culturally Responsive Teaching (Gay, 2010)

Components of Culturally Responsive Pedagogy
1. Is integral to all classes and all skills taught
2. Enhances learning for all, not some, students
3. Happens systematically, continuously, and purposefully, not just sometimes
4. Cultivates success for all aspects of a person without negatively affecting cultural identity
5. Integrates context, culture, and lived-experience of students of color into curriculum
6. Creates a classroom culture of academic success, collaboration, reciprocity, community
7. Reflects students' differing perspectives and cultures in all inter-related areas of curriculum, school and classroom climate, instruction, and communication styles.
8. Uses both general group and particular individual student cultural patterns
9. Provides accurate information about contributions of members of ethnic groups, discussion of moral or ethical issues, power and privilege or distribution and deconstruction of academic racism and hegemony
10. Teaches students of color informal, unstated, implicit rules or behaviors needed to succeed
11. Uses multiple assessments like cultural preferences, participation, communication styles
12. Empowers students with tools for continuous self-assessment

13. Demands with genuine caring and appropriate amounts of assistance that students achieve high levels of academic success
14. Scaffolds learning between school culture and content and students' funds of knowledge
15. Help students imagine a different life, create goals, and pursue a path to their dreams
16. Develop intolerance for oppression and moral courage to address injustice and promote justice
17. Requires professional development to improve cultural knowledge, teaching skills, reflection, and self-monitoring of classroom situations for students of color
18. Uses school or teacher resources of time, funds & imagination for student success

Research Design

An interpretive qualitative research design was used for this study using semi-structured interviews with middle school mathematics teachers. Qualitative research is used to help researchers make meaning of what is happening (Merriam, 2009).

Research Questions

To fill an identified gap in the literature, portray the experiences of middle school math teachers with their African American students, and offer recommendations for culturally responsive teaching strategies in mathematics, the following research questions frames this qualitative research study:

RSCH Q 1 - How do middle school mathematics teachers describe the elements of their teaching they perceive as directly related to success with African American students?

RSCH Q 2 - What experiences contributed to middle school math teachers' understanding and use of the pedagogical strategies that have contributed to their success?

Definition of Terms

To provide understanding of the terms used throughout this dissertation, the following key terms and definitions are provided as defined by the researcher.

Critical Race Theory. Critical race theory "asserts that race and racism are historically and socially constructed and have been normalized within our society" (Ladson-Billings & Donner, 2005).

Cultural Congruence. Cultural congruence is the understanding and use of a variety of teaching and learning strategies in the classroom (DeCapua and Marshall, 2015).

Cultural Dissonance. An occurrence that happens when a teacher's beliefs do not align with the student and their family's beliefs and behaviors (LaRocque, 2013).

Culturally Responsive Teaching. Instructional practices that take into consideration the cultural and linguistic backgrounds of the students (Gay, 2010).

Cultural Synchronization. Irvine (1990) notes that when the culture of the school and culture of the students do not align, there is a lack of cultural synchronization. Therefore, when the cultures of the school and students are in alignment there is cultural synchronization.

Deficit Thinking. The idea that students of color and students from socioeconomic status fail in school because of their own deficits or the deficits of their families (Delpit, 2006).

Limitations of the Study

This interpretative qualitative study depended on self-reported data from the participants who gave interviews. Self-reported data has several limitations revolving around the behavior of the participants. First, the answers given by the participants cannot always be verified. Therefore, the researcher must take the word of the participant.

In this study, the participants were interviewed. Their responses will not be verified with another source. Second, there are several sources of bias that are limitations.

Selective Memory. The participants may recall experiences that may or may not have happened. They may also choose to leave out certain experiences.

Telescoping. The participants may recall experiences and attribute them to occurring at a particular time when the experiences occurred at a different time.

Attribution. The participants may attribute positive experiences to themselves and attribute negative experiences or outcomes to external forces, such as parental involvement or lack of resources.

Exaggeration. The participants may embellish or exaggerate the outcomes of the events in their classroom as being more important than what is suggested in the data.

Because of the limitations involved in this qualitative study, the results are not generalizable to the larger population. However, the use of rich description regarding all aspects of this study will enable readers to determine the relevance of these findings for their population.

Summary

African American students in middle school mathematics classes have consistently underperformed. This is evident by the achievement gap in mathematics that has persisted for years. Scholars surmise the achievement gap is due to an unfamiliarity with the culture of African American students. Teachers of African American students may not share the same racial or cultural background of their students and struggle to design lessons that meet the learning styles of their students. Their struggle is compounded by a lack of training in culturally responsive teaching during college

coursework. This is problematic because scholars suggest that African American students have been consistently denied access to rigorous coursework in mathematics. When teachers fail to meet the needs of African American students and then deny them access to rigorous coursework due to their math deficits students leave school unable to compete for admission to top colleges and go into the workforce unprepared to compete for higher paying jobs.

Critical race theory provides a description of why African American students struggle in the school setting. Culturally responsive teaching is one solution to the problems experienced by African American students in the school setting. Proponents of critical race theory suggest racism has become normalized in our society and thus part of our day-to-day living. Scholars say culturally responsive teaching is the way to fix racial issues in the classroom. When teachers use culturally responsive teaching, they are bringing aspects of their students' lives into the classroom and creating an atmosphere that is accepting of all backgrounds. Therefore, it is important to investigate teachers who are embedding the culture of their students into the classroom and validating their African American students' racial identities.

Chapter II

REVIEW OF LITERATURE

The purpose of this literature review was to provide an overview of culturally responsive teaching, the achievement gap in mathematics classrooms, and successful teaching of African American students in mathematics classrooms. There is an achievement gap that separates culturally diverse students from Caucasian students academically (Howard, 2010). Researchers have documented the achievement gap and show that one group of culturally diverse students that has been shown to be underachieving in reading, math, science, and social studies are African American students. (Howard, 2010; Ladson-Billings, 2009). Some of the past erroneous explanations for this achievement gap are that African American students are less capable due to genetics, cultural deprivation, low cognition and poor motivation (Howard, 2010). In *The Bell Curve* (1994) psychologist Richard Hernstein and political scientist Charles Murry asserted that the reason for the achievement gap was because African Americans were genetically less capable than Caucasians. Their theory was widely believed by many and was further perpetuated by the IQ test, which African Americans scored lower on than their Caucasians peers (Nisbett, 2011). The culturally deprived child was viewed as one who had meager means and suffered due to poverty (Persell, 1981). However, race and culture have been found to play a significant role in the achievement gap that exists between students of color and their Caucasian counterparts.

Eighty-seven percent of teachers in K-12 public schools in the United States are Caucasian in the K-12 school setting, and one out of three students are of an ethnic background (Griner & Stewart, 2013). Universities and teacher preparation schools are not adequately preparing teachers to teach culturally diverse students (Delpit, 2006; Ladson-Billings, 2009), given the racial diversity that exists in schools today. These factors do not help in the quest for cultural synchronization, the alignment of students' home culture and school culture, in classrooms (Ladson-Billings, 2009). Culturally synchronized classrooms do not require teachers to be the same race as their students; however, teachers that understand the culture of their students have more success (Mattai, Wagle, & Williams, 2010). In culturally synchronized classrooms the teacher combines traditional forms of discipline with culturally based strategies, such as, facial expressions, voice intonation, and pattens of speech to provide the behavioral expectation in the classroom (Monroe & Obidah, 2004). However, most teachers do not have experiences with any culture other than their own. Therefore, beliefs about how students should learn and behave at school are constructed from their own cultural background and personal experiences (Delpit, 2006).

Researchers have stated the solution to the achievement gap is culturally responsive teaching (Delpit, 2006; Gay, 2002; Grier & Stewart, 2013; Howard, 2010; Ladson-Billings, 2009). Ladson-Billings (1990) said when the school environment is like the home environment, African American students experience more success at school. The purpose of this literature review was to provide an overview of culturally responsive teaching and address the act of bringing students' culture in the classroom as stated in Delpit's (2006) definition of culturally responsive teaching. This literature review is set

up in the following order. First, *Teacher Self-Efficacy and Perceptions of Culturally Responsive Teaching* will be discussed. Researchers found that some teachers do not believe that CRT is a pedagogy they can use effectively, while others do not believe it is necessary for students to be successful (Ebersole, Kanahele-Mossman, & Kawakami, 2016; Tuncel, 2016). *The Role of Culturally Responsive Instruction* will be an opportunity to discuss how teachers implement culturally responsive teaching in content areas. Ukpododu (2011) explained that teachers find reading and social studies to be easier subjects to implement culturally responsive teaching strategies than math and science. Others agree teachers do not feel comfortable using culturally responsive teaching in math and science classes (Siwatu, 2011*). Preservice Training and Professional Development of Culturally Responsive Teaching* is a chance to examine how preservice training and professional development affect teachers' willingness to engage in CRT. Teachers are more willing engage in CRT and view it as a necessary part of teaching when trained (Debman et al., 2015; McKoy et al., 2017; Siwatu, 2011). *Culturally Responsive Teaching in Urban Settings* is a discussion concerning teachers' beliefs about teaching in urban schools. Thomas-Alexander and Harper (2017) mentioned that teachers have a negative view of teaching in urban schools and resist using culturally responsive strategies. *Culturally Responsive Teaching and African American Teachers* is a topic that details the attitudes and attributes of African American teachers who are culturally responsive. Many African American teachers bring unique skills to the classroom and are effective teachers of African American students because of these skills (Zhang-Wu, 2017). However, not all African American teachers can relate to the culture of their students and must be willing to learn about their students and their community

(Coffey & Farinde-Wu, 2016). Lastly, *Culturally Responsive Teaching and Mathematics* will examine how African American students have traditionally performed in mathematics and describe what successful students and teachers look like in a mathematics classroom.

Culturally Responsive Teaching

Ladson-Billings (1994) pioneered work in culturally responsive teaching and brought attention to the term culturally relevant when she studied eight successful teachers of African American students. Through her work, she found that students performed higher when their teacher was culturally responsive to their needs and did not expect them to assimilate into the mainstream culture of the school or classroom. Ladson-Billings (1994) found that successful teachers of African American students made connections between the students' culture and the curriculum.

Culturally responsive pedagogy is an avenue for teachers to bring their students history, music, art, and way of life to the classroom (Gay, 2002). Ladson-Billings (2009) said culturally responsive teaching uses references from the students' culture to teach them in a manner that does not make them feel marginalized. Culturally responsive teaching is a way for teachers to recognize the achievements of their students and validate their experiences. Culturally responsive teaching focuses on the achievements of students of color.

Schools all over the country are more diverse than in the past (Howard, 2010). It is crucial that educators seek best practices for educating students from diverse backgrounds (Gay, 2002). Educators who choose to modify their classroom environment to meet the needs of culturally diverse students will be ready for the changing

demographics in classrooms today (Howard, 2010). Teachers that bring the students' cultural background into the classroom can effectively increase student achievement and motivation (Gay, 2002). The practice of acknowledging students' cultural background and using their experiences to teach is known as culturally responsive teaching (Gay, 2002).

Teacher Self-Efficacy and Perceptions of Culturally Responsive Teaching

Ebersole et al. (2016) revealed that teachers believe culturally responsive teaching (CRT) is completing a set of activities; however, this view changes by providing teachers with the opportunity to reflect on their cultural values. This reveals the importance of providing teachers with professional development that helps them move towards cultural responsiveness. Richards (2011) and Tuncel (2016) also shared concerns about teachers' perceptions of culturally responsive teaching and suggested teachers examine their own cultural identity before attempting to relate to their students. It is important to understand teacher self-efficacy and perceptions of CRT so that we understand the choices teachers make about culturally responsive teaching in their classrooms (Ebersole et al., 2016). Teachers can begin to understand their self-efficacy and perceptions about CRT once they have evaluated their cultural values (Ebersole et al., 2016; Richards, 2011). Teachers who see the value in their own cultural identity will embrace CRT as seen in the Ebersole et al. (2016) research study.

