

A STUDY OF ELEMENTARY MATHEMATICS TEACHERS'
KNOWLEDGE OF EQUITY

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University of Missouri

In Partial Fulfillment of the Requirements for the Degree
Doctor of Philosophy

by

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The undersigned, appointed by the Dean of the Graduate School, have examined the dissertation entitled

A STUDY OF ELEMENTARY MATHEMATICS
TEACHERS' KNOWLEDGE OF EQUITY

presented by Christa D. Jackson

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For Michael,

Thank you for all of your love and support.

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ABSTRACT

Currently, mathematics instruction in U.S. classrooms is far from achieving equity for African American students. Establishing an equitable classroom environment that results in student learning for African Americans requires specialized teacher knowledge, productive dispositions and beliefs, and effective teaching practices. The study reports on 13 elementary mathematics teachers' knowledge of equity related specifically to teaching mathematics to African American students. Teachers' knowledge of equity in teaching was examined using interview data and videotaped classroom observations based on the three components of the Knowledge of Equity in Teaching Framework: (1) knowledge of equity issues; (2) beliefs; and (3) knowledge of equity pedagogy. The participants in this study demonstrated a specific knowledge related to equity in teaching mathematics to African American students. The results of this study revealed that the components of the Knowledge of Equity in Teaching Framework influence each other.

Implications for research and practice are discussed and recommendations for future research are suggested.

CHAPTER 1: INTRODUCTION

Considerable progress in improving mathematics education for African American students has occurred in the past 30 years. This has been facilitated by the publication of national reports, implementation of federal policies, reform efforts in classrooms, and research. Yet, we are still far from achieving equity for African American students. Establishing an equitable classroom environment that results in student learning for African Americans requires specialized teacher knowledge, productive dispositions and beliefs, and effective teaching practices. Therefore, achieving the goal of equitable mathematical environments on a large scale will require more work in preparing and supporting teachers. It will also require further research that examines the specialized knowledge teachers need in order to effectively teach mathematics to African American students. Thus, the purpose of this research study is to further understand elementary teachers' knowledge as it relates to equity in the instruction of mathematics to African American students. In this chapter, I discuss the inclusion of African American students in mathematics via policy documents and legislation. I then discuss the purpose and research questions. I conclude with a discussion of the theoretical perspectives framing the study.

Looking Back

As we examine the educational opportunities for African Americans for the past 200 years, history documents a tremendous improvement. Although African Americans faced many challenges, their desire and dedication to securing high quality education has facilitated growth. For example, after a period of 90 years (1863-1953) the literacy rate of African Americans rose from 7 percent to 90 percent (Spring, 2005). In addition, in many

cases, African American teachers not only had content knowledge and were qualified, but they were able to understand the students, including their patterns of social interaction and cultures (Martin, 2007). Unfortunately, after public schools became integrated, there was an influx of teachers who were unable to *understand* African American students. Too often, teachers lacked the specialized knowledge related to teaching African American students. This lack of knowledge contributed to lower student achievement for African American students.

After the Civil Rights Movement in the 1960s-1970s, several national reports began to acknowledge that there was a problem that needed to be addressed. For example, in 1980, the National Council of Teachers of Mathematics (NCTM) published *An Agenda for Action: Recommendations for School Mathematics for the 1980s*. The researchers recommended that “more mathematics study be required for *all* students and a flexible curriculum with a greater range of options be designed to accommodate the diverse needs of the student population” (italics added for emphasis, p. 1). Unfortunately, these recommendations were misinterpreted. Decisions related to who was and who was not *capable* of doing mathematics resulted in different options—some desirable and some not. In too many cases, minorities and students who were economically disadvantaged were relegated to remedial mathematics instruction coupled with low teacher expectations. Although the authors of this report recommended mathematics for all, they did not discuss disparities in student achievement among different ethnicities or make specific recommendations related to teaching African Americans.

Nine years later, *Everybody Counts: A Report to the Nation on the Future of Mathematics Education* (NRC, 1989) was released. It was one of the first national reports

to document the disparities in mathematical achievement among African Americans, Hispanics, and other minority groups. Lynn Steen, a mathematician and the editor of *Everybody Counts*, argued that the United States school system had wrongly accepted the low achievement of minority students in mathematics education. He also argued that typical mathematics instruction did not facilitate the learning of mathematics as it involved teachers talking while the students listened and mimicked what their teacher did in class. Consequently, large numbers of students, particularly minority students, were not successful with mathematics. Although *Everybody Counts* acknowledged the achievement disparities, the author did not include any suggestions for addressing the problem.

At the same time, NCTM released *The Curriculum and Evaluation Standards for School Mathematics*, (NCTM, 1989). In this document, the authors devoted one paragraph to the notion of equity in mathematics education. In this paragraph, the authors stated that opportunities must be given to all students to be successful in mathematics and past injustices in mathematics education must be corrected. However, the authors did not make any specific recommendations for how to accomplish this goal.

In 2000, NCTM released its revised standards with the document titled, *Principles and Standards for School Mathematics*. This document placed greater emphasis on the issue of equity. The six principles for school mathematics included: (1) Equity, (2) Curriculum, (3) Teaching, (4) Learning, (5) Assessment, and (6) Technology. The Equity Principle demanded high expectations for all students in school mathematics not by the means of equality (i.e., ensuring all students receive the same instruction), but by providing opportunities for all students to engage in mathematics regardless of their

“personal characteristics, backgrounds, or physical challenges” (p. 12). Thus, “mathematics can and must be learned by *all* students” (p. 13). Again, the emphasis was on all students similar to its 1989 publication so race was not specifically addressed. Moreover, this publication did not include recommendations for realizing the equity principle in more mathematics classrooms.

Between 1980 and 2000, as shown above, a number of national reports and policy documents suggested that more work was needed in order to accomplish more equitable practice. In addition, a number of intervention efforts occurred that targeted improving mathematics teaching and learning for African American students (see Chapter 2 for a discussion). For the first time, federal legislation (i.e., No Child Left Behind Act of 2001 (NCLB, 2002)) was introduced to identify specific achievement disparities at the district and school level. A primary tenet of NCLB was for “stronger accountability,” including the mandate that all school districts formulate and disseminate annual “local report cards” that include information on how students from different ethnic groups in the district and in each school performed on state assessments. This legislation mandated that the needs of low-achieving students must be met, and the achievement gap between high and low performing individuals, particularly between minority and non-minority students be closed.

Moving Forward

Achieving equity and the mandates of No Child Left Behind, specifically in relation to African American students, requires teachers with specialized knowledge and productive beliefs. Too often, teachers hold beliefs that do not facilitate the academic participation and learning of African American students. For example, some public

school teachers hold the belief that African Americans are lazy and cannot learn (Martin, 2007). These beliefs may be grounded in the longstanding belief that Blacks were generations behind Whites with regard to skills and intelligence in an evolutionary sense (Anderson, 1988; Spring, 2005). These beliefs lead to low expectations that deny access to problem solving and higher-order thinking skills in mathematics. Thus, a primary focus on low-level skills facilitates academic achievement disparities between African Americans and their White counter-parts.

In addition to beliefs that hinder academic achievement of African American students, teachers have not had the opportunities to develop sufficient knowledge and/or the ability to enact that knowledge so that African American students are successful with mathematics. According to Irvine (2003), “Students fail in school not because their teachers do not know their content, but because their teachers cannot make connections between subject-area content and their students’ existing mental schemes, prior knowledge, and cultural perspectives” (p. 47). Teaching with this level of sophistication requires specialized knowledge and skill in using instructional strategies. Further, Gay (2000) argues that, “decontextualizing teaching and learning from the ethnicities and cultures of students minimizes the chances that their achievement potential will ever be fully realized” (p. 23). Thus, teachers must again have specialized knowledge related to the ethnicities and cultures of the students and the ability to *enact* that knowledge during instruction. Research has described different knowledge bases required for teaching including knowledge of mathematics content that relates directly to the mathematics they teach, effective teaching strategies, the scope and sequence of mathematics curriculum, the general characteristics of elementary students, typical student errors and

misconceptions and how to deal with them, how to engage in critical reflection and evaluation of one's own teaching, and how to work in diverse school settings, including an understanding of the conditions of their students' lives and of the social factors that affect schooling (Ball, Hill, & Bass, 2005; Ma, 1999; Shulman, 1986). Yet, no research has involved understanding teacher knowledge related to equity in teaching mathematics to African American students.

Ogbu and Simons (1998) argue that, "the treatment of the minorities in the wider society is reflected in their treatment in education" (p. 158). Based on the treatment of African Americans in the wider society, even to this day, this is problematic. Establishing an equitable classroom environment that results in student learning for African Americans requires specialized teacher knowledge, productive dispositions and beliefs, and effective teaching practices that oppose the reflection described by Ogbu and Simons.

Virtually no research in mathematics education exists that investigates what specialized knowledge mathematics teachers need to teach African American students. Thus, research is needed to examine and explore mathematics teachers' knowledge of equity to begin to understand the phenomenon of how teachers facilitate high mathematics achievement among African American students.

Research Purpose and Questions

The purpose of the research study is to further understand elementary teachers' knowledge as it relates to equity in the instruction of mathematics to African American students. The research questions underlying this study are:

1. What knowledge related to equity in teaching African American

- students do successful elementary mathematics teachers draw upon?
2. What beliefs related to (a) teaching African American students and (b) teaching mathematics to African American students influence the mathematics teaching of successful elementary mathematics teachers?

Theoretical Perspectives

Historically, research on teacher knowledge has primarily focused on general pedagogical knowledge as described by Shulman (1986):

The emphasis is on how teachers manage their classrooms, organize activities, allocate time and turns, structure assignments, ascribe praise and blame, formulate the levels of their questions, plan lessons, and judge general student understanding. What we miss are questions about the *content* of the lessons taught, the questions asked, and the explanations offered... Where do teacher explanations come from? How do teachers decide what to teach, how to represent it, how to question students about it and how to deal with problems of misunderstandings? (p. 8)

Shulman (1986) realized teacher knowledge encompassed more than just general pedagogy. In his 1985 American Educational Research Association (AERA) Presidential Address he argued that teacher knowledge needed to be reconceptualized. Subsequently, he published what has become a seminal paper in the area of teacher knowledge (Shulman, 1986), arguing that teachers must possess three domains of knowledge: content knowledge, pedagogical content knowledge, and curricular knowledge. Pedagogical content knowledge (PCK), according to Shulman, “goes beyond knowledge of subject matter per se to the dimension of subject matter knowledge for teaching... a particular form of content knowledge that embodies the aspects of content most germane to its teachability” (p. 9, author’s emphasis). Shulman defined PCK as knowledge that is needed *beyond* the subject, it is the knowledge needed “*for teaching.*” He further denoted that PCK “includes an understanding of what makes learning of specific topics easy or

difficult: the conceptions and preconceptions that students of different ages and backgrounds bring with them to the learning of those most frequently taught topics and lessons” (p. 9). In addition to PCK, Shulman distinguished (a) content, (b) content knowledge, (c) pedagogical knowledge, (d) subject matter knowledge, (e) curricular knowledge, (f) propositional knowledge, (g) case knowledge, and (h) strategic knowledge, as other knowledge bases that can be used to analyze teacher knowledge. (See Figure 1.) The categories of propositional knowledge include principles, maxims, and norms. Principles develop from empirical research, whereas maxims develop from teaching practice. Maxims represent collective “slices” of wisdom that have never been “proven” or confirmed through empirical research. Norms, the heart of teacher knowledge, is where teachers’ values, thoughts of fairness, and equity play out in the classroom. It is the teacher’s guide.

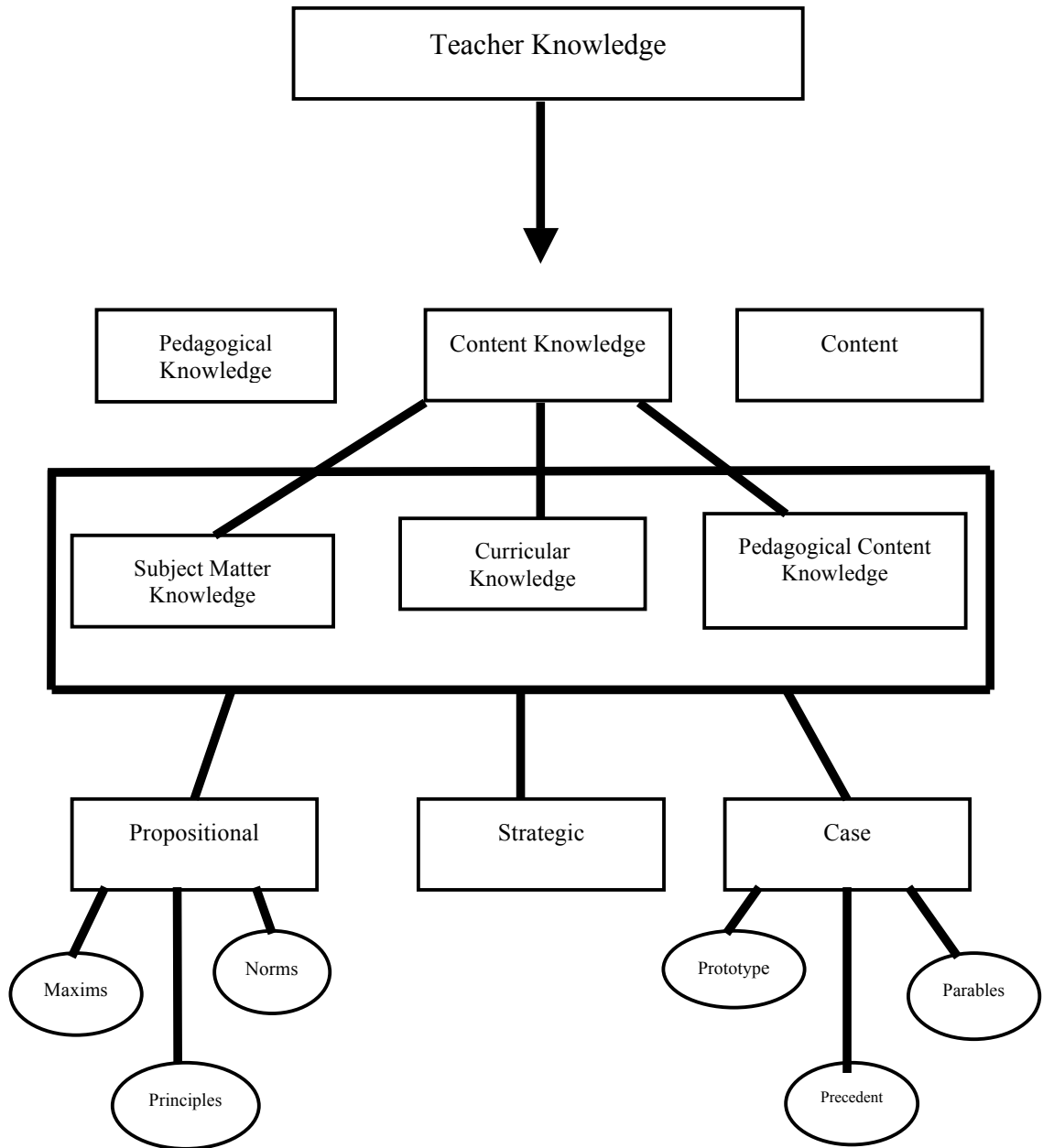


Figure 1. Model representing Shulman’s conception of teacher knowledge.

Grossman (1990) extended Shulman’s framework of teacher knowledge by adding three components: (1) teachers’ goals, knowledge, and beliefs about the purpose of teaching; (2) teachers’ knowledge of learners (i.e., understanding students’ conceptions

and misconceptions); and (3) teachers' knowledge of instructional strategies and representations for teaching particular topics as shown in Figure 2.