Ebersole et al. (2016) studied 18 teachers' understandings and perspectives on CRT in an action research study. Data collection was completed through post-course questionnaires, a focus group interview, and follow up questionnaires. Three themes were identified: (a) CRT is completing a prescribed set of activities; (b) self-reflecting about

one's own cultural values will motivate teachers to integrate more culturally responsive activities into their lesson plans; (c) having a culturally responsive perspective allows teachers to teach in a more culturally responsive way, rather than only completing activities. The results of the study revealed that when teachers think about what is important to them culturally, it helps them to realize the value of the cultural identity of others. Ebersole et al. (2016) concluded that teachers with a culturally responsive perspective and high self-efficacy did not need activities or extra resources. They understood culturally responsive teaching (CRT) to be integrating and respecting the culture of all the students in the classroom. Tuncel (2016) also suggested that this is true when he explained that when teachers understand their own culture, they see the differences in the cultures of others. In his qualitative, action research study focusing on 40 prospective social studies teachers and their awareness of cultural responsiveness, he found that with training, prospective teachers learned that the language of culturally diverse students is important and influences student outcomes in the classroom.

Pre-Service and Professional Development of Culturally Responsive Teaching

It is important for experienced educators in all academic disciplines to continue their training in CRT (Siwatu, 2011).

McKoy et al. (2017) point out that teachers feel more comfortable with culturally responsive teaching, are aware of culturally responsive teaching strategies, and are willing to use them after they receive professional development. Teachers with no training in culturally responsive teaching may have low self-efficacy beliefs about culturally responsive teaching (Debman et al., 2015; Siwatu, 2011).

McKoy et al. (2017) found that 18 music teachers benefited from in-service training that included five days of training on culturally responsive teaching, assessment strategies, and mentorship. Data was collected using a pretest/posttest survey instrument. Each participant took a pretest survey, was trained, and then, took a posttest survey. The results of the posttest showed that participants felt more comfortable with culturally responsive teaching, were more aware of culturally responsive teaching strategies, and were willing to use them. However, participants continued to express concerns about implementing culturally responsive teaching in the correct way. The concerns were due to not knowing the cultural backgrounds of the students and worrying about having to take more time to plan lessons. However, posttest results showed that participants still saw the value in culturally responsive teaching despite their concerns. The in-service changed the way the participants viewed culturally responsive teaching. However, it is important to note that the self-efficacy of the teachers in this study was low. The participants showed low self-efficacy beliefs about correctly implementing culturally responsive teaching. We should ask the question: Do teachers demonstrate low self-efficacy beliefs due to a lack of experience with culturally responsive teaching, or do teachers demonstrate low self-efficacy beliefs due to unfamiliarity with cultures that are different from their own?

Low self-efficacy affects teachers' attitudes towards CRT (Siwatu, 2011). Providing teachers with knowledge about culturally responsive teaching may be secondary to increasing their self-efficacy beliefs about their ability to incorporate culturally responsive teaching in their classrooms (Siwatu, 2011). For example, in the McKoy et al. (2017) study, the teachers received training and knowledge about CRT.

However, they did not believe they could implement it the correct way in their classrooms.

Siwatu (2011) conducted a mixed methods study with 192 teacher candidates to determine if self-efficacy beliefs influenced their ability to use CRT. During the first phase, researchers administered a Likert type questionnaire containing 40 items on a 100-point scale. The scale was called the *Culturally Responsive Teaching Self-Efficacy Scale.* Students rated their confidence level with engaging in culturally responsive teaching pedagogy. Siwatu (2011) found that teachers were more comfortable with general teaching tasks, such as using a variety of teaching methods and creating a warm atmosphere. However, culturally responsive teaching tasks, such as praising English Language Learners for speaking in their native language, rated in the lower quartile. During the second phase, students were asked to participate in a face-to-face interview, and 93 students agreed to participate. Teachers noted in their face-to-face interviews that much of their training on culturally responsive teaching was limited to class discussions. However, these teachers indicated they had no procedural knowledge and did not know how to implement culturally responsive teaching once they were in the classroom. The teachers in the McKoy et al. (2017) study had no procedural knowledge either, which may have contributed to their low self-efficacy beliefs.

Students who had high self-efficacy beliefs noted they had the opportunity to observe their cooperating teachers practice CRT (Siwatu, 2011). They gained confidence and were able to implement culturally responsive practices once there was a model. Having a cooperating teacher model culturally responsive teaching increased their self-efficacy beliefs about culturally responsive teaching. Other studies discussed this notion

(McKoy et al., 2017; Tuncel, 2016). Also, students with high self-efficacy beliefs indicated they had opportunities to practice culturally responsive teaching (Siwatu, 2011).

Debman et al. (2015) agreed that having the opportunity to practice increases self-efficacy when she conducted a quantitative study with 142 elementary school teachers and found that teachers had higher self-efficacy when exposed to culturally responsive teaching strategies. The study consisted of two parts. First, the teachers completed self-report surveys about culturally responsive teaching. Second, observations were conducted using *The Assessing Schools Settings: Interactions of Students and Teachers (ASSIST)*. She found there was a positive correlation between teacher observation and self-reported culturally responsive teaching. The results of the *ASSIST* indicated that as class size increased so did culturally responsive teaching behaviors; however, math classrooms scored lower on the *ASSIST*, and social studies classrooms scored higher.

The Role of Culturally Responsive Instruction

Ukpodadu (2011) noted that a lack of models to follow hinders teachers from engaging in culturally responsive teaching. Other researchers have also explained that a lack of teaching models decreases the likelihood that teachers will use culturally responsive strategies (McKoy et al., 2017; Siwatu, 2011). Culturally responsive teaching is more likely to be seen in reading and social studies due to being able to incorporate multicultural literature (Bui & Fagan, 2013). Therefore, there is an urgent need to study teachers who are using culturally responsive teaching in their classrooms, particularly during math and science (Siwatu, 2011).

In Ukpododu's (2011) qualitative study, he examined why teachers are not using culturally responsive teaching strategies in mathematics. Forty-five preservice and in-

service teachers enrolled in the researcher's graduate course participated in the study. Data were collected at the beginning of the course and toward the end of the course. Students were given a prompt at the beginning of the semester that asked why teachers did not use culturally responsive teaching strategies in math. During the tenth week of school and after students participated in discourse, conversations, and readings about culturally responsive teaching, teachers were asked what they thought culturally responsive teaching practices looked like in the mathematics classroom. This study, concerned with culturally responsive teaching in mathematics, found that teachers thought math was neutral and could be taught using a textbook. The participants also noted that teachers believed high stakes testing took precedence.

Bui and Fagan (2013) used a quasi-experimental nonequivalent group, pretest-posttest design and found that embracing multiculturalism increased the academic performance of 49 fifth graders from two classrooms at an urban elementary school. The researchers used two strategies: The Integrated Reading Comprehension Strategy (IRCS) intervention, which used comprehension strategies through a culturally responsive framework and the IRCS Plus intervention, which added multicultural literature to the IRCS strategies. Two fifth grade teachers divided their classes in half to create two equal groups of students. There two halves from each class were randomly combined. One group became the IRCS group, and the other group became the IRCS Plus group. There were five, 80-minute sessions conducted with each group. The sessions followed a scripted protocol. There were five lessons: (a) making a personal connection, (b) story grammar elements, (c) overcoming fears, (d) prediction strategy, and (e) find and tab strategy. Bui and Fagan (2013) found that the IRCS and the IRCS Plus group made

statistically significant gains. There was not a statistically significant difference between the IRCS group and the IRCS Plus group. Embracing students' cultural differences enhance instruction by increasing student engagement and motivating students to advance themselves academically (Bui & Fagan, 2013).

Culturally Responsive Teaching in Urban Settings

Teachers in urban classroom settings have many challenges that affect their willingness to use culturally responsive teaching (Thomas-Alexander & Harper, 2017). Many students in urban settings live in poverty, and teachers equate their students' socioeconomic status to their low academic achievement (Thomas-Alexander & Harper, 2017). It is important for teacher candidates to spend time working in diverse settings to minimize the negative attitudes about working in urban settings or with culturally diverse students (Endo, 2015). It is important for teachers in urban classroom settings to combine culturally responsive teaching and high expectations when teaching students in urban classroom settings (Garcia & Chun, 2016).

Garcia and Chun (2016) measured students' perceptions of teacher expectations and culturally responsive teaching to determine if teacher expectations and culturally responsive teaching had a positive influence on Latino students' academic self-efficacy and academic performance. Students from three middle schools close to the U.S.-Mexico border participated in the study. About 20% of the students invited to participate returned parent consent forms. Middle school students attending summer camps were also invited to participate. About 40% of the students attending the two summer camps participated in the study. There was a total of 110 participants (55% female, 45% male). The racial makeup of the participants was Latino ($N = 92$), Asian ($N = 9$), Black ($N = 6$), and Native

American ($N = 5$). The school district reported approximately 66.6% of the teachers as being White and 28.9% as being Latino. Student perception of teacher expectations was measured using a subscale of the Expectations for Student Achievement (ESA)-Related Teacher Practices Scale, which was made up of six items. Student perception of culturally responsive teaching was assessed using two subscales from Student Measure of Culturally Responsive Teaching scale (SMCRT). Garcia and Chun (2016) found that students' academic self-efficacy increased due to culturally responsive teaching and high teacher expectations through rating scales and self-reports of report card grades. Thus, teachers will need to possess certain traits, such as high expectations of all students if they are going to impact culturally diverse students (Ladson-Billings, 2009).

Thomas-Alexander and Harper (2017) also used the *Culturally Responsive Teaching Self-Efficacy Scale* developed by Siwatu (2011) to obtain quantitative data. The data was from 252 mentor teachers from various classrooms in the metropolitan Ohio district and was used to determine if teachers had positive or negative beliefs about urban schools. It was also used to determine how confident these teachers were with working in urban classrooms. Thomas-Alexander and Harper (2017) queried the teachers to get feedback about their beliefs as they related to working in urban schools. Most of the beliefs about urban classrooms were negative. Nineteen of the participants made positive comments, whereas 124 participants made negative comments. One hundred and nine comments were neutral. Two themes emerged as the reasons for the negative comments: (a) a lack of resources and (b) diversity among the students. The quantitative data from the *Culturally Responsive Teaching Self-Efficacy Scale* showed that the teacher's negative

view of urban schools significantly impacted their ability to implement culturally responsive teaching strategies.

Endo (2015) conducted a service-learning experience with 17 of her students who were teacher candidates. The study took place in an urban elementary school where over 80% of the students qualified for free and reduced meals. The experience took 16 weeks to complete and an additional 16 weeks of follow up. The researcher conducted interviews and focus groups with the 19 teacher candidates. Endo (2015) found that 70.5% of the students believed that culturally responsive teaching was necessary. However, 41.18% of the students believed that teachers should be colorblind. Therefore, they did not believe that culturally responsive teaching was necessary. The notion of colorblindness disregards the importance of the students' cultural background and deprives students of the opportunity to have their culture represented in the academic setting (Delpit, 2006). Bui and Fagan (2013) noted that culturally diverse students come to school with various backgrounds that do not always match the culture of the school, so cultural dissonance between themselves and their teachers is likely to occur. Therefore, if teachers prescribe to the idea of colorblindness, they are decreasing culturally diverse students' chances of being successful at school.

Culturally Responsive Teaching and African American Teachers

Researchers have noted that African American teachers possess attributes that are effective when instructing African American students (Coffey & Farinde-Wu, 2016; Idris, 2019; Zhang-Wu, 2015). Many African American teachers do not have the same cultural background as their students and face difficulty when instructing African American students (Coffey & Farinde-Wu, 2016). These teachers must learn the culture

of their students (Coffey & Wu, 2016). Zhang-Wu's (2015) case study with the only African American teacher in a fourth-grade classroom showed that culturally responsive African American teachers consider the backgrounds of their students, become a resource for their students, give students the chance to use their voices at a school, and seek support from the community. These findings are in line with the findings of Ladson-Billings case study where she identified the culturally responsive traits of successful teachers of African American students (2009). Coffey and Farinde-Wu (2016) also examined the teaching behaviors of an African American teacher using an exploratory case study design and found that she was able to use the students' culture to teach effectively. The researchers wanted to know if membership in the same cultural group as one's students influenced the teacher's experiences in the classroom. The first author observed the teacher in her classroom for 90 minutes, one to two times per week. The observations increased to four to five times per week when the teacher found out she was pregnant. The researchers collected data through observation notes, lesson plans, emails, and interviews. Coffey and Farinde-Wu (2016) found that the teacher designed culturally relevant curriculum for her students, developed relationships with families, and built relationships with her students by sharing her own experiences. Idris (2019) found similar results when he studied nine English language teachers from six different secondary schools and their students. Teachers were trained to use culturally responsive text, and in doing so, teachers began to exhibit culturally responsive teaching behaviors, such as empathy and communication, assertiveness and authority in the classroom, and a caring attitude towards their students. When teachers bring students' culture into the classroom,

they are more responsive to their students' needs (Coffey & Farinde-Wu, 2016; Idris, 2019).

Lopez (2011) found similar results in her case study with minority, high school students. The purpose of the study was to make a connection between culturally responsive pedagogy and critical literacy. This qualitative, action research study took place in a sub-urban secondary school. Data collection took place through journals, class observations and dialogue. The teacher was able to integrate culturally responsive teaching into her classroom by allowing students to write new forms of poetry and use performance poetry. The poems related to the lives of students living in urban areas. Students experienced success because the teacher brought the students' culture into the classroom.

Culturally Responsive Teaching and Mathematics Instruction

Culturally Responsive Math Teachers

Abdulrahim and Orosco (2020) conducted a synthesis to show what culturally responsive teaching looks like in mathematics classroom. Using an online database, ancestral searching, and Google Scholar search, researchers searched for articles between 1993 and 2018 and eventually used 35 of the articles. Researchers looked at articles that contained research conducted in the United States with practicing teachers. Also, the theoretical frames contained either culturally responsive teaching or culturally responsive pedagogy. Abdulrahim and Orosco (2020) only included research studies, and ensured that each study chosen contained methods, including the "setting, participants, data sources, and data collection procedures" (p. 5).

Coding involved both deductive and inductive analysis. Seven themes were developed (a) cultural identity, (b) instructional engagement, (c) high expectations, (d) student critical thinking, (e) educator reflection, (f) social justice, and (g) collaboration. Cultural identity was identified as important in mathematics instruction. Connecting students' cultural backgrounds to mathematics instruction allows them to see themselves as capable mathematicians. Instructional engagement is also important during mathematics instruction. When teachers can connect instruction to the social, emotional and cognitive needs of their students, there will be increased instructional engagement and higher mathematics achievement. Abudulrahim and Orosco (2020) also noted that culturally responsive math teachers set high expectations. Creating cultural identity and increasing instructional engagement, while setting high expectations, helps students increase academic success because they have teachers that support them. Culturally responsive math teachers also teach critical thinking skills. Students need critical thinking skills to solve complex problems and become problem solvers. Culturally responsive math teachers also reflect on their teaching practices. They reflect on their own belief systems about race and culture. Abudulrahim and Orosco (2020) found through their synthesis that when teachers reflect on their belief systems about race and culture, they can intentionally connect the culture of their students to mathematics instruction. Culturally responsive mathematics teachers also recognize the classroom; however, their families are also part of the classroom.

Bonner (2021) discussed the cornerstones of culturally responsive mathematics classrooms and the effects of such classrooms on students of color. She notes four cornerstones in a culturally responsive mathematics classroom: knowledge,

communication, relationships and trust, and reflection and revision. Teachers in a culturally responsive mathematics classroom possess content knowledge; however, they also have knowledge of the culture of their students and the communities in which their students live. Culturally responsive mathematics teachers understand that their knowledge will evolve as their students evolve. Communication is vital in a culturally responsive mathematics classroom. Bonner (2021) notes that teachers are tasked with finding ways to communicate abstract content to students of color. Many culturally responsive mathematics teachers use choral response and chants. At times, the communication style of a culturally responsive teacher can appear harsh due to the level of high expectations placed on the students. Lastly, culturally responsive mathematics teachers develop relationships and trust with their students and their families. Culturally responsive mathematics teachers understand that they must constantly reflect on their practices and revise as the needs of their students change. They contact families often and form bonds that impact students in a positive way. In the mathematics classroom, teachers can use the four tenants of knowledge, communication, relationships and trust, and reflection and revision to create cultural congruity in the classroom (Bonner, 2021).

Mathematics Instruction of African American Students

Mathematics teachers play a vital role in how students view their mathematical ability (Frank, 2018). Students of color and students from low socioeconomic backgrounds (SES) have traditionally experienced substandard mathematics instruction (Battey, 2013). Missed opportunities to engage in quality mathematics instruction results in students not acquiring higher order thinking skills required to think deeply about mathematics concepts. All students need access to quality mathematics instruction

because mathematics is what Martin (2009) calls "the gatekeeper" to higher level mathematics classes, entry into college, and higher paying jobs.

Underperformance of African American Students in Mathematics

African American students have consistently underperformed in mathematics in comparison to Caucasian and Hispanic students (NAEP, 2017). Scholars (Brand, Glasson, & Green, 2006) believe that the underachievement of African Americans may be due to the "hidden curriculum" (p. 229). Brand, Glasson and Green (2006) note the hidden curriculum consists of sociocultural factors about rules in society, social class, and the roles that people play in society. The hidden curriculum is a precursor to feelings of inferiority because it lowers African American students' self-esteem by perpetuating negative stereotypes and causes cultural conflict between the teacher and the African American students (Brand, Glasson, & Green, 2006). Therefore, African American students find themselves in conflict with the perception about what they can do in the mathematics classroom, and what they want to do the mathematics classroom. Negative stereotypes in the hidden curriculum teach African American students that math is a subject for smart students and discourage African Americans and other minorities to pursue careers that involve mathematics (Brand, Glasson, & Green, 2006). As a result, African American students have experienced low expectations from their teachers in the mathematics classroom. Berry (2005) discussed how African American boys are viewed as less capable in the mathematics classroom, even after they demonstrate an ability to perform. African American students who perceive that their teacher does not believe in them may become guarded in the classroom (Brand, Glasson, & Green, 2006).

Characteristics of Successful African American Males

Although little evidence has been provided to highlight successful African American boys, Thompson and Lewis (2005) noted nine factors that contribute to their success. Thompson and Lewis (2005) note that prior exposure to a meaningful and challenging curriculum, positive relationships with teachers, instructional practices based on the curricular standards, positive interactions academically and socially, having counter-stories of negative images of African American males, high self-esteem, adult advocates, positive influences, and a fulfillment of life experiences contribute to success in mathematics.

Berry (2005) found that successful African American males in his study possessed similar traits as the African American males in the Thompson and Lewis (2005) study. Berry (2005) interviewed three teachers of successful African American male middle school students, their parents, and the students' teachers. Five themes were identified: (a) early experiences, (b) aggregated individual racism, (c) support systems, (d) drawing upon school/community resources, and self-empowerment. The parents in this study provided their sons with early educational experiences, such as flashcards, educational toys, workbooks. The students went to school already possessing skills that other students had yet to learn. The parents also chose day cares that emphasized education. In addition to providing early educational experiences, the parents were also advocating for their children. Two of the students, Phillip and Bilal, were denied access to the Academically Gifted program (AG) because their teachers believed they were hyperactive and immature, respectively. Their behavior was used to assess their intellect (Berry, 2005). However, Phillip's teacher the following year, an African American,

advocated for him to be tested for AG and he qualified. Phillip's teacher was questioned by a family friend, a Caucasian woman, concerning him not being tested. As a result, he was tested and qualified for the AG program.

The families and community members pushed these males to succeed. Failure was not an option. The parents were present in the schools because they did not believe the schools were interested in helping African American males succeed. The parents supported their sons in schools by attending activities, working on committees, and chaperoning events. Community was very important. Each student discussed church involvement as being an important aspect of their lives and received encouragement from members of their churches. Phillip and Bilal participated in a Mathematics/Science Pre-College Program, while Phillip participated in the TIP Program at Blue University. The boys also worked hard in athletics and understood that their parents would not allow them to participate without exceptional grades.

The boys were all self-empowered. They believed that they should succeed and worked hard to accomplish the goal of succeeding in everything they did. They believed in their mathematical abilities. They had teachers and parents that helped them realize their mathematical potential, which helped create self-efficacy in these three students.

Characteristics of Successful African American Female Students

Morton (2014) conducted a study that was a secondary analysis of qualitative and quantitative data from a project titled the Mathematical Identity Development and Learning project (MIDDLE). The MIDDLE project was a three-year longitudinal, cross-sectional design in which diverse middle school students in southeastern United States were studied. The purpose of the MIDDLE project was to learn how reforms in

mathematics affected students' development, to examine students' development in mathematics during middle school and provide a longitudinal analysis and identify the processes that can be used to tell how students' mathematical learning and self-conceptions change over time.

Morton (2014) studied 52 students described as double minority due to their gender and race. The study was a secondary analysis of a subset of data from the MIDDLE project. The students were identified as African American and female. Morton (2014) studied the students mathematical problem-solving skills. Problem solving skills were defined as using one's own background knowledge to make new knowledge and solve problems that do not have a straightforward answer. Problem solving strategies were defined as a set of rules that help learners successfully solve mathematical problems.

Morton (2014) noted that students need to understand proportional reasoning to achieve higher-level mathematical thinking. Proportional reasoning involves recognizing the differences between proportional and non-proportional reasoning situations and knowing multiplicative relationships within and between ratios.

Morton (2014) also examined students conceptual understanding. In this study conceptual understanding was defined as being able to "(a) to apply concepts to new situations; (b) to connect new concepts with existing information; and (c) to use mathematical principles to explain and justify problem solutions" (p. 236).

The students' responses to mathematical tasks were analyzed in three ways. The final responses to sorted as being correct, incorrect or no solution/attempt. Secondly, responses were analyzed to determine what problem-solving strategy was used. Thirdly,

the students' level of understanding was analyzed using their problem-solving strategies and written responses and coded as "no understanding", "understands difference representation of ration", understand the meaning of the ration and proportionality", understand the meaning of the ratio, proportionality, and now to apply and explain their application."

Seven students found the correct answer in the first year. The second year, 10 students found the correct answer. Twelve students found the correct answer in year three. Fifty percent of African American students made no attempt or showed no understanding each year of the project.

Morton (2014) found that teachers could help African American female students by providing more hands-on activities, group work, teacher modeling, note sand homework. Students said they had a better understanding when there was teacher modeling, multiple examples provided, and extra help provided by the teacher.

Successful Math Strategies for Teaching African American Students

Bonner (2014) conducted a study to determine the practices of highly successful teachers and found results like Thompson and Lewis (2005). Bonner (2014), however, focused specifically on the strategies used by successful strategies of students who traditionally did not have high academic achievement in mathematics. Participants in the study included three teachers who were nominated by community members. She found that highly successful teachers were not prevalent in high needs schools. Bonner (2014) extended the work of Ladson-Billings adding mathematics to the research. She examined how these three teachers used culturally responsive teaching strategies in their mathematics classrooms. Bonner (2014) determined that relationships/trust,

communication, knowledge, reflection/revision, and pedagogy/discipline are prevalent themes in the classroom of successful mathematics teachers of African American students. The first teacher in the study had a structured, math centered classroom. She incorporated aspects of the students' culture by using chanting, storytelling, singing, and movement to teach mathematics. The second teacher created a comfortable environment where students were allowed to discuss and reason verbally in their home language. Students also worked in learning centers with manipulatives and interacted with other students. The third teacher allowed her students time to think and work through problems. Students worked in pairs and helped to answer each other's questions. The supportive environment and instructional strategies that related to the students' everyday lives created an academic environment that helped these students and teachers succeed.

Characteristics of Successful Mathematics Teachers

Bonner (2014) studied the practices of successful mathematics teachers. Bonner (2014) sought to find the pedagogical strategies implemented by successful mathematics teachers, the interaction of the pedagogical themes and the ways that successful mathematics set up their classroom environments to create success.

The study took place across three mathematics classrooms of traditionally underserved students using a comparative and interactive approach. Bonner (2014) use a comparative and cross-analysis approach to examine the "language, action and varied realities (of the teachers, students, and researcher)" p. 381. The three participants were chosen using Ladson-Billings' (1994) method of community nominations. Meetings were conducted at school events, in churches and after school programs to discuss successful teaching and who the community thought had the attributes of a successful teacher.