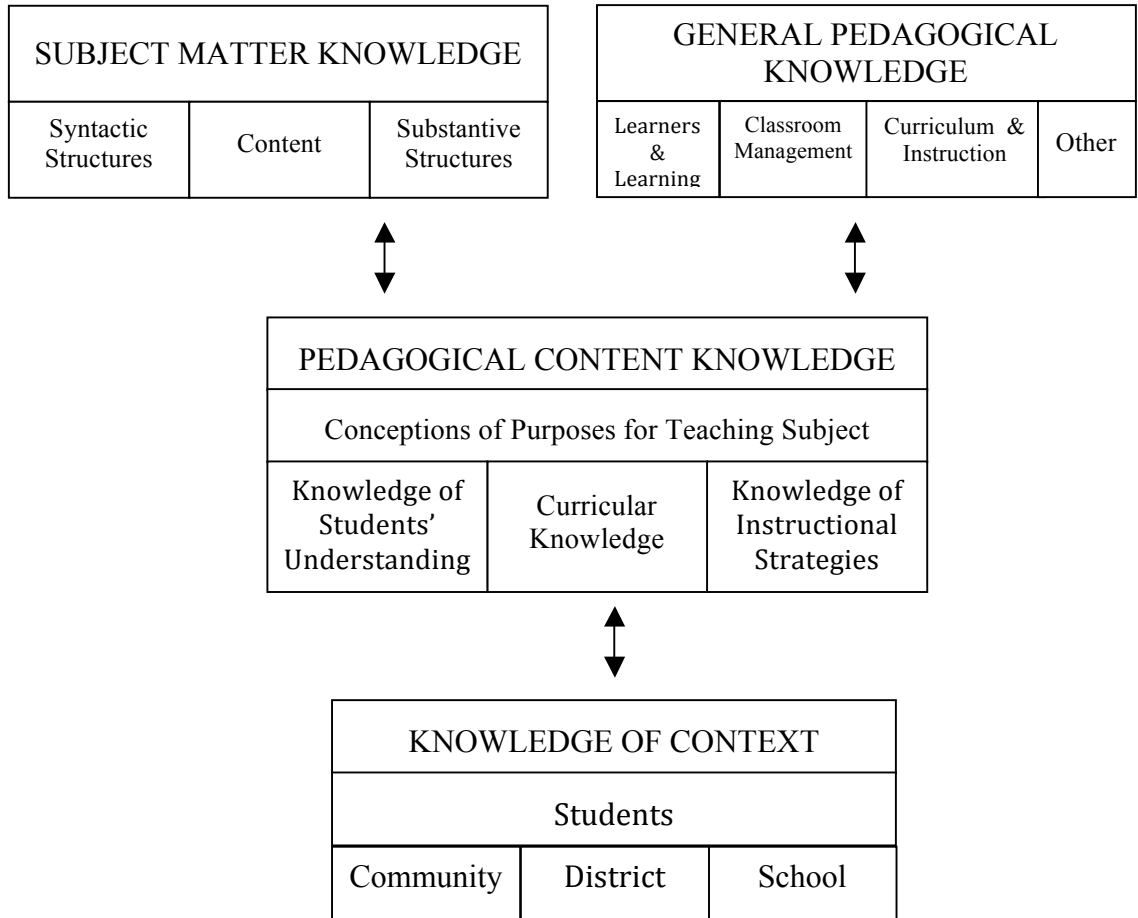


Figure 2. Grossman's model of teacher knowledge.

Magnusson, Krajcik, and Borko (1999) further conceptualized PCK for science teaching and furthered our understanding of teacher knowledge by augmenting Grossman's framework (see Figure 3). Magnusson, Krajcik, and Borko renamed Grossman's component, "Conceptions of Purposes for Teaching Subject" as "Orientations toward Science Teaching and Learning" (p. 97). In addition, the researchers modified Grossman's instructional strategies component to include teachers' knowledge of subject-specific and topic-specific strategies. Knowledge of subject-specific

instructional strategies includes inquiry, discovery, conceptual change, and didactic approaches while knowledge of topic-specific strategies refers to topic-specific representations or topic-specific activities. Magnusson, Krajcik, and Borko also added knowledge of assessment to the framework. Knowledge of assessment consists of two categories: knowledge of dimensions to assess and knowledge of methods of assessment. Knowledge of dimensions to assess is the teachers' knowledge of what feature of student learning they consider important to assess. Teachers' knowledge of methods of assessment includes knowledge of specific instruments that can be used to assess students' understanding (e.g., written tests or laboratory notebooks). Magnusson, Krajcik, and Borko's addition of the assessment component and modifications to Grossman's PCK framework has added to the understanding of teacher knowledge, and has helped guide researchers who are interested in studying knowledge for teaching (mathematics).

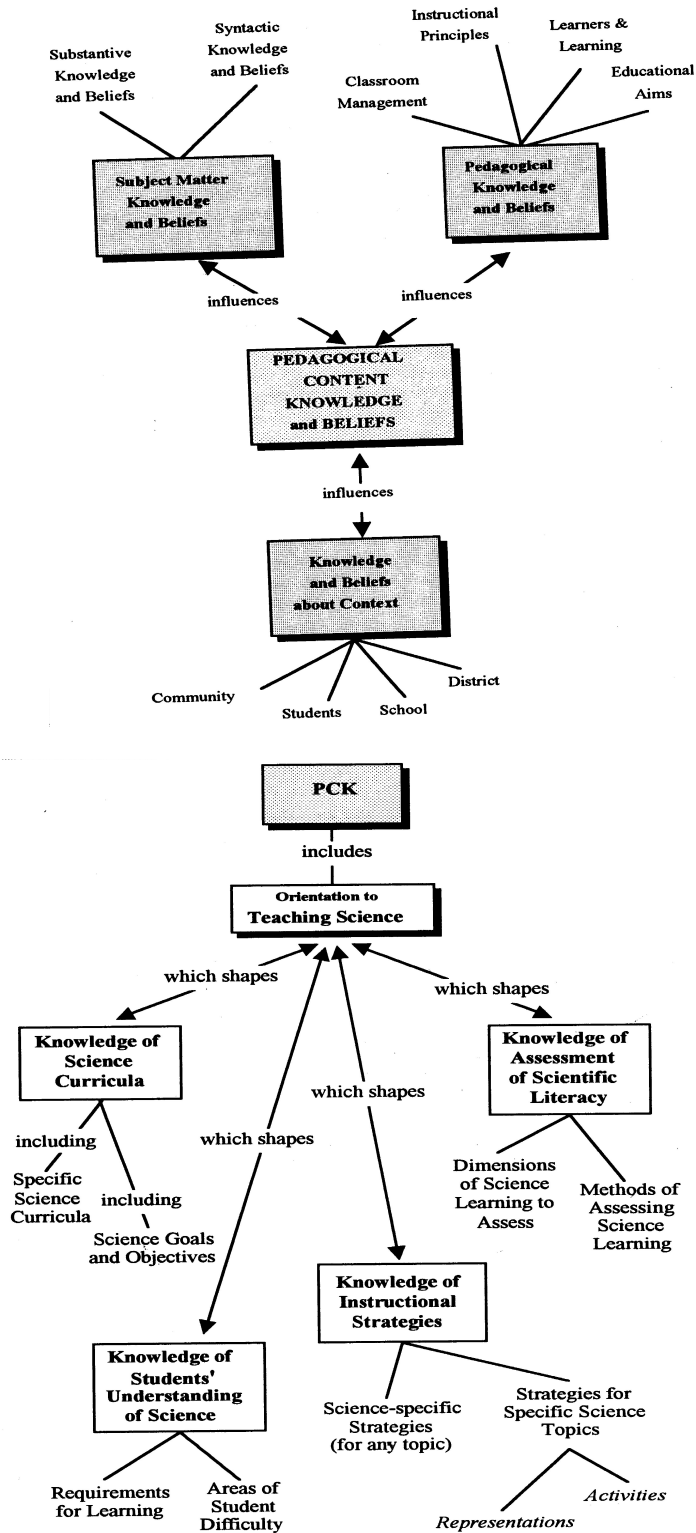


Figure 3. Magnusson, Krajcik, and Borko's (1999) model of teacher knowledge.

The Researching Science and Mathematics Teacher Learning in Alternative Certification Models (ReSMAR²T) project team adapted Grossman's (1990) model of teacher knowledge and Magnusson, Krajcik, and Borko's (1999) model of pedagogical content knowledge to further delineate pedagogical content knowledge. This model of teacher knowledge is represented in Figure 4.