Though most community members noted that successful teachers in their children's schools were rare, inspiring passion within the community was an attribute for teachers who were viewed as successful. A teacher that inspired passion within the community taught math while allowing students to explore and maintain their cultural identity. Bonner (2014) triangulated data from the community with student test scores on the state test and administrative nominations.

Three female teachers were identified and participated in the study. The first teacher, an African American woman, worked in an elementary setting with low-income, African American students. She grew up in the community where she worked and used the arts (repetition, songs, and dance) to instruct her students; however, she maintained a strict classroom. The second teacher, a White woman, taught middle school remedial courses with low-income, students of color. However, the school as whole contained most wealthy White students. She maintained a student-centered classroom with high expectations for all her students. Her classroom was designed to be comfortable and laid back. The third teacher was a mathematics teacher at an all-girls middle school. Her ethnicity was Mexican and Arab. Her students consistently have high scores on the state test, with many increasing in achievement after transferring to the school. She uses her cultural background to connect with her students and help them explore their cultural identity. Her teaching style is structured. She is warm towards her students, yet she sets high expectations.

The data collected consisted of teacher interviews, classroom observations, and artifacts. The researcher noted five categories that emerged from the data:

relationships/trust, communication, knowledge, reflection/revision, and pedagogy/discipline.

Summary

In this literature review, research related to culturally responsive teaching, perceptions and self-efficacy, culturally responsive teaching in content areas, culturally responsive teaching and professional development, culturally responsive teaching in urban settings, African American teachers use of culturally responsive teaching, and successful strategies for teaching math to African American students were examined. Research reviewed demonstrated the positive impact that CRT can have on student achievement. Culturally responsive teaching and the attributes of a culturally responsive teacher needs further study in other areas, such as in the south.

Chapter III

METHODOLOGY

The goal of the study was to describe the teachers' journeys to success in teaching mathematics to African American students; therefore, an interpretive qualitative study was selected (Merriam, 2002). In this chapter a brief description of the interpretive qualitative design will be provided, along with procedures for selecting participants, data collection, analysis, and strategies that were used to ensure trustworthiness. This chapter includes a researcher-interviewer section that discusses the researcher's personal background, bias, and interest in the study.

Research Design

The researcher in this study used an interpretive qualitative design. An interpretive qualitative design is used to "discover and understand a phenomenon, a process, the perspectives and worldviews of the people involved, or a combination of these" (Merriam, 2002, p. 6). This design includes posing open-ended questions that result in reported experiences to answer these research questions. It involves careful, systematic analysis resulting in a descriptive-interpretive understanding of participants' experiences. Information is sorted into clusters of similar experiences generating common themes.

Therefore, an interpretive qualitative design was useful as the researcher sought to understand how middle school mathematics teachers described elements of their teaching that were related to successfully instructing African American students

and to understand experiences that may have contributed to middle school mathematics teachers understanding and use of culturally responsive teaching. This interpretive methodology allowed the perspectives of middle school math teachers to emerge because the design focused on how participants interpreted their experiences and made meaning (Merriam, 2002).

The data collected in this interpretive qualitative study was collected by interviewing participants. Qualitative interviews are conducted in person, by phone, or through focus groups (Creswell, 2014). The purpose of interviewing is "to allow us to enter into the other person's perspective" (Patton, 2015, p. 426). Therefore, interviews were used to collect qualitative data in this study.

Research Questions

The following questions were addressed in this interpretive qualitative study.

RSCH Q 1- How do middle school mathematics teachers describe the elements of their teaching they perceive as directly related to success with African American students?

RSCH Q 2- What experiences contributed to middle school math teachers' understanding and use of the pedagogical strategies that have contributed to their success?

Research Site

This study took place across two different public middle schools in a school system (N = 10,561) located in Southeast Georgia. The Governor's Office of Student

Achievement (2019) reported for the 2018-2019 school year the school system's overall performance was higher than 87% of the school systems in the state of Georgia. Both middle schools serve grades sixth through eighth.

This study was conducted during the COVID-19 pandemic, resulting in reluctance of several school districts to allow access to the researcher. Two schools were selected from one school district that did allow researcher access. Each school consists of White, African American, Hispanic, Asian, and Multi-racial students. School A ($N = 942$) consists of Hispanic ($N = 151$), African American ($N = 219$), White ($N = 528$), and Multi-racial ($N = 40$) students. According to schoolgrade.gov.org, School A's overall academic performance was higher than 82% of the schools in the state. School B ($N = 705$) consists of Hispanic ($N = 97$), African American ($N = 188$), White ($N = 330$), and Multi-racial ($N = 61$). According to schoolgrade.gov.org, School B's overall academic performance is higher than 96% of the schools in the state. Neither school reported having any Asian students on their October 6, 2021 Full-Time Equivalent (FTE) count.

Participants

A purposeful sampling method was used to identify participants for this study. Principals at two middle schools in one district were asked to create a list of teachers who met the criteria of successfully teaching mathematics to African American students based on each teacher's Teacher Keys Effectiveness System (TKES) evaluation. Teachers were considered successful if they scored a level 3 or 4 on the ten performance standards on this evaluation. Additionally, principals were asked to review these evaluations looking for teachers who were effective in creating relationships and teaching African American students.

Participants meeting the criteria were identified with the assistance of the principals at each school. A total of 11 teachers were identified by principals as meeting the criteria. The principal at school A identified six teachers, and the principal at school B identified five teachers.

An email was sent to the 11 teachers identified as meeting the criteria for the study. A total of five teachers responded to the invitation to participate in the study. Therefore, the participants consisted of five middle school mathematics teachers of sixth through eighth grade including one male and four female teachers. There were two participants from school A and three participants from school B. Participants provided perspectives from different grade levels across two different schools and included a range of years of teaching.

The researcher contacted teachers by email and advised them they had been selected for participation in the study (See Appendix A for sample email).

Consent to Initiate Study

Prior to the initiation of the study, full IRB approval was attained by Valdosta State University and by the school district where this study was situated. This study adhered to the guidelines involving human subjects and was compliant with the U.S. Department of Health and Human Services Code of Federal Regulations, 45 CFR § 46.102(2009) (see Appendix B for approvals).

Consent to Participate in Study

Before beginning the interview, each participant was asked to verify they were 18 years or older. The researcher read a consent script and asked if he or she was willing to

participate in the interview. Each participant's participation in the interview was deemed consent to participate (See Appendix C for the consent script).

Interview Procedures

Each of the five participants engaged in an interview lasting between 60 and 90 minutes. The researcher recorded the video and audio during the interviews. Each interview was scheduled after working hours at a time that was convenient for the participants. Two reminders of the scheduled interview were sent to each participant. The first reminder was sent by e-mail a week before the scheduled interview. The second reminder was sent by e-mail two days before the scheduled interview. Each reminder contained the meeting link that participants used to log in for the interview.

An interview protocol guided the semi-structured interviews (See Appendix D for a copy of interview questions). Questions for the protocol were guided by Gay's (2010) discussion of the 19 pillars of culturally responsive teaching.

Researcher-Interviewer

My interest in the role that culture plays in classrooms began when I was a special education teacher from 1998-2007. During that time in my career, I taught an overwhelming number of African American students. Unfortunately, these students did not receive quality educational resources and access to a rigorous mathematics curriculum. Students who have access to a variety of resources and exceptional teachers have more success in the mathematics classroom (Bonner, 2014). Many of the students in my special education classroom were perceived as having severe behavior difficulties. As a result, they were diagnosed as having Attention Deficit Hyperactivity Disorder (ADHD), Emotional Behavior Disorder (EBD), or placed in a self-contained classroom

for students with EBD. I began to talk to my students about their difficulties in the classroom and would often find the students did not fully understand why their actions, mannerisms, and ways of interacting with others were offensive to their teachers. Berry (2005) notes that African American students have behavioral verve. Berry (2005) defines verve as "a kind of intellectual and behavioral vibrancy evidenced by engagement in high energy level activities and affinity for change and stimulation" (pp. 56-57). The African American students in my special education classroom had a desire to talk about their work and stay busy, but their behavioral verve was often misunderstood and portrayed as defiance or hyperactivity. Unfortunately, these offenses negatively affected how they learned and despite the students' willingness to appease their teachers, nothing they did seemed to work. Equally as interesting is that even though the teachers said the students' behavior, attitude, and lack of motivation were the driving forces behind all the problems, the students expressed frustration with the classroom climate due to the actions of the teachers. I began to understand here was a disconnect between the African American students and teachers of African American students.

In 2014, I was given the opportunity to work as a gifted teacher and coordinator at my elementary school. The students in the gifted program were predominately Caucasian males and rarely experienced problems in their grade level classrooms. They were high achievers and expected to perform well academically. Surprisingly, the few African American students in the gifted program often experienced problems. However, these students managed to succeed in mathematics. It was after I had experience as both a special education and gifted teacher, I concluded the issues were not parental involvement or lack of motivation as some teachers had proclaimed. The gifted students

were very motivated, and their parents were extremely involved. I concluded the problem was that some teachers do not understand the culture of African American students because of racism. They believed African American students should conform to a narrative that supports mainstream Caucasian America's view of what is considered normal because anything else must be wrong.

Data Analysis

Data analysis not only provides information about a study's design, but also is informed by the design (Maxwell, 2013). In this interpretive qualitative design, data were analyzed using memos written during the data collection phase along with categorizing and contextualizing strategies.

The researcher began the process of analyzing the data by reading each interview transcript and memo. Descriptive codes were used to identify, label, and group topics (Saladana, 2013). A table containing each interview question listed vertically was constructed. The participant's response was recorded on the table next to each research question. The researcher listed interesting phrases or ways of expressing an idea next to the participant's complete answer. The process was repeated using each participant's interview response.

Next, in vivo codes were used to explain the process that led to the behaviors of the teachers (Saladana, 2013). In vivo coding is a process whereby the codes are derived from the language of the participants rather than the researcher. The language of the participant was used in each step of in vivo coding. In vivo coding is appropriate in qualitative research where the voices of the participants are needed to understand their experiences. In vivo codes also ensure the researcher the most significant information is

acquired from the participants. The language of the participants is used instead of the researcher, thereby the codes are reflective of the participants' perspectives and not the researcher. The last step of in vivo coding involved listing surprising ideas or ideas that lent insight into the interview question on the table.

Third, axial coding was used to connect the data that emerged during the first cycle of in vivo coding. Miles and Huberman (1994) suggest using matrices to compare the data. Matrices are "tables formed by the intersection of two or more lists of items; the cells are filled with data either raw or summarized, allowing comparisons of similarities and differences among the cells" (Maxwell, 2013). During the second cycle of coding, pattern and axial coding was used (Saldana, 2013). A matrix was created listing each interview question vertically. Each participant's response was recorded next to the corresponding interview question. Ideas that were expressed by more than one participant were recorded on the matrix in line with the corresponding interview question. Next, ideas that were expressed by only one participant were recorded. The data were compared across all teacher participants to understand the similarities, differences, and relationships in their experiences.

Lastly, research questions one and two were listed horizontally on a matrix. Responses that answered research question one were recorded, and responses that answered research question 2 were recorded on the matrix. Axial coding (Saldana, 2013) was used in the third round of analysis to relate categories to each other and analyze the core themes. The data were presented in the form of a narrative.

Validity and Trustworthiness

There are several threats to internal validity. Maxwell (2013) identified five threats to internal validity in qualitative research: descriptive validity, interpretation validity, researcher bias, theory validity, and reactivity. Descriptive data ensures that the data is accurately recorded. Researcher bias describes data that fits into the researcher's existing belief system. Reactivity is described as the influence the researcher has on the environment being studied. The researcher conducted steps to minimize internal validity in the following ways:

Memos

Memos were used as a method of data collection in addition to interviews. Memos provided the researcher with interpretations that were formed when the interviews initially took place. These memos were used in the analysis of the data, comparing researcher perceptions with participants' responses.