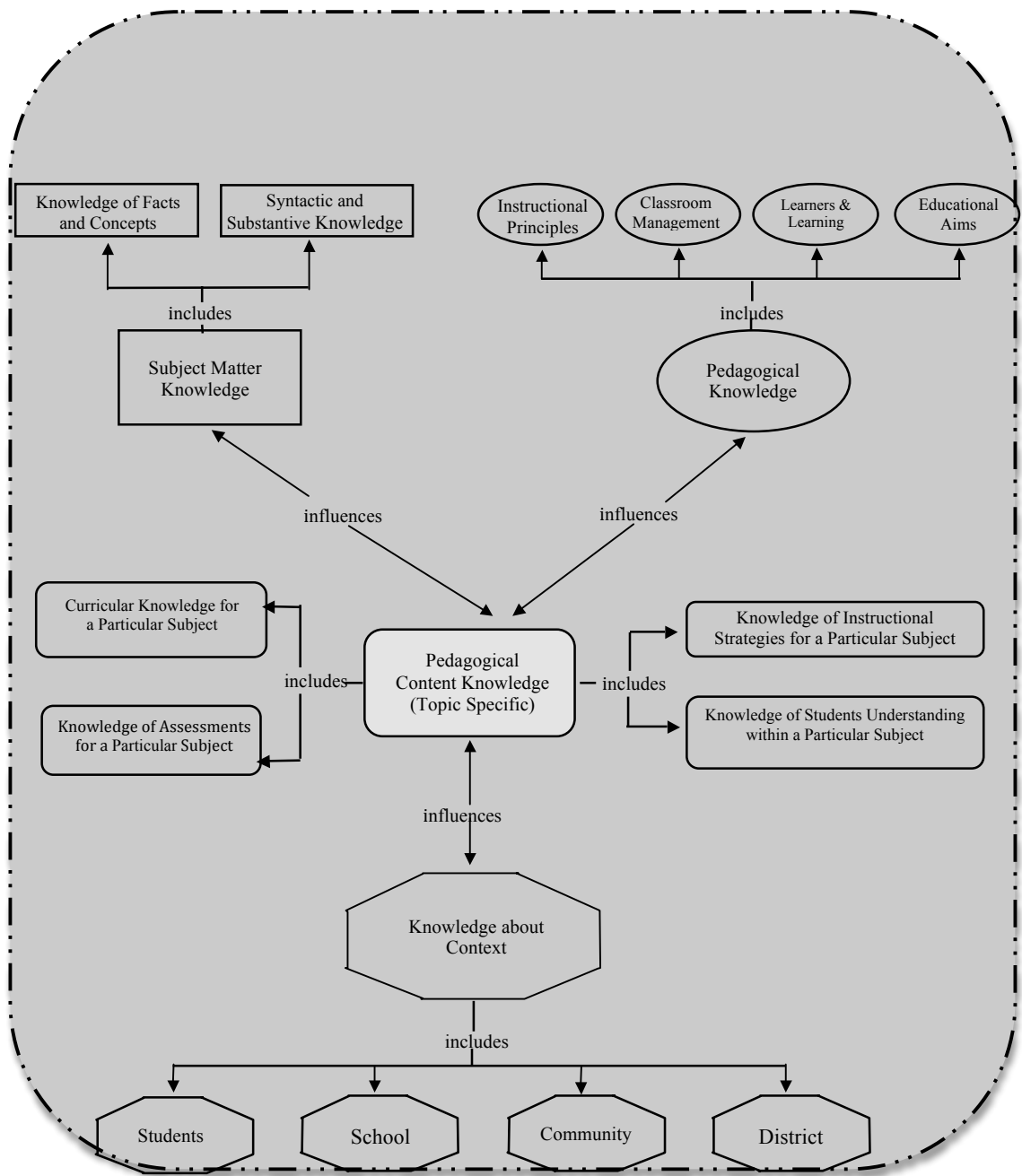


Figure 4. ReSMAR²T model of teacher knowledge.

From The Re-SMAR²T Project at the University of Missouri-Columbia, Sandra K. Abell, PI, 1/08 based on: Grossman, P. (1990). *The making of a teacher: Teacher knowledge and teacher education*. New York: Teachers College Press. Magnusson, S., Krajcik, J. & Borke, H. (1999). Nature, sources, and development of PCK for science teaching. In J. Gess-Newsome & N.G. Lederman (Eds.), *Examining pedagogical Content Knowledge* (pp. 95-132). Dordrecht: Kluwer Academic Publishers.

Several mathematics education researchers have studied knowledge for teaching over the past two decades (e.g., Carpenter, Fennema, Peterson, & Carey, 1988; Hill, Rowan, & Ball, 2005; Ma, 1999). Building on these studies, Hill, Ball, and Schilling (2008)

delineated the construct of teacher knowledge through a concerted effort to conceptualize mathematical knowledge for teaching (MKT). MKT is divided in two categories: subject matter knowledge and pedagogical content knowledge. Each category contains three strands of MKT. The strands for subject matter knowledge include common content knowledge (CCK), knowledge at the mathematical horizon, and specialized content knowledge (SCK). The strands for pedagogical content knowledge include: knowledge of content and students (KCS), knowledge of content and teaching (KCT), and knowledge of curriculum. Hill, Ball, and Schilling reconstructed Shulman's framework and modeled it to focus specifically on studying teachers' knowledge for mathematics teaching. The researchers draw from Shulman's (1986) framework of teacher knowledge, and acknowledge that all of the MKT strands for pedagogical content knowledge are comparable to Shulman's. In addition, the CCK strand is similar to Shulman's subject matter knowledge. The researchers included SCK, a strand not developed from Shulman's work, but similar to Magnusson, Krajcik, and Borko's (1999) instructional strategies, as a new construct to further conceptualize mathematical knowledge for teaching.

As discussed above, teachers must develop and draw from numerous knowledge bases to effectively teach mathematics to all their students. Although the frameworks discussed above include components such as knowledge of context and knowledge of learners, they do not include knowledge related to equity. Currently the conceptualization and research related to the knowledge of equity has not been pursued. In what ways could this specialized knowledge be conceptualized? How do we facilitate the development of this specialized knowledge in teacher preparation and professional development

programs? What does this knowledge look like as it is enacted in the elementary mathematics classroom?

As shown in the conceptual framework in Figure 5, teachers' knowledge, beliefs, and pedagogy related to equity interact and influence social processes in the mathematics classroom which in turn influence student learning.

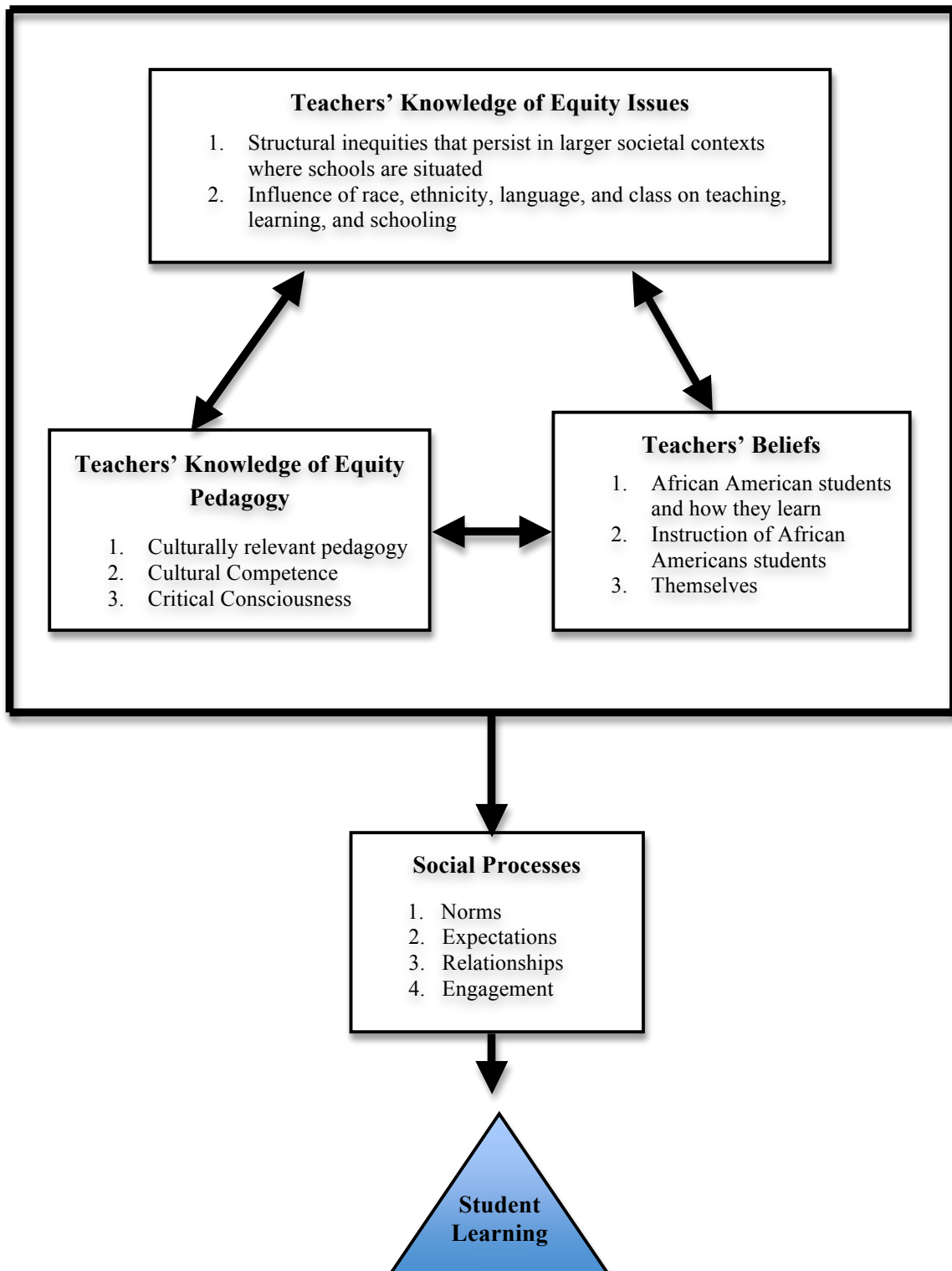


Figure 5. Knowledge of equity in teaching framework.

The top section of the framework emphasizes that teachers should develop knowledge about structural inequities that persist in larger societal contexts where schools are situated as well as the influence of race, ethnicity, language and class has on teaching and learning. Pai (1990) suggests:

Our goals, how we teach, what we teach, how we relate to children and each other are rooted in the norms of our culture. Our society's predominant worldview and cultural norms are so deeply ingrained in how we educate children that we seldom think about the possibility that there may be other different but equally legitimate and effective approaches to teaching and learning. In a society with as much sociocultural and racial diversity as the United States, the lack of this wonderment about alternative ways often results in unequal education and social injustice. (p. 229 as cited in Gay, 2000, p. 23)

The rectangle on the right side of the framework emphasizes teachers' beliefs. Philipp (2007) asserts beliefs are "psychologically held understandings, premises, or propositions about the world that are thought to be true...beliefs might be thought of as lenses that affect one's view of some aspect of the world or as dispositions toward action" (p. 259). Teachers need productive beliefs specifically related to African American students, how African American students learn, and effective teaching practices for African American students. Moreover, they need productive beliefs related to themselves as teachers and the roles they play as they teach mathematics through an equitable lens.

On the left-hand side of the conceptual framework, I include three components within knowledge of equity pedagogy: culturally relevant teaching, cultural competence, and critical consciousness. Ladson-Billings (1994) defines culturally relevant teaching as a "pedagogy that empowers students intellectually, socially, emotionally, and politically by using cultural referents to impart knowledge, skills, and attitudes" (p. 17). Gay (2000)

extends this definition by stating culturally responsive teaching is “using the culture knowledge, prior experiences, frames of reference, and performance styles of ethnically diverse students to make learning outcomes more relevant and effective for them” (p. 29). Culturally relevant/responsive teaching is designed to teach the “whole” child through acknowledging and addressing the child’s race, language, ethnicity, and class through teaching. Students’ “identities” are not ignored or subsumed in the deficit model of teaching and learning, but are contributors to the teaching and learning of students. For example, culturally relevant/responsive teachers use the strengths, experiences, and accomplishments of students in their instructional approaches. The following are some components of culturally relevant teaching that I examined: (1) teachers believe *all* students can succeed; (2) teachers view themselves as part of a community; (3) teachers help students make connections between their racial, cultural, local, national, and global identities; (4) teachers establish relationships with students that extend beyond the classroom environment; (5) teachers establish a community of learners; (6) teachers believe knowledge is constantly recycled, re-created, and shared by students and themselves – it is not static; (7) teachers view teaching as students developing their knowledge; and (8) teachers use a variety of instructional strategies (Gay, 2000; Ladson-Billings, 1994).

Cultural competence includes teachers’ knowledge about their own culture and the role it has in their lives; knowledge of students’ cultures; the necessity to *study their students* (Ladson-Billings, 2001); and the ability to communicate (both verbal and nonverbal), understand, and interact with people from different cultures. For example, a teacher of African American students may give a class a certain “look” to quiet them

down. In the African American culture, adults generally use facial expressions and eye contact to discipline their children. However, this form of “discipline” is not effective with all African American children. Thus, it is important for the teacher to *know the students* and their background and not overgeneralize the use of specific approaches. A culturally competent teacher has the capacity to function in other cultural contexts (King, Sims, & Osher, n.d.). I refer to culture as the amalgamate patterns of behavior that include customs, beliefs, thoughts, communication, and values.

Critical consciousness engages both teachers and students to critically question, reflect, participate in meaning making, and act in their sociopolitical environment.

[Critical consciousness is] learning to think critically about accepted ways of thinking and feeling, discerning the hidden interests in underlying assumptions and framing notions (whether these are class-, gender-, or race/ethnicity). It means learning to see, in the mundane particulars of ordinary lives, how history works, how received ways of thinking and feeling serve to perpetuate existing structures of inequality. (Hopper, 1999, p. 210, as cited in Diemer, Kauffman, Koenig, Trahan, & Hsieh, 2006, p. 445)

Ladson-Billings (2001) suggests teachers who promote critical consciousness: (a) have knowledge of the larger sociopolitical context (i.e., knowledge of political and social realities in which they live beyond the television and newspaper articles); (b) invest in students and understand students are important for who they are and who they can become; (c) plan and implement academic experiences that connect students to the larger social context; and (d) believe the success of students has consequences for their quality of life.

Not only must teachers have a knowledge base of equity pedagogy, they must have knowledge of learners, specifically African American learners, which is embedded within these instructional practices. Knowledge of learners involves knowledge of how students

learn, knowledge of misconceptions and their incoming knowledge, and knowledge of learner difficulties. Moreover, teachers must have *pedagogical learner knowledge*. Pedagogical learner knowledge includes “knowledge that allows teachers to understand learners from different cultural, social, and family backgrounds, interpret properly what they say and do, and support effectively their development in cognitive, social, physical, and psychological dimensions” (Darling-Hammond, 1998, cited in Achinstein & Athanases, 2005, p. 858).

The conceptual framework outlines the critical components of knowledge of equity issues, beliefs, and knowledge of equity pedagogy. It guided the design and implementation of the study including the review of the literature as well as the data collection and analysis phases. In chapter 2, I discuss the review of the literature.

CHAPTER 2: LITERATURE REVIEW

The purpose of this research study is to further understand elementary teachers' knowledge as it relates to equity in teaching mathematics to African American students. To inform the design of this study, I surveyed literature related to equity including policy documents, advocacy pieces, calls for theory and research, as well as empirical research studies. Within this literature, authors target different issues related to equity such as gender, race, class, and language. Some authors (Morgan & Watson, 2002; NCTM, 1989; 2000) refer to equity or equitable practice without acknowledging specific gender, race, class, language, or culture. In these cases, the discussions focus on "mathematics for all" or "opportunity to learn." Others (e.g., Boaler) use terms such as "students of color" or "minority students" but do not identify specific sub-groups of students. There is a relatively small group of researchers who specifically research and write about African American students and their teachers. Some (Foster, 1997; Gay, 2000; Irvine, 2003; King, 1991; Ladson-Billings, 1994; 2001; Sleeter, 2001; Thompson, 2003; 2004; 2009) are outside of the mathematics education context while others (e.g., Berry, 2003; 2008; Lubienski, 2000; 2002; Malloy, 1997; 2009; Martin, 2000; 2003; 2007; Stinson, 2009; Strutchens, 2000; Tate, 1995) are within mathematics education.

Although I surveyed the literature more broadly, I focus my discussion of the literature on four major areas: inequity related to African Americans, teaching African American students, teachers' beliefs about African American students, and teachers' knowledge related to equity.

Inequity Related to African Americans

Race is a "concept that signifies and symbolizes sociopolitical conflicts and

interests in reference to different types of human bodies” (Winant, 2000, p. 172). Further, race is a socially constructed category that has a social reality that reinforces White privilege – the racial structure that predominates in the United States (Bonilla-Silva, 2006). This racialized social system, grounded in power, has been a significant factor in determining inequities experienced by non-White members in society, specifically African Americans (Bonilla-Silva, 2006; Ladson-Billings & Tate, 1995). I begin the section with a historic account of the inequities faced by Blacks in education. I then discuss racism and the stereotype threat and the negative effects each has on African Americans. I conclude with a discussion of the achievement gap in mathematics education and racialized inequities.

Historical Overview

Prior to and following the Civil War, educational opportunities for African Americans varied throughout and within the states. However, there were some distinct differences between the North and the South. I describe some events that occurred in the North and the South that illustrate these differences.

In northern cities such as Philadelphia, New York, Baltimore, and Boston, former slaves had opportunities to attend schools. With the passage of the 1789 Massachusetts Education Act, students living in towns of more than 200 families were able to attend elementary schools six months of the year (Anderson, 1988; Spring, 2005). At that time there were 766 Black families living in Boston and the children from these families had the opportunity to attend public schools. Unfortunately, the Black children enrolled in these public schools encountered hostile treatment from Whites. For example, some teachers would send misbehaving White children to sit in the “nigger-seat”, a symbol of

stupidity and a place of shame, for punishment (Schultz, 1973). In response, African American parents made a request to the Boston School Committee for separate schools to protect and shield their children from White prejudice. These parents were determined to secure safe learning environments for their children. The Boston School Committee rejected this request. They argued that if they opened up separate schooling facilities for African American students, then they would have to open separate facilities for other ethnic and minority groups. Not wanting their children to endure the harsh treatment and the realities of prejudice, these African American parents decided to open their own private school in Boston in 1802. In 1806, the Boston School Committee overturned their decision and allocated public funds and contributions from White philanthropists to open a segregated school. Although no law existed requiring segregation, the Boston School Committee opened, controlled, and supported a segregated school (Schultz, 1973; Spring, 2005). This resulted in the spread of separate, segregated schools throughout Boston.