Collecting Rich Data

Data collection in qualitative research can be done in the form of interviews, focus groups and observation. Semi-structured interviews were used in this study. The questions asked in the interviews were open ended because closed ended questions will only yield yes or no responses (Jacob & Fergerson, 2012). Korstjens and Moser (2018) note collecting rich data includes "providing a rich account of descriptive data, such as the context in which the research was caried out, its setting, sample, sample size, sample strategy, demographic, socio-economic, and clinical characteristics, inclusion and exclusion of criteria, interview procedure and topics, changes in interview questions based on the iterative research process, and excerpts from the interview guide" (p. 3).

Triangulation

Triangulation is the collection of data from multiple sources. There were a total of five teachers from two different middle schools, both male and female, with varying years of teaching experience. The use of multiple participants across two different schools enabled triangulation with multiple viewpoints, experiences, and environmental contexts to compare (differences in school demographics).

Iterative Questioning

Iterative questioning was used to detect deliberate deception or confusion by the participants (Shenton, 2004). The researcher returned to topics previously discussed and rephrased questions.

Respondent Validation

The interviews gave voice to the teachers. To make sure that the participants' stories were accurately told in their voices, member checking was used. Member checking prevents the researcher from inaccurately representing the voices of the participants (Creswell, 2014). Participants were allowed to read the transcript and verify the meaning and values in the stories were accurately portrayed.

Summary

This study was a basic interpretive qualitative design. Data were collected using semi-structured interviews. The interview responses were transcribed and recorded on a matrix. Data were analyzed through coding techniques: In vivo codes and axial codes. The collection of rich data, triangulation, iterative questioning, and respondent validation was used to ensure the trustworthiness of the study.

Chapter IV

RESULTS

The purpose of this study was to understand middle school teachers' perceptions of the role of culturally responsive teaching strategies in teaching mathematics to middle school students. An introduction to the problem was outlined in the first chapter. The problem addressed in this study was African American students performing significantly below their Caucasian peers in mathematics. A review of the literature relating to the study was discussed in the second chapter. The methodology used during the collection and analysis of the data was outlined in the third chapter. This chapter contains the results of the study, in addition to profiles of each participant.

Data Analysis and Findings

Five middle school mathematics teachers participated in individual interviews lasting approximately 60 to 90 minutes. The interviews were audio and visually recorded. Each interview was transcribed by the researcher at the conclusion of the interview. During the data analysis phase, the transcribed interviews were put into a matrix that addressed each research question. Several levels of coding were used including in vivo and axial coding. Patterns across participants were discovered by looking for words and phrases that provided answers to the research question. Themes were then identified based on those patterns. Interviews consisted of semi-structured interview questions allowing teachers to share their experiences teaching mathematics to

African American students (see Appendix B). During the data collection phase, teachers were given a pseudonym. Table 2 provides demographic data for the participants.

Table 2

Demographics of Participants

Pseudonym	Grade Currently Teaching	Years of Experience	Race/Ethnicity	Gender
Stephen	8th	11	Caucasian	Male
Torie	6th – 8th	24	African American	Female
Tiffany	7th, 8th	10	African American	Female
Elizabeth	6th	31	African American	Female
Nicole	7th	12	African American	Female

Brief Profiles of Participants

Stephen

Stephen is a White, male teacher. Stephen attended a state university and majored in secondary education. He is certified to teach students in grades sixth through twelfth. He is currently teaching eighth grade algebra. Stephen taught high school mathematics for four years but transitioned to middle school when a position requiring a high school certified teacher to teach algebra became available.

Torie

Torie is an African American, female teacher. Torie has been teaching for 24 years and is currently a math interventionist for grades sixth, seventh, and eighth. She has been a math interventionist for the past 8 years.

Tiffany

Tiffany is an African American, female teacher and has been teaching 10 years. She currently teaches seventh and eighth grade math for half the day and is the mathematics instructional coach for half the day.

Elizabeth

Elizabeth is an African American female teacher and has been teaching for 31 years. She currently teaches sixth grade math.

Nicole

Nicole is an African American, female teacher who has been teaching for 12 years. She is currently teaching seventh grade mathematics, but previously taught in second and fourth grades.

Themes from Research Question I

Research Question 1

How do middle school mathematics teachers describe the elements of their teaching they perceive as directly related to success with African American students?

The first research question for the study was designed to understand middle school teachers' perceptions of how their pedagogy impacts African American students in mathematics. The first eleven interview questions (See Appendix D for interview Protocol) were designed to discover perceptions of how their pedagogy successfully

impacts African American Students. Participants were asked about their experiences with culturally responsive teaching, their interactions with families, their perceptions of the role race in the student/teacher relationship and any professional development they may have had that influenced their pedagogical decisions.

Individual interviews were conducted and were audio and visually recorded. Interview recordings were then transcribed and analyzed by identifying central ideas, common phrases, or comments that were common across all participants. Common themes with representative quotes addressing research question 1 are listed below in Table 3.

Table 3

Middle School Math Teachers Perceptions of the Reason for their Success with African American Students

Theme	Quote
Making Connections	"I try to find some way to make a connection with them, whether it be through sports or games or shows or whatever it is, just so I can have a conversation." (Stephen)
	"I wear jeans. I wear t-shirts and tennis shoes. I sit on the floor. We go over the concepts together. It's not really my class. It's like our place. It's not like, oh this is my classroom. Even when we're working together, there

	could be some music playing in the background." (Torie)
	"Like Hispanic month is coming up, so they're really excited about like, we're decorating our door. We're going to bring in food. We're going to dress up. That month we'll play Hispanic music. So that's going to be the thing that we do just so they can feel comfortable in their environment." (Elizabeth)
Building Relationships	So, I'm the counselor. I'm the mom. I'm the tutor. So, they come to me all the time about any and everything." (Tiffany)
	"When I'm outside doing car duty, I'm waving at them and I'm laughing at them and the kids come hug me, or I say something to them positively or give the kids nicknames and things like that." (Tiffany)
	"I do put little more focus, I guess, on the African American student. Simply because for me, growing up and being in school, I don't think I had a teacher that looked like me." (Nicole)

Communication	“Even when you see them out and about in Walmart they'll come and talk, you know, parents will come and talk to me.” (Nicole)
	“When we're on the same page, when I'm on with the parents, then I get more focus, you know, more paying attention, less playing around, pretty much because they know that we have that relationship in the communication.” (Nicole)
	“I’ve had opportunities where I had to go to a couple of kids’ houses because of their behavior. When I walked in on their playing grounds, they were like, ‘This lady, either she’s crazy or she really cares.’ And I saw a child who was just acting up change completely.” (Elizabeth)
Parental Involvement	“We have done game nights. We also have had the career STEM days. African American families don’t come. If they do, it’s the same ones that have been coming from sixth, seventh and eighth grade.” (Tiffany)
	“But they do come to events, especially next month. And it’s not just our students. We

	invite the entire neighborhood. This is an event that your entire family can come to with your little brother." (Torie)
Community	"I have some clubs that I sponsor... After school I walk the track at the school two days a week and you know we've got our kids out there. I go to their football games. I cheer them on. I go to the basketball games. I go to all the sports events. At least I try to go to at least one sport event. It's part of building that relationship." (Torie)
	"When you're like, if I see you in public or anything, you're invested in them. It's not just math. You're listening and carrying on the conversations." (Elizabeth)
Culture	"I think the biggest thing in my classroom is that I make sure everyone is involved, and I try to make sure that I bring a piece of all of my students into the classroom." (Tiffany)
	"It looks like, maybe like how your neighborhood looks." (Torie)
Teacher Background	"One thing I can say is that I know that an African American teacher can say certain

	things to an African-American student or say in certain ways to an African-American student that can be received a whole lot better than I can." (Stephen)
	"It's as if they see you. If you look like me, I will work harder for you most of the time. If you look like me and I have built some type of relationship with you I will work harder for you." (Tiffany)
Behavior	"You know, one will act out in class, and you talk with them. You know, find out what the real problem is. The real problem is not always a behavior issue." (Torie)
	"I would say patience. Not jumping to conclusions. Listening and understanding what could be causing this behavior." (Elizabeth)

Making Connections. Participants noted that making connections with their students allowed them to develop the types of relationships with their students that improved learning and decreased behavior issues. Making connections to the lives and interests of students is a critical component of culturally responsive teaching. Gay (2010) noted that culturally responsive teachers bridged the gap between home and school. The

participants described scenarios in their classrooms where situations relevant in the lives of their students were used to connect students to the academic content. For example, Torie, a math interventionist, mentioned that she wears jeans and t-shirts, and sits on the floor with her students. She plays instrumental versions of the music they like to make connections with them. She makes her students feel at home and wants them to be comfortable in the setting that she has created. The connection that she makes with her students is on a personal level because she is combining her students' lived experiences with the math curriculum to create a connection with her students.

Elizabeth said that although bringing in food did not relate to math, she allows her students to do so because she wants them to feel comfortable in her classroom. She said, "So that's going to be the thing that we do just so they can feel comfortable in their environment." Making connections was not only bonding with students, but it was also about giving value to each student's unique personal experience. Stephen also pointed out that he uses music, sports, and games to make connections with his students. For all participants making connections with students was a vital and necessary part of the classroom. Participants did not view their students' lives as deficient as described in the deficit thinking model. Instead, participants used the lives of their students to create culturally congruent classrooms.

Building Relationships. All participants described situations in which they built relationships with students. The participants discussed how they were viewed as parent figures to their students. Tiffany said, "So, I'm the counselor. I'm the mom. I'm the tutor. So, they come to me all the time about any and everything." Nicole discussed the importance of developing relationships with her African American students because she

understood how important it was for them to have an African American teacher. She said "I do put little more focus, I guess, on the African American student. Simply because for me, growing up and being in school, I don't think I had a teacher that looked like me. I don't think throughout the entire, you know, my elementary, I don't think I had even any through high school." Tiffany said that her students call her mama, and she makes a point to talk to them and the parents in the car rider line when she has car duty. Stephen commented that the students come to school with their own personal biases. However, he felt that part of building relationships with his students was changing any negative connotations that they may have about him because he is a Caucasian male. The participants said that learning what movies the students liked and the music they listened to helped them to build relationships with them. Stephen asked his students what types of movies and music they liked so he could learn about their interests and talk to them about the things that interested them.

Building relationships, however, was not in isolation from the theme of making connections. The two themes were dependent on one another. Nicole understood the importance of building a relationship with her African American students; however, she first had to make a connection with them. She connected with them through their shared lived experiences. Stephen built relationships with students by learning about their interests. The relationships were built by the connection he was trying to make with his students. Building relationships and making connections are connected and dependent on one another.

Communication. Participants discussed communication playing a significant role in their success with African American students. Participants noted making phone calls

and sending progress reports home to communicate frequently with parents. Stephen said that communication was important because once students knew that the teacher and parent were communicating, they could not manipulate the adults, meaning the teacher and parent. Elizabeth shared that she has even visited the homes of students who were misbehaving in her classroom.

Communication, however, would not have been possible if the participant had not built positive relationships with parents and students. Sending home progress reports and making phone calls are forms of communication, but they are also forms of building relationships so connections can be made. Communication was the vehicle that the participants used to get to build relationships and make connections. Again, each subtheme was not mutually exclusive. Each subtheme's effectiveness was dependent on the others.

Parental Involvement. Making contact with families through family events held at school was discussed across all participants. Participants stated that positive interactions with parents helped parents to understand that teachers were here to help their kids and work alongside parents for the good of the students. Elizabeth described a family night event where the parents participated in an Escape Room and did a line dance with the students. Tiffany, however, did not relay the same experiences. She noted that parents of African American students are less involved in the academic lives of the students and believes that is one reason we do not see a higher number of African American students in advanced mathematics courses. Torie, however, plans events and allows the entire neighborhood to take part. Students bring their entire family and neighborhood friends to celebrate Halloween. Families come and meet the teacher, but

they also have opportunities to meet each other and make connections as family and friends.

Community. All the participants suggested they were involved with students outside of their mathematics classroom. Most participants coached students in sports or were sponsors of after school clubs. Stephen noted that in addition to building strong relationships with students, being involved in the students' communities allows their parents to see teachers' dedication to working with their children. Torie said the community building aspect of teaching African American students was important because, he kids need to see you more than in the classroom. She said, "They need to see you doing regular normal stuff that regular normal people do."