While African Americans initially supported enrolling their children in segregated schools, they soon realized that their children were receiving an inadequate and inferior education as a result of segregation. David Walker, writer of the first Black newspaper *Freedom's Journal* argued Whites were holding Blacks back from receiving an education. He further concluded segregated schools were a conspiracy to keep Blacks ignorant (Schultz, 1973; Spring, 2005). Unqualified teachers were appointed to teach in the all Black schools and the school buildings were deteriorating (Anderson, 1988; Schultz, 1973; Spring, 2005). This problem continued for many years.

Not only were these schools under resourced and inferior, but also often children had to travel great distances to attend. For example, in 1849 Benjamin Roberts and his five-

year old daughter walked by five White schools as they traveled each day back and forth to his daughter's Black school (Spring, 2005). Roberts finally realized this did not make sense and decided to enroll his daughter in one of the closer White schools. The school refused to admit his daughter, so Roberts sued the city of Boston. The Judicial Supreme Court ruled that schools had already been provided for Black children and Roberts must enroll his daughter in the Black segregated school. This was one of the first rulings that argued for separate, but "equal" educational opportunities in American history. The underlying assumption was that both Blacks and Whites had the same educational opportunities in each of their separate learning environments. In 1855, the governor of Massachusetts passed a law stating no child would be denied access to public schools based on race or religion. Consequently, Boston public schools were integrated. However, not all Black children in the United States had the opportunity to attend White schools.

Although the conditions reported about Massachusetts above were less than ideal, they were significantly better than the realities for Blacks living in the South around the time of the Civil War. Before Abraham Lincoln signed the Emancipation Proclamation it was against the law to educate Blacks in the South (Anderson, 1988; Spring, 2005). Whites believed that it would be in their best interest to keep Blacks ignorant and even feared the possibility that they would become educated. For example, if Blacks learned how to read and write, they would no longer consider themselves inferior and subject to the White man. Therefore, slaves were severely punished when they were caught trying to learn to read and write. The punishment included (1) cutting off the forefinger of the slave's right hand; (2) being severely beaten; or (3) death. On one occasion a slave master

caught a slave teaching a younger slave how to spell and read. The slave owner beat the slave to death for teaching the young slave, and then severely beat the child to try to make him forget everything he learned (Anderson, 1988). Yet, despite the consequences, numerous slaves persevered and learned how to read and write.

After Lincoln signed the Emancipation Proclamation in 1862, Blacks fervently sought means to secure an education for themselves and their children. Booker T. Washington asserted,

Few people who were not right in the midst of the scenes can form any exact idea of the intense desire which the people of my race showed for education. It was the whole race trying to go to school. Few were too young, and none too old, to make the attempt to learn. (Anderson, 1988, p. 5)

Therefore, Blacks established and supported their own schools by staffing them with Black teachers to ensure their students received a quality education. On March 22, 1864, Major General Nathaniel P. Banks founded the Board of Education to “organize and govern the spread of black schools” (Anderson, 1988, p. 9). Black schools flourished. For example, in 1866 in Charleston, South Carolina a school whose administrators and teachers were all Black had an average daily attendance of 720 pupils (Spring, 2005). Many Blacks received a liberal arts education, which educated Blacks in higher-level mathematics and foreign languages such as Greek and Latin (Anderson, 1988). As more and more African American children began to attend school, this posed problems for many southerners who employed them. A large number (i.e., 404,225 out of 516,276) of school-aged African Americans (i.e., age 10 to 15) had jobs as unskilled farm laborers. The Whites feared that in the short term these laborers would not be available to do their work and in the long term educated Blacks would either leave agricultural work

altogether or demand more money for their labor. Thus, as African Americans became educated and literate, many White southerners and planters grew angry as they viewed the education of Blacks as a threat to their economic success.

At this point, the Southern Whites knew they could not prevent Blacks from attending school, but perhaps they could influence what they learned while they attended school. Spring (2005) concludes there was tension as to the type of education Blacks should receive, particularly in the South. Blacks wanted an education to improve their political and economic positions in the South, whereas missionaries from the North wanted to emphasize morality, and White southerners wanted industrial education to keep Blacks in their place. As a result, some Southern Whites and many northern philanthropists funded and organized Black schools for the purpose of educating Blacks to develop a “proper” work habit and moral behavior. Thus, these schools were designed to *educate* Blacks about the role in society (i.e., to work in unskilled and semi-skilled occupations) that others wanted them to have. Blacks would become “civilized” beings and begin to accept their subordinate position in society. Consequently, at these schools, Blacks did not study liberal arts courses. Instead, they took courses such as “working on the farm” and “cleaning and plowing the field” that Southern Whites believed should be designated for African Americans. Other course offerings included (1) domestic classes, where the primary goal was to teach Black females how to sew and how to be cooks for White families and (2) carpentry and construction classes for males that primarily focused on how to build frames (Anderson, 1988; Spring, 2005). Therefore, Blacks obtaining an industrial education received superficial lessons on the three Rs (i.e., reading, writing, and arithmetic). African American teachers were now equipped with the

necessary knowledge to *educate* Black students for their proper role in society as defined by those who designed these schools.

Of course, it is important to remember that segregation was not limited to school environments, but all aspects of life such as attending religious institutions, eating at restaurants, and traveling. As time passed, some determined African Americans began to fight against the idea of segregation in all contexts and more specifically in school environments. In some cases, this determination reached the U.S. Supreme Court. In 1896, the Supreme Court heard the *Plessy v. Ferguson* case and through their 7-1 decision ruled in favor of the “separate but equal doctrine.” Federal law now protected racial segregation provided the “facilities” were of equal quality (Fireside & Morial, 2004; Groves, 1951). Unfortunately, equal quality was not defined, and it was clear to all in this time period that Black and White schools were far from equal.

According to Spring (2005), the Second Crusade for Black education took place from 1910 to the 1930s where African Americans worked to improve the quality of the segregated Black schools. Spring noted that the Second Crusade involved the “expansion of segregated schools for African American children paid for by a combination of personal donations of time and money by Black citizens, donations by private foundations, and government money” (p. 227). When Blacks realized they were not going to receive support from the White community and the Board of Education, they raised money on their own to provide a substantial place to educate their children. In fact, an ex-slave gave all of the money he had so that Blacks could be educated in his community (Anderson, 1988; Spring, 2005). Despite the inequities endured by Blacks, they were yet determined to educate themselves and their children. As a result, they paid

the required tax to support White segregated schools, but sought additional funds to support the development and maintenance of schools for their own children.

Historical accounts delineate the success and commitment African Americans had for obtaining an education. Moreover, several researchers (Jones, 1981; Morris, 2002; Spring, 2005; Sowell, 1974; Walker, 1996) report the educational success of African Americans despite the structural and societal inequities that existed during this time period. In other words, despite the unequal funding provided to African American schools, Black students received an excellent education. This was attributed to the community involvement and caring about the education and success of the African American student (Spring, 2005).

Throughout the Second Crusade, other U.S. Supreme Court rulings began to shift the view of “separate but equal” (see *Ladson-Billings* and *Tate* for examples), but the battle was not won until 1954 with the *Brown v. Board of Education of Topeka* decision. In this case, the U.S. Supreme Court ruled that segregated education was unconstitutional, and it overturned the “separate but equal doctrine.” This United States Supreme Court decision brought encouragement to African Americans who hoped this new ruling would finally bring equality and eliminate structural inequities faced by African Americans. However, this hope was not realized. As the integration of America’s public schools slowly took place over the next few decades, African Americans continued to face obstacles of unequal educational opportunities. Similar to the resistance African American students faced in Boston following the Civil War, African American students in the late 1950s were not welcomed by many of their White peers and faced hostility from parents,

students, teachers and administrators as has been illustrated vividly by photographs, documentaries, and movies.

A different aspect of this transition to integrated schools that is not as well known is the impact of the *Brown* decision on the African American teaching workforce. Before *Brown*, about 82,000 African American teachers were responsible for teaching two million African American public school students (Hudson & Holmes, 1994). Ladson-Billings (2004) writes, “Black teachers received advanced training in some of the best northern institutions, including Teachers College, University of Wisconsin-Madison, and the University of Chicago making them better qualified than White southern teachers, but still legally prohibited from teaching White children” (p. 6). These teachers gained specialized knowledge that supported their teaching of African American students. After *Brown*, many African American teachers and administrators were displaced or demoted (Fairclough, 2007; Ladson-Billings, 2004). Ladson-Billings writes, “Despite the job losses and demotions, Black teachers and administrators generally supported school desegregation even though it meant likely displacement for them” (p. 6). As a result, over time, African American students transitioned into classrooms taught by White teachers (i.e., by 2004 only 8.4% of the U.S. teaching workforce was African American (U.S. Census Bureau)).

The historical account described above is foundational to the current state of education for African Americans in the U.S. These historical events have led to racial inequalities that currently plague our classrooms.

Racism

In a wealthy suburb in New York City, an African American father joins his two sons, aged 7 and 9, for breakfast and tells them they are the best boys ever. He continues to inform them that they can be successful at anything. This ritual takes place every morning during breakfast before the boys go to school. The father hopes the daily talk would counteract the subtle and overt racist assumption that his Black boys are less intelligent than their White peers (Landsman, 2004).

Racism is the

systematic mistreatment of certain groups of people on the basis of skin color or other physical characteristics. This mistreatment is carried out by societal institutions or by people who have been conditioned by the society to act, consciously or unconsciously, in harmful ways toward people of color. (Weissglass, 2002, p. 36)

African American students are cognizant of racism that occurs in the classroom. For example, a student in an advanced placement high school class in St. Paul, Minnesota reports his teacher always asked challenging questions to White students and all the easy, less challenging questions were directed to Black and Latino students. When this was brought to the teachers' attention, the teacher acknowledged her actions and stated she assumed Black students did not know the answers. So, to avoid any type of embarrassment she only asked them questions she thought they could answer correctly (Landsman, 2004). Perez (2000) also found that mathematics teachers ask White students more challenging questions, interact more with White students, and provide White students with more analytical feedback. Thus, privileging White students.

Solomon, Portelli, Daniel, and Campbell (2005) report on a qualitative study that explored the attitudes, beliefs and ideologies of 200 (60 students of color and 140

students of European descent) preservice teachers from two universities. One of the universities had a strong emphasis in equity and focused on: (a) integrating issues of diversity and equity in the pedagogy of teacher education; (b) preparing teachers to teach in an urban environment; (c) developing collaboration among teacher educators and other preservice teachers; and (d) supporting classroom teachers to form a community of learners. The other university did not emphasize these components. The researchers used discourse analysis, manifest and latent analysis (i.e., addressing specific comments of participants in addition to analyzing their statements) to identify connections and inconsistencies with participants responses to the article “White privilege: unpacking the invisible knapsack” by Peggy McIntosh (1990). Three predominant categories emerged: ideological incongruence, negating white capital, and liberalist notions of individualism and meritocracy.

Ideological incongruence refers to the “dilemma experienced by individuals when their ideological belief sets are incompatible” (Solomon, Portelli, Daniel, & Campbell, 2005, p. 153). For example, teachers can participate in racist practices while simultaneously declaring racial innocence: “My predominant response to a discussion of racism and white privilege is one of wanting to retreat from an overwhelming and seemingly impossible task and to avoid paralyzing feelings of guilt about my privilege [as a White male]” (p. 154). Another student commented:

As a white male...I grew up believing that if someone works hard then they will be able to achieve almost anything. I assumed that people who achieved little were fully responsible for their situation, ignoring the fact that not everyone in this society starts off on the same playing field. I did not take into account that members of the dominant society are privileged and that others have been disadvantaged. (p. 154)

White preservice teachers realized their ideologies of understanding themselves and their position in society was socially constructed. Having the knowledge that their White ancestors created a society by oppressing and dominating other racial groups to benefit and privilege Whites, forced the preservice teachers to grapple with some incongruous positions.

Negating white capital occurred when participants denied the existence of white privilege and all the benefits accorded to it. Instead, many believed the excellence and rewards they obtained was due to their individual efforts. But some participants tried to reconcile their beliefs by stating multicultural education should be included in the classrooms:

If ignorance continues we cannot move forward in combating racism. One way of doing this is to have monthly themes that examine *other* [emphasis added] cultures. This can be done by having guest speakers who are natives of various cultures, decorations around the room depicting a particular culture, eating food from foreign places, include personal reflections from students and so on. Encouraging students to conduct studies about places that they are not familiar with and present it to the class describing the way of living, via role-playing a person from that culture. (Solomon, Portelli, Daniel, & Campbell, 2005, p. 158)

The researchers discussed several problems with the above comments. First, the teacher removed herself and the role *she* would play. Thus, eliminating the need to analyze the issues of power, historical colonization and oppression, and dominance. Second, by removing herself from the situation, whiteness is further entrenched in normalcy of the system (Solomon, Portelli, Daniel, & Campbell, 2005).

In Landsman's (2004) multicultural college education class, a student majoring in education, wrote "It is good I took this class from you, because before I took it, I thought all black people were stupid because they let themselves be slaves" (p. 29) on a final

paper. This student has gone through most of her education career believing that Blacks are inherently inferior beings. Landsman, an advocate to eliminate racism in classrooms, argues, “if educators read and reflect, engage in ongoing dialogue, immerse ourselves in other cultures, create safe classrooms, and challenge racist definitions of intelligence, then schools will stop using racist assumptions to determine a child’s potential”

(Landsman, 2004, p. 32). If teachers are not willing to openly discuss and challenge racist viewpoints toward African American students in their classroom and school institutions, African Americans will continually be degraded and looked upon as inferior beings.

Stereotype Threat

Aronson and Steele (see Aronson, 2004; Aronson & Steele, 2005; Steele & Aronson, 1995) characterized the stereotype threat as “stereotypes that allege intellectual inferiority” (Aronson, 2004, p. 14) on a group of students whom the stereotype is targeted. About half of White Americans believe Blacks are unintelligent (Smith, 1990). This belief plays a powerful role in the poor achievement of African American students. For example, after entering college with similar backgrounds (i.e., SAT scores and grades), Black students scored worse than White students. When the stereotype threat was removed, Black student performance increased. For instance, Steele and Aronson (1995) administered a challenging standardized test to White and African American students. The control group was informed the test would measure their intellectual ability, and the experimental group was informed the test was designed to investigate the psychology of verbal problem solving. Students in both groups were equally talented, given equal time to complete the test, and all other testing conditions were the same. Black students in the experimental group solved more problems than Blacks in the

control group. There was no effect on White students. Thus, “human intellectual performance is far more fragile than we customarily think; it can rise and fall depending on the social context” (Aronson, 2004, p. 16). This work demonstrates the power and influence that racism has on African American students’ achievement and performance.

Achievement Gap

Although African American and White students enter school with similar mathematical performance (Weissglass, 2000), numerous studies show a substantial gap in mathematical achievement between African American and White students after they experience school mathematics (Lee, 2004; Lee & Wong, 2004; Lubienski, 2002; Reyes & Stanic, 1988). For example, according to the 1991 U.S. National Center for Education Statistics more than 40% of African American eighth graders are behind at least one grade level of their typical and expected achievement (Waxman & Padron, 1995). Lubienski (2002) further reports the gap on the 2000 NAEP (i.e., National Assessment Educational Progress) between fourth grade African Americans and White students was 31 points. This gap widened to 39 points for 8th graders and to 34 points for 12th graders. Since the NAEP is based on a 500-point scale, where nine points is equivalent to one grade level (Lee, 2004; Reyes & Stanic, 1988), African American fourth graders were four grade levels behind their White peers. In addition, on the 2000 NAEP, African American 12th graders performed lower than White 8th graders (Lubienski, 2002).

Not only did African Americans perform poorly on national exams, they also had low mathematical achievement on international tests. According to the 2007 Trends in International Mathematics and Science Study (TIMSS) assessment, the fourth grade achievement gap between White and African American students was 67 points, and in

eighth grade the gap climbed to 76 points (TIMSS, 2007). The achievement gap promotes a sense of learned helplessness and hopelessness among African American students in the mathematics classroom (Lubienski, 2000).

Racialized Inequities

Educational outcomes for many African American students are functions of the unequal racialized social system. Within this system many African American students are (a) taught by unqualified teachers; (b) not challenged in the mathematics classroom; and (c) not provided with adequate resources to learn. I discuss these inequities below.

Unqualified teachers. The National Commission on Teaching and America's Future reported that new, uncertified "teachers" are usually assigned to teach in high poverty school districts containing high populations of students of color, whereas *educated* new teachers are hired to teach in wealthier school districts (Darling-Hammond, 1998). In 1994, Darling-Hammond (1998) reported that $\frac{1}{3}$ of the teachers in high-poverty schools taught without a minor in their main field and nearly 70% taught without a minor in their secondary field of study. Additionally, according to the Schools and Staffing Survey (SASS), mathematics teachers in predominantly Black and/or Hispanic High Schools are less likely to teach in their certified area and field of study than teachers who teach in predominantly White schools. The chances are higher for students to be taught by unqualified, inexperienced, uncertified, and out of field teachers, the more impecunious and racially isolated a school is (Lee, 2004).

Unchallenging mathematics instruction. Teachers make daily instructional decisions on what and how to teach and to *whom* they will teach (Reyes & Stanic, 1988). For example, in 8th grade mathematics classrooms, African American and Hispanic students

were given multiple-choice tests that tested basic skills and facts, while White students were given tests that emphasized reasoning and problem-solving skills (Lubienski, 2002). Lubienski (2002) asserts high minority schools spend less time emphasizing higher order thinking skills than non-minority schools. Many teachers believe a prerequisite to teaching higher order problem solving is mastery of basic facts. Thus, teachers spend an extended amount of mathematics instruction *teaching* low-level skills (e.g., drill and practice) to minority students (Lubienski, 2002; Waxman & Padron, 1995). Consequently, minorities are not afforded the opportunity to learn challenging mathematics.