Culture. Culturally responsive teaching was described by two participants as being real and bringing the life of the student into the classroom. Torie said that in her classroom she is not too high and mighty. She described her classroom as looking like the neighborhood of the kids that she teaches. She used the connections she made with her students' lived experiences to create a classroom culture that was inviting to her students. Tiffany echoed the same sentiment when she said, "I think the biggest thing in my classroom is that I make sure everyone is involved, and I try to make sure that I bring a piece of all of my students into the classroom." She described playing music in her classroom when students transition from one activity to the next. However, she does not choose the music. She allows her students to create the class playlist. For these two participants, culturally responsive teaching means creating an environment that was like home for their students.

The culture in these classrooms would have been possible without the connections that the participants had previously built. The participant needed knowledge about the lives of their students to create culturally responsive classrooms, along with relationships to help the students feel comfortable and at home with their teacher. The trust that participants created between themselves, and their students decreased behavior problems, which helped to further create an environment that was responsive to the needs of the students.

Teacher Background. All African American participants either believed their race was a strength in their classrooms or believed the race of the teacher played a role in the success of African American students. Participants stated that African American students worked harder and had better behavior in their classrooms because the students could see their family members in them. Elizabeth said, "I think just being African American sets the tone for them to behave. Just the presence of my auntie. I'm a mama, you know? So, I think it's a different respect level because they see me in their households." Stephen, the Caucasian, male participant, noted that African American teachers could say things to African American students that were firm and with love, but as a Caucasian teacher he felt that the same words would not be perceived with love and respect because of his race. However, Torie believed that her race and life experiences played a role in her students' success. She said, "I can relate (to my students) because I haven't always been where I am. So that fact that I can do it, just shows that you can do it."

Behavior. None of the participants reported having behavioral issues with students in their classrooms. They noted that the lack of behavior issues was due to them

not jumping to conclusions about their behavior and taking the time to understand the cause of the behavior. Stephen is a wrestling coach at his school and acts as a parent figure when a teacher cannot contact a parent. His influence as a coach helps maintain discipline in the classroom. He helps manage behavior by making connections and building relationships with students in sports. Tiffany noted that she did not give empty threats. She said it one time, and her students knew that she would follow through. Her style of not giving empty threats succeeded because she and her students had built a relationship of trust. They understood that she would be fair, yet firm.

Torie and Elizabeth both looked for "the why" when students demonstrated misbehavior. They both said before they assumed that the students were simply misbehaving, they talked to the student to understand why or what the underlying reason for the behavior may have been. Elizabeth and Torie had also built a relationship of trust with their students. Students trusting their teachers even when they are misbehaving is important because the student understands that their needs are still going to be met. Elizabeth and Torie found out why their students were misbehaving and then attempted to meet their students' needs instead of applying a consequence.

Themes from Research Question 2

Research Question 2

What experiences contributed to middle school math teachers' understanding and use of the pedagogical strategies that have contributed to their success?

The second research question for the study was written to understand what teaching strategies relate to culturally responsive teaching. The last three interview questions (See Appendix B for interview Protocol) were designed to discover perceptions

of specific strategies that positively impact African American Students. Participants were asked about their strength as a math teacher and specific strategies that they have found to be effective. As with research question 1, transcriptions were analyzed to identify common themes between participants.

Common themes identified as addressing research question 2 are listed below in table 4.

Table 4

Teachers' Experiences that Influenced their Understanding of Successful Pedagogical Strategies

Theme	Quote
Differentiation	"My students are in groups most of the time and you're in groups based on ability." (Torie)
	"I normally differentiate based on modality." (Tiffany)
	"I think mostly go with skill level and in different groupings." (Nicole)
Presenting Information	I have to scaffold it to make it fit my particular group of kids and I usually try to scaffold a little bit lower than their ability because I like for them to have successes right out the door." (Torie)
	"It's breaking up sometimes into parts. It might be an all-day thing, or it might be

	broken into parts like, for instance, the opening might be a video with music and we're singing the rules. And then like a mini lesson that we usually do. And then the activity, like we had a rap battle. So, let's see if you understand those concepts." (Elizabeth)

Differentiation. All but one participant revealed that differentiation was important in the classroom. Four participants agreed that grouping students was an important pedagogical strategy and vital to student achievement. They grouped their students by skill level, achievement, and modality. One teacher pointed out that her closures in the classroom are important in deciding what she teaches the next day and how her lessons are presented. Nicole said that she breaks the information down for her students. She noted breaking down information into smaller parts helped them to not feel overwhelmed when they saw the first problem. She said, "I think the biggest thing is breaking it down. Because I think sometimes when the students see a problem, you know that first problem, they're like, 'Oh gosh!' you know?" She also believes in grouping students by skill level and allowing them to work and learn from each other. Torie's groups are based on ability and are fluid, changing weekly or daily as needed. Tiffany stated her lessons were always tiered, a term she used to discuss how she differentiates for different student abilities. Differentiation was a daily part of each participant's daily instruction. The one participant

that did not use differentiation said that he struggled with how to differentiate and preferred to work one on one with students who needed extra help in his math classes.

Presenting Information. The participants all used different modalities to present information to students. Music was commonly discussed as a method to engage students and help them remember steps in a process or important notes. Movement was also prevalent in the participants' responses. Students were given opportunities to get up and talk to each other about the work they were doing. Student talk was frequently discussed. Participants believed that students collaborating and talking to each other provided a solid foundation for learning how to solve problems on their own. However, providing students with the background knowledge needed to be successful was also present. Tiffany said, "I think that if you don't have background knowledge of something it's hard to be able to solve a specific problem. If the teacher is not giving you multiple models to use to gain some type of prior knowledge, that's hard for you to gain it." Elizabeth said she found introducing a lesson with a video was an appropriate opener followed by a minilesson and them an activity, like a rap battle where the students are reviewing what they have learned, was an ideal way to present information in her classroom.

Summary

This chapter disclosed the themes that emerged to address the research questions in this study. Several subthemes emerged through the interviews. The themes that answered research question one were making connections, building relationships, parental involvement, communication, community, teacher background, and behavior. The themes that answered research question two were presenting information and differentiation. All five participants had experience teaching mathematics to African

American students and believed they needed to employ specific tactics when instructing African American students in the mathematics classroom. All teachers discussed the importance of building relationships with students, making connections to their lives, communication with parents, and the role that the background of the teacher plays in the academic lives of the students. Teachers also discussed pedagogical strategies used in their classrooms they believe are directly related to the success of their African American students. Differentiation strategies were prevalent. Participants used ability and skill-based groups, one on one instruction and breaking information down into smaller parts, and scaffolding, for students in their mathematics classrooms. Engaging students' multiple modalities, such as movement, videos, note taking and music were frequently discussed by participants as pedagogical strategies used to aid in the success that participants have teaching African American students. In chapter 5, a conclusion which includes an overview of the study as well as the limitations and recommendations for future research is provided.

Chapter V

DISCUSSION AND CONCLUSIONS

This chapter includes a brief overview of the study. This study focused on two primary research questions. The first research question was written to understand middle school teachers' perceptions of how their pedagogy impacts African American students in mathematics. The second research question was written to understand what teaching strategies used by the participants related to culturally responsive teaching. Additionally, the overview includes the study's purpose, research design, data analysis, limitations, and recommendations for future research based on the results of the study.

The primary goal of this research was to understand middle school mathematics teachers' perceptions of the role of culturally responsive teaching strategies in teaching mathematics to African American students. Specifically, teachers understanding of how to effectively work with African American students in the classroom and their teaching strategies were explored.

Research Design

An interpretive qualitative research design was used to understand the perspectives of each teacher and the experiences that have made them successful teaching mathematics to African American students. Individual interviews were used to identify a range of teaching practices that teachers were using to help their students succeed mathematically. Each interview lasted between 60 and 90 minutes and was audio and visually recorded. Semi-structured interview questions were written in advance.

Participants were selected with the assistance of the school principals. Each principal was asked to identify math teachers who demonstrated successful teaching of mathematics to African American students as determined by the Teacher Keys Evaluation System (TKES) evaluation. Math teachers performing at a level three or four as measured by their TKES evaluation were asked to participate. It should be noted that successful teaching of mathematics as measured by TKES does not disaggregate based on race, however principals were asked to use their knowledge and the performance of African American Students in mathematics to generate the list of potential participants.

After each principal identified teachers meeting the criteria of success, names were sent to the researcher. The sample of teachers identified by the principals were then asked to volunteer for participation. Five teachers agreed to participate. The participants were all middle grade mathematics teachers in the same school district. However, participants were divided between two different middle schools, with three being at one school and two being at another school. The following research questions were developed to understand the participants perceptions of the role of culturally responsive teaching strategies in teaching mathematics to African American middle school students.

Research Questions

RSCH Q1- How do middle school mathematics teachers describe the elements of their teaching they perceive as directly related to success with African American students?

RSCH Q2- What experiences contributed to middle school math teachers' understanding and use of the pedagogical strategies that have contributed to their success?

Data Analysis

Five middle school mathematics teachers participated in the study. The teachers were comprised of grades sixth, seventh, and eighth grade. One teacher was a math interventionist, and another was a math instructional coach for half of the day in addition to being a math teacher. The teachers participated in individual interviews lasting between 60 and 90 minutes. Each interview was audio and visually recorded and transcribed by the researcher immediately after each interview. The interview recordings were destroyed immediately after they were transcribed. The interviews were written in narrative form and given to the participants for review. After the interviews were transcribed, common terms and phrases were identified and themes that emerged from each interview were labeled and categorized. Several levels of analysis were used including axial coding and in vivo coding.

Discussions

The themes in the study were derived from analysis of the interview responses that aligned with the research questions guiding the study. A total of 10 emergent themes were identified from the data analysis transcripts. From the first research question, eight themes emerged, while two themes emerged from research question number two. After themes were established for the two research questions, they were compared with one or more elements of Yosso's Community Cultural Wealth Model (2005), culturally responsive teaching and elements of culturally responsive mathematics teaching (Bonner & Adams, 2012). The analysis indicated that participants generated responses that were consistent with Yosso (2005) and Bonner & Adams (2012) research. Five major themes emerged that summarized all ten subthemes from both research questions.

1. Building on Students Prior Experiences
2. Encouraging Students to Leverage their Cultural Capital
3. Relationships and Trust
4. Empathetic and Caring Teachers
5. Reflective Teachers

Building on Students Prior Experiences

Building on students' prior knowledge was a prevalent theme throughout the study and encompasses the subtheme, *'Presenting Information'.* Gay (2002) notes that culturally responsive teachers use the cultural knowledge of their students, their prior experiences and performance styles to make learning more appropriate and effective. Participants in the study often used their students' store of knowledge and performance style to engage students and increase academic achievement.

These results are consistent with the results of Bui and Fagan (2013) when they found embracing students' cultural differences enhanced instruction by increasing student engagement and motivating students to advance themselves academically. The students in the Bui and Fagan (2013) study completed lessons where they had to make a personal connection to the activity they were completing.

The participants in this study knew what types of activities the students engaged in outside of school. They were familiar with the music students listened to, their style of dress, and the types of interactions they were having with their peers and families outside of school. They were able to use what they knew about their students to create engaging lessons. Teachers are completing work in advance when they build om students prior

experiences. They are making connections and building relationships ahead of time, so they have the most effective lesson.

Encouraging Students to Leverage their Cultural Capital

Encouraging students to leverage their cultural capital embodies the subthemes *'Making Connections' and "Culture"*. The participants sought ways to bring the students' cultural knowledge and strengths to the classroom and use it to create success for students, such as rap battles to review for tests. Gay (2010) noted in her *18 Pillars of Culturally Responsive Teaching* that culturally responsive teachers cultivate success for all aspects of a person without negatively affecting cultural identity. Participants noted instances when they encouraged students to bring their cultural identities to the classroom.

Lopez (2011) found similar results in a study with minority high school students. The students were allowed to write new forms of poetry and use performance poetry in the classroom. Culturally responsive teachers capitalize on the experiences of their students. Those experiences are incorporated into the classroom and become part of the classroom culture.

Relationships and Trust

All five participants expressed a desire to build relationships with their students. Relationships and Trust embodied the subthemes *'Building Relationships'*, *'Communication'*, *'Community'*, and *'Parental Involvement'*. Each participant discussed the after-school activities they sponsored and how those activities helped them to build relationships with their students. Two of the participants were involved with the athletic program in their schools, another sponsored a school club, and one participated in school

sponsored family nights on a regular basis. They all described situations in which students communicated with them when they wanted to talk about their lives. The participants developed bonds with their students that endured beyond the one year the students were their students.

This aligns with the Coffey and Farinde-Wu (2016) study where they found that developing relationships with students was an important part of culturally responsive teaching in the classroom. Idris (2019) found similar results in a study with mine English language teachers where he found that empathy and communication, assertiveness and authority in the classroom, and a caring attitude toward their students were attributes of a culturally responsive teacher. When students see teachers doing everyday things, participating in activities outside of school, and developing relationships with their families, they start to trust their teachers and cultural congruity begins to form.

Empathetic and Caring Teachers

The participants expressed a desire to understand the struggles of their students and displayed a caring attitude. The subthemes *'Teacher Background'*, and *'Behavior' and 'Culture'* embody this theme. The participants were able to empathize with their students either because they cared deeply for their students, and for some, because they understood the struggles of a person of color.

Nicole said that she put more emphasis on students of color because she remembers the struggle of not having a teacher who looked like her when she was a student. Tiffany said that she believes her students respond to her because they see their own family members in her.

Similarly, Zhang-Wu (2017) found that African American teachers possess attributes that are effective when teaching African American students. They consider the backgrounds of their students, become a resource for their students, give students a chance to use their voices at school, and seek support from the community. The participants understood that their African American students may have different experiences than their peers. They allowed their African American students to have a voice by not drawing immediate conclusions concerning behavior.

Ebersole et., al (2016) found that teachers needed to examine their own cultural identity before attempting to understand the cultures of their students. The theme of '*Empathetic and Caring'* teachers relates to the Ebersole et., at (2016) study. The participants in this study understood how their cultural identities affected how their students would perform in the classroom. The participants embraced strategies that were related to culturally responsive teaching because they understood the value of their own cultural identities. African American teachers possess certain characteristics that are valuable when working with diverse populations. This aligns with research from Coffee & Farinde-Wu, 2015, Idris, 2019 and Zhang-Wu, 2017.

Reflective Teachers

All participants had the ability to reflect on their own cultural backgrounds and use that to help the students they teach. The subthemes '*Culture*' and '*Behavior*' encompass the practices of reflective teachers. However, reflective teachers reflect on all areas of their teaching (Bonner 2014), therefore this major theme encompasses all sub-themes. The four African American participants believed the students benefited from having African American teachers because the students could see themselves and their

family members in them. The one Caucasian participant noted he sought ways to be culturally sensitive and learn the cultures of his students. Teachers also reflected on their student behavior.

This type of reflection is important because as Bonner (2014) notes, culturally responsive mathematics teachers are constantly reflecting on their knowledge of the content and their students, their communication style, and the relationship and trust they have with their students. Two participants said they looked for the reason of the behavior instead of treating the situation as simply a behavior problem. The participants were able to reflect on the situation before reacting and adjust their response accordingly. Reflective teachers also reflect on their daily lessons. The participants reflected after each lesson and differentiated their instruction to meet the needs of their students daily. Stephen noted that he believed in one-on-one instruction whenever feasible. Another participant noted that her formative assessments drive her instruction. She used her formative assessments to reflect on her practices and then adjust her teaching strategy. Abudulrahim and Orosco (2020) said culturally responsive math teachers reflect on their teaching practices. However, they also reflect their own belief systems about race and culture. This practice was evident when participants said that their own race played a role in how students performed in the classroom.

Theoretical and Conceptual Frameworks

Cultural Community Wealth Model

Yosso's six forms of cultural capital examine the strengths and experiences that students of color bring with them to the educational setting. The six forms of cultural capital include: aspirational, linguistic familial, social, navigational, and resistant. Yosso

(2005) asserts that despite the obstacles students of color may face in the educational setting, they have a certain skillset that helps them overcome those obstacles.

The study was examined using the conceptual frameworks, Culturally Responsive Math Reaching in combination with Culturally Responsive Teaching and Yosso's Community Cultural Wealth Theory, as a lens to answer research questions one and two.

A summary of major themes connected to Yosso's Community Cultural Wealth Theory can be found in Table 5. Each theme was aligned with one or more of Yosso's six forms of cultural capital.

Table 5

Summary of Themes Connected to Yosso's Community Cultural Wealth Theory

Themes	Community Cultural Wealth Theory
Building on Students' Prior Experiences	Aspirational Capital
	Familial Capital
	Social Capital
Encouraging Students to Leverage their Cultural Capital	Aspirational Capital
	Familial Capital
	Linguistic Capital
	Social Capital
	Navigational Capital
	Resistant Capital
Relationships and Trust	Aspirational Capital
	Familial Capital
	Social Capital

	Navigational Capital
Empathetic and Caring Teachers	Aspirational Capital
	Familial Capital
	Social Capital
Reflective Teachers	Resistance Capital
	Aspirational Capital
	Familial Capital
	Social Capital
	Navigational Capital
	Resistance Capital

Yosso (2005) described aspirational capital as the ability to maintain one's hopes and dreams in the face of obstacles. The participants in the study believed that students could achieve. They promoted their students' aspirational capital because they understand that many people believed African American students' cultural backgrounds could be a hindrance in their academic progress. However, the participants maintained that their students could excel, and encouraged students' aspirations by talking to them about things that interested them and encouraging their endeavors. They promoted their students' aspirational capital when they *Built on their Students Prior Experiences, Encouraged Students to Leverage their Social Capital,* built *Relationships and Trust, became Empathetic and Caring Teachers,* and when they were *Reflective Teachers.*

Linguistic capital (Yosso, 2005) is the various communication skills and skills that students bring with them to the education setting. The participants promoted linguistic capital by communicating and using the language and communication style that

met the needs of the students and their families. Participants *Encouraged Students to Leverage their Cultural Capital*. They communicated with parents and students, were active in the community, and helped them to understand the value that they brought to the school setting. Participants allowed their students to talk to them and express themselves in the manner they chose. Promoting students' linguistic capital was vital to encouraging students to leverage their cultural capital.

Familial capital is the resources that students have in their homes and communities (Yosso, 2005). Participants promoted familial capital by engaging in family nights, talking to parents socially, and engaging in student centered activities after school. They used what was familiar to help their students succeed. They promoted their students' familial capital when they *Built on their Students Prior Experiences, Encouraged Students to Leverage their Social Capital,* built *Relationships and Trust,* and when they were *Reflective Teachers.* The resources from students' homes and communities, such as, their parents and life experiences provided participants with resources to use at school and make their instruction stronger.

Social capital (Yosso, 2005) refers to peers and other social contacts. The participants encouraged their students to work together and collaborate with one another. They encouraged events where students would have opportunities to socialize. They promoted their students' social capital when they *Built on their Students Prior Experiences, Encouraged Students to Leverage their Social Capital, built Relationships and Trust, became Empathetic and Caring Teachers, and when they were Reflective Teachers.*

Navigational Capital refers to the ability to navigate educational spaces (Yosso, 2005). The participants promoted navigational capital by creating spaces that were comfortable for all students. They allowed student talk, movement, and various means of presentation during instruction. They promoted their students' navigational capital when they *Encouraged Students to Leverage their Social Capital, built Relationships and Trust, and when they were Reflective Teachers.*

Resistance capital refers to students' ability to fight for equal rights (Yosso, 2005). Participants understood the obstacles that students faced in their lives. One participant described how she once faced the same obstacles as her students. She used her resistance capital to promote her students' resistance capital and encourage them to continue setting high goals. They promoted their students' resistance capital when they were *Empathetic and Caring Teachers, and when they were Reflective Teachers.*

Culturally Responsive Mathematics Teaching

Table 6 demonstrates how the study's themes align with the characteristics of culturally responsive math teaching. Each theme is aligned one more of the components of CRMT.

Table 6

Summary of Themes Connected to Culturally Responsive Mathematics Teaching

Themes	CRMT Connection
Building on Students' Prior Experiences	Knowledge Communication

Encouraging Students to Leverage their Cultural Capital	Knowledge Communication Relationships and Trust
Relationships and Trust	Relationships and Trust
Empathetic and Caring Teachers	Relationships and Trust
Reflective Teachers	Consistent Reflection and Revision

Bonner and Adams (2012) found that successful mathematics teachers of minority students use four components to engage students and increase achievement: communication, knowledge, trust/relationships, and constant reflection/revision. Bonner and Adam's work extends the work of Ladson-Billings by focusing on culturally responsive teaching by focusing on the mathematics classroom.

Knowledge is described in Culturally Responsive Mathematics Teaching as being knowledgeable about one's content area, but also about the lives of the student that one teaches (Bonner & Adams, 2012). The participants were knowledgeable about mathematics and were intentional about learning about the lives of their students. They used this knowledge to *Build on the Prior Experiences of Students* and create engaging lessons that challenged the students academically. The participants also *Encouraged Students to Leverage their Cultural Capital*, which required knowledge of the communities in which the students lived and their cultural background.

Relationships and Trust was the most prevalent major theme in the study. It embodies four subthemes: building relationships, communication, community, and parental involvement. Three major themes aligned with the culturally responsive math cornerstone of relationship and trust. Culturally responsive teachers continuously make connections with students and parents by *Encouraging Students to Leverage their Cultural Capital*, developing *Relationships and Trust*, and being *Empathetic and Caring*. Building relationships and trust helps negate the negative feelings people of color may have about math and helps the teacher become an advocate in the community for mathematics (Bonner and Allen, 2012).

Communication also ties to *Building on Students Prior Experiences.* The words used by participants to teach math were important. The participants had to use the prior experiences of students to communicate with them in a way that would be effective and conducive to learning. Bonner and Adams (2012) describe teachers with a culturally responsive teaching style as being "warm demanders". They set high expectations and communicate in a manner that tells students they are capable of the high expectations that have been set. Encouraging students to leverage their cultural capital also involves a communication style the impacts students and families in a positive manner. The participants communicated with phone calls, progress reports, and visiting the homes.

Bonner and Adams (2012) emphasize that culturally responsive mathematics teachers are always reflecting on their practices, whether it relates to relationship building or pedagogy. Therefore, all five themes require constant reflection and adjustment as participants learn more about their students. Participants in this study reflected constantly to build the best experiences for their students.

Research Question 1

According to Gay (2010), culturally responsive teaching is about "helping students of color maintain identity and connections with their ethnic groups and communities; develop a sense of community, camaraderie, and shared responsibility; and acquire an ethic of success" (p.32). As noted in the theme, '*Encouraging Students to Leverage their Own Social Capital,'* students were encouraged by their teachers to use the strengths they already possessed to excel in mathematics. Participants helped students recognize their strengths through the connections they made with them and relationships they formed with their students. The effort that participants gave to developing *'Relationship and Trust'* with their students coincided with having an *'Empathetic and Caring'* attitude toward their students. The two latter major themes had to be present before teachers could begin the process of encouraging *students to leverage their own social capita*l. By developing relationships and trust and being empathetic and caring, participants were empowering their students. Gay (2010) notes, "Because culturally responsive teaching is empowering, it enables students to be better human beings and more successful learners. Empowerment translates into academic competence, personal confidence, courage, and the will to act. In other words, students must believe they can succeed in learning tasks and be willing to pursue success relentlessly until mastery is obtained" (p. 34).

These three themes have a circular relationship. Neither of the three themes could be initiated on its own. Participants had to constantly implement one behind the other and at times implement some of the major themes simultaneously. As Gay (2010) notes, "Expectations and skills are not taught as separate entities but are woven together into an

integrated whole that permeates all curriculum content and the entire modus operandi of the classroom" (p. 32).

As participants described elements of their teaching that they perceived as related to success with African American student, constant reflection was emphasized. The theme *'Reflection'* part of the circular dynamic that answered research question one. Culturally responsive math teachers are constantly reflecting on their interactions with students and their pedagogy. Bonner and Adams (2012) emphasized the importance of reflection for successful mathematics teachers. They noted that successful mathematics teachers are constantly reflecting about the connections and relationships between themselves and their students, in addition to their pedagogy. As they reflect, they are adjusting as needed, but continuing the circular connection of leveraging social capital, developing relationships and trust, and being empathetic and caring teachers.

Research Question 2

The theme *'Building on Student's Prior Experiences'* is evident throughout the study. Participants discussed many ways of presenting information that helped their African American students succeed. They talked about student talk, differentiating with tiered lessons, ability, and skill-based ability groupings. Through the many ways of presenting information, participants used students' prior experiences to help their students succeed. Connections were made to their students' lived experiences during instruction which created more engagement. There is a dynamic connection between research question one and research question two. The experiences that contributed to the participant's success would not have been possible without them first encouraging students to leverage their cultural capital, developing relationship and trust with their

students, being empathetic and caring teachers, and consistently reflecting on their practices. These themes continuously revolve in a circular pattern. Additionally, research questions one and two have a causal relationship. Because participants laid the groundwork for successful interactions with students and parents, they were able to instruct successfully.

Limitations of the Study

The study was limited in several areas. First, the study was conducted with participants in one school district. Conducting research with multiple school districts would provide an opportunity to understand if the teachers' teaching strategies are indicative of the training received in the district or the result of culturally responsive teaching practices. Secondly, the participants worked in a school district that is one of the highest performing districts in the state and African American students are the minority. Third, topics of race are sensitive to some, and participants may have been reluctant to speak freely while being audio and visually recorded. And lastly, although culturally responsive teaching is noted in the TKES standards, none of the teachers had been officially trained to use culturally responsive teaching strategies. This limited the participants' ability to discuss how their pedagogy related to culturally responsive teaching and responses were based on what they knew personally.

Conclusion

Participants in this study were identified as successful teachers of mathematics based on their TKES evaluations. Each participant described elements of their teaching that they believed were related to the academic success of their African American students. The participants described experiences where they connected with their students

by learning what their students liked, intentionally building relationships with them, using their background to identify with students' experiences and communicate with the parents of their students on regular basis. These participants described themselves as active in and outside of the regular school day. They sponsored clubs, coached sports, and worked at the after-school program. In addition, their teaching strategies helped students to achieve in their mathematics classrooms. Based on the findings of the study, culturally teaching is about more than just teaching. It is a mindset that teachers have about their students. Teachers with this mindset engage in practices that empower their students to see their cultural backgrounds as an asset and normal part of everyday life.

Recommendations

Further research should consider several factors. First, four of the participants in this study were African American women and one was a Caucasian male. Although Stephen shared many views that were like the other four participants, he had a distinct perspective when looking at African American students through the lens of a Caucasian male. His gender also played a role in his perspective. It is recommended that in future research there is a larger sample size, and the participants are more diverse in gender and race. In doing so, a researcher could determine if responses or reflective of a group of people rather than one person. Secondly, participants across different school districts would provide a wider range of perspectives. Teachers who work in the same district tend to receive the same professional learning and their responses to questions could be the result of that training or lack of training. Third, classroom observations would give validity to the participants responses. And lastly, research comparing the teaching practices of teachers intentionally trained in the use culturally responsive teaching as

opposed to those not having any training would provide better results when attempting to determine if the strategies used in CRT help African American students achieve in mathematics.

It is important to note that none of the teachers in this study were formally training in. culturally responsive teaching. It is recommended that schools should begin with professional development to help teachers gain a deeper understanding of culturally responsive teaching. The participants in the study had a surface level understanding of culturally responsive teaching, but training may have deepened and extended their understanding and use of culturally responsive practices. Secondly, it is recommended that teachers become resources for other teachers. Many teachers have firsthand knowledge of the culture and communities of students of color. These teachers can be liaisons between the student and their communities. Lastly, educators desiring to implement culturally responsive teaching can begin by incorporating the culture of the students into the classroom using what is popular (music, movies, video games). Culturally responsive teaching has multiple levels and beginning small is one way to begin creating an educational space that is a community for all learners.

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Appendix A:

Participant Consent Form

Greetings,

My name is Stephanie Hicks, and I am a doctoral student at Valdosta State University, pursuing the dissertation phase of my Ed.D. degree in Curriculum and Instruction. You are invited to participate in a study designed to understand middle school teachers' perceptions of the role of culturally responsive teaching strategies in teaching mathematics to African American middle school students.

I am requesting your help because you have been identified as a successful middle school mathematics teacher of African American students. Your experiences teaching African American students would provide valuable information about math pedagogy that can be used to increase the math achievement of African American students. Currently, there are very few studies that examine successful middle school mathematics' teachers' experiences teaching African American students and their teaching practices. Mathematics teachers nationwide would benefit from understanding how successful mathematics teachers of African American students interact and teach African American students in their classrooms.

Your participation is voluntary. Should you agree to participate in this study, you will be asked to participate in a 60-to-90-minute interview. You may discontinue participation at any time. No personal information would be released before, during, or after the study, and pseudonyms will be used in order to protect your anonymity. If you would like to participate in this research and are at least 18 years old, please reply to this email.

Questions regarding the purpose or procedures of the research should be directed to Stephanie Hicks at sngregor@valdosta.edu. This study has been approved by the Valdosta State University Institutional Review Board (IRB) for the Protection of Human Research Participants. The IRB, a university committee established by Federal law, is responsible for protecting the rights and welfare of research participants. If you have concerns or questions about your rights as a research participant, you may contact the IRB Administrator at 229-253-2947 or irb@valdosta.edu.

Sincerely,

Stephanie Hicks

sngregor@valdosta.edu

229-834-4334

Appendix B:

IRB Approval

Institutional Review Board (IRB)
For the Protection of Human Research Participants

PROTOCOL EXEMPTION REPORT

Protocol Number: 04206-2021 **Responsible Researcher(s):** Stephanie Hicks

Supervising Faculty: Dr. Karla Hull

Project Title: *Mathematic Teachers' Perceptions of Culturally Responsive Teaching and the Effects on African American Students.*

INSTITUTIONAL REVIEW BOARD DETERMINATION:

This research protocol is **exempt** from Institutional Review Board (IRB) oversight under 45 CFR 46.101(b) of the federal regulations **category 2**. If the nature of the research changes such that exemption criteria no longer apply, please consult with the IRB Administrator (irb@valdosta.edu) before continuing your research study.

ADDITIONAL COMMENTS:

- *Upon completion of the research study collected data must be securely maintained (locked file cabinet, password protected computer, etc.) and accessible only by the researcher for a minimum of 3 years. At the end of the required time, collected data must be permanently destroyed.*
- *To ensure confidentiality, pseudonym lists must be kept in a separate, secure file from corresponding name lists., email addresses, etc.*
- *Exempt guidelines **prohibit** the collection, storage, and/or sharing of recordings. Exempt protocol guidelines **permit** the recording of interviews provided recordings are made to create an accurate transcript. Upon creation of the transcript, the recorded interview session must be deleted immediately from all devices.*
- *As part of the informed consent process, interview recordings must include the researcher's reading of the consent statement, confirming participant's understanding, and establishing willingness to take part in the interview. Participants must be offered a copy of the research statement.*

☒ ***If this box is checked, please submit any documents you revise to the IRB Administrator at irb@valdosta.edu to ensure an updated record of your exemption.***

Elizabeth Ann Olphie *08.30.2021*

Thank you for submitting an IRB application. Elizabeth Ann Olphie, IRB Administrator ***Please direct questions to irb@valdosta.edu or 229-253-2947.***

Revised: 06.02.16

LOWNDES COUNTY SCHOOLS

Home of the Vikings

1592 Norman Drive • Valdosta, Georgia 31601 • 229 245-2250 • FAX 229 245-2255

August 26, 2021

Ms. Tina Wright, Compliance and Research Integrity Specialist
Office of Sponsored Programs and Research Administration
Valdosta State University
Converse Building
1500 N. Patterson Street, Suite 3100
Valdosta, GA 31698

Dear Ms. Wright,

After reviewing the description of the research presented by Stephanie Hicks, I have granted authorization for Mrs. Hicks to conduct research in our school system.

I understand the purpose of the study is to understand middle school teachers' perceptions of the role of culturally responsive teaching strategies in teaching mathematics to African American middle school students. Mrs. Hicks will work with the principal to identify teachers who meet the criteria of successfully teaching mathematics to African American students. Once teachers have been identified, Mrs. Hicks will email the identified teachers and ask for volunteers to participate in the study.

I have indicated to Mrs. Hicks that participation in the research study is strictly voluntary. Participants may withdraw consent at any time during the study with no penalty. Furthermore, there is no penalty for anyone who chooses not to participate. There are minimal risks anticipated for all participants. The study is for research purposes only and not for decision-making by any organization. There will be no compensation or immediate personal gain from participants participating in this research study. All information is confidential and will only be used for research purposes.

If you have any concerns about the permission being granted by this letter, please contact me at the phone number listed above.

Sincerely,

Rodney T. Green
Assistant Superintendent

Appendix C:

Informed Consent

You are being asked to participate in an interview as part of a research study entitled *"Mathematics Teachers' Perceptions of Culturally Responsive Teaching and its Effect on African American Students,"* which is being conducted by Stephanie Hicks, a student at Valdosta State University. The purpose of the study is to investigate how middle school mathematics teachers describe the elements of their teaching that they perceive as directly related to success with African American students. You will receive no direct benefits from participating in this research study. However, your responses may help us learn more about the experiences that contribute to middle school math teachers' understanding and use of culturally responsive teaching pedagogy. There are no foreseeable risks involved in participating in this study other than those encountered in day-to-day life. Participation should take approximately 60 to 90 minutes. The interview will be audio recorded in order to accurately capture your concerns, opinions, and ideas. Once the interview recording has been transcribed, the recording will be deleted from recording devices. ***Your name and workplace will be replaced with a pseudonym in publications or presentations.*** Your participation is voluntary. You may choose not to participate, to stop responding at any time, or to skip any questions that you do not want to answer. You must be at least 18 years of age to participate in this study. Your participation in the interview serves as your voluntary agreement to participate in this research project and your certification that you are 18 years of age or older.

Questions regarding the purpose or procedures of the research should be directed to Stephanie Hicks at sngregor@valdosta.edu. This study has been exempted from Institutional Review Board (IRB) review in accordance with Federal regulations. The IRB, a university committee established by Federal law, is responsible for protecting the rights and welfare of research participants. If you have concerns or questions about your rights as a research participant, you may contact the IRB Administrator at 229-253-2947 or irb@valdosta.edu.

Appendix D:

Interview Protocol

1. I would like for you to tell me about your professional development, including college training, as a math teacher.
2. What has been your experience with professional development related to diverse populations?
3. You were nominated by your principal because you have demonstrated a strength in teaching mathematics. What type of things are you doing in your pedagogy that enables your students to learn so well?
4. When you design your math lessons, how do you differentiate for your students (race, gender, interest, skill level)?
5. How do you design math lessons differently to meet the needs of African American students?
6. I would like to pick your brain and have you tell me about some of the encounters you have had in mathematics with African American students.
7. Nationally, there has been a huge push for teachers to be culturally responsive in the classroom. Talk to me about your experiences with culturally responsive teaching and how that looks in your classroom.
8. What kinds of interactions do you have with families?
9. What have you learned about interacting with the families related to their mathematics achievement?
10. As a math teacher, what kind of a role do you play in the lives of your African American students outside of the classroom?
11. In what ways do interactions with families outside of the classroom make a difference?
12. What has been your experience with after school activities, such as math night or parent night? Did African American families come?
13. When you think about the African American students that you teach, what would you describe as their biggest strengths? Challenges?
14. In your experience, what role, if any, does the race of the teacher play in the academic growth of African American students in mathematics?
15. Have you ever taught African American students who struggled with mathematics and, if so, did you notice any patterns in the types of struggles that African American students have in mathematics?
16. In your experience, what role, if any, does the race of the student play in academic growth of African American students in mathematics?