Resources. Schools serving larger numbers of students of color have significantly fewer resources than schools serving predominantly White students. In a high school in Detroit a course in word processing was taught without a word processor, and a high school in East St. Louis had a biology lab without laboratory tables or usable dissecting kits, whereas nearby suburban students had computers and elaborate science laboratories to conduct their experiments (Darling-Hammond, 1998). Minority students have access to fewer opportunities to learn in the classroom (Royer & Wallas, 2007), which potentially limits their ability to succeed, particularly in the mathematics classroom.

Teaching African American Students

Pedagogy is “about the relationship between teaching and learning, and how together they lead to growth in knowledge and understanding through meaningful practice” (Loughran, 2007, p. 2). Researchers (Ladson-Billings, 1994; Malloy, 2002; 2009; Matthews, 2005) argue as teachers practice pedagogy related to equity they are able to build relationships, have high expectations, and students are able to maintain their

identities. Teachers must have knowledge of students' culture, lives, and experiences to make learning relevant (Malloy, 1997). This knowledge includes understanding African American learning styles and identities. In this section, I discuss African American students learning preferences and mathematical identities. I then discuss teachers' pedagogical practices (e.g., culturally relevant pedagogy, democratic education, and social justice) and instructional strategies they use with African American students. I conclude with a discussion of intervention projects that focus on improving mathematics teaching and learning of African American students.

Learning Styles

A learning style is “a way of perceiving, conceptualizing, and problem-solving” (Willis, 1992, p. 261) in order to understand a particular phenomenon. African American students tend to be more field dependent learners and rely less on analytic reasoning (Malloy, 1997). Stiff (1990) writes analytic teachers and learners place order and structure on the world to understand it. These types of learners are focused on the importance of precision, directness, and conciseness when learning mathematics. Competition in this type of atmosphere is both acceptable and desired. However, many African American students prefer learning mathematics holistically in a cooperative learning environment (Slavin & Oickle, 1981; Stiff, 1990). For example, Malloy (1997) gave middle school African American students the following problem:

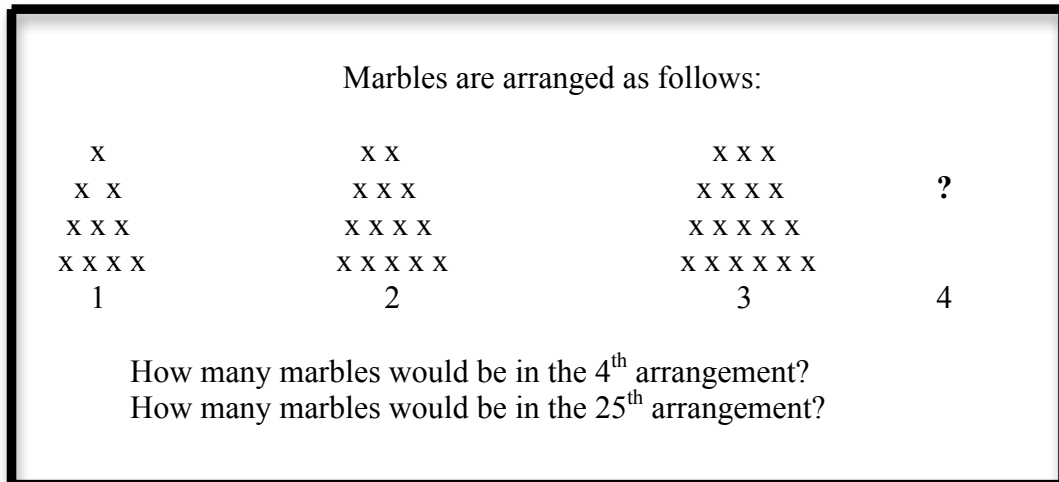


Figure 6. Marble problem (adapted from Malloy, 1997, p. 25).

The majority of students who successfully solved the problem used a holistic approach. They examined all the arrangements and recognized the number of marbles in the first row of each arrangement was the same as the arrangement number, and each subsequent row increased by one marble. To contrast, a student solving this problem using an analytic approach would count the total number of marbles in each arrangement and discover that the number in the succeeding arrangements increases by four, and use this knowledge to find the fourth and twenty-fifth arrangement. Malloy and Malloy (1998) argue the learning preference of African American students in a mathematics classroom is holistic, field-dependent, and interdependent. This learning style suggests that mathematics instruction should include instructional strategies that allow students to focus on the whole and participate in social interaction.

In Willis' (1992) review of the literature on the cognitive functions and learning styles of African American children, four key assumptions that characterize the learning styles of African American students are described. The four assumptions include: (1) a child's learning style needs to be taken into consideration in school; (2) culture affects

attitude, personality, behavior, and cognition; (3) African Americans are influenced by their African culture and heritage; and (4) differences between Blacks and Whites are differences – not deficits. Based on these assumptions, Willis (1992) summarizes the learning preferences of African American students:

1. *Social/affective*: people oriented, emphasis on affective domain, social interaction is crucial, social learning is common.
2. *Harmonious*: interdependence and harmonic/communal aspects of people and environment are respected and encouraged, knowledge is sought for practical, utilitarian, and relevant purposes, holistic approaches to experiences, synthesis is sought.
3. *Expressive creativity*: creative, adaptive, variable, novel, stylistic, intuitive, simultaneous stimulation is preferred, verve, oral expression
4. *Nonverbal*: nonverbal communication is important (intonation, body language, etc.), movement and rhythm components are vital. (p. 268; Malloy & Malloy, 1998; Shade, 1989; Hale-Benson, 1986; Hilliard, 1976)

Mathematics teachers must incorporate the learning preferences of African American students during mathematics instruction. Currently, in mathematics instruction the learning preferences of African American students are ignored which exacerbates the mathematical underachievement of African American students.

Mathematical Identities

Stinson (2009) examined how mathematically successful African American male students negotiated the White male myth (i.e., positioning mathematics as a white male, middle class field by using white, middle class males as the point of reference when comparing students' mathematics achievement scores) using counter-storytelling and poststructuralist theory. Purposeful sampling was used to select the five African American males who met the following criteria: (a) attended Keeling High School (located in an middle/upper-middle class suburban African American community with an

enrollment of 99% African Americans, 44% eligible for free and reduced lunch, and 25% enrolled in the embedded mathematics and science magnet program) from 9th to 12th grade; (b) completed at least one mathematics course taught by Stinson; and (c) persisted and achieved in high school mathematics. The data included: (a) two face-to-face interviews, (b) two phone interviews, (c) a written autobiography, and (d) a written mathematics autobiography. Before each interview the participants were asked to read, reflect, and respond to articles focused on the following theories:

1. Deficit theories

- a. Cultural deprivation theory - African American students come from culturally disadvantaged environments;

- b. Culture conflict theory - African American communities do not prepare their children with White, middle class skills that are necessary for school success and schools do not capitalize on the unique experience of African American students;

- c. Institutional deficiency theory - the organization of schools favor middle and upper-class White students;

- d. Educational equality theory - unequal schooling opportunities for African American students;

- e. Heredity theory- African Americans possess inferior genetic qualities for intellectual work

2. Cool prose theory - some African American males develop ritualized forms of masculinity that counters school success in order to cope in a racist environment;

3. Stereotype threat theory - focuses on negative societal stereotypes about specific groups that influences the intellectual functioning and identity development of individuals;

4. Cultural-ecological theory- positions academic and school success as privileged to White students resulting in African Americans rejecting school and academic success;

5. Raceless persona theory - the claim that African Americans need to reject their Black identity to achieve school and academic success; and

6. The burden of “acting White” theory - attempts to explain how high achieving African American students manage the burden of “acting White.”

As Stinson (2009) analyzed the data in relation to African American students’ reactions to these theories, he found that the students accommodated and reconfigured the deficit theories. The participants did not attribute the deficit to race, but rather to socioeconomic status and personal drive. Cool prose theory was also accommodated and reconfigured as the students engaged in cool prose behaviors outside of the classroom, but “shed” this behavior inside the classroom. Stereotype threat theory was accommodated and reconfigured by providing motivation and determination to disprove the stereotype. The participants resisted the remaining theories. The participants viewed success not in relation to race, which aided in the successful negotiation of the White male math myth.

Stinson draws on Martin’s (2000) framework that includes sociohistorical context (i.e., examines racism through the lens of social and historical policies and teaching practice that prevent African Americans from becoming equal members in society and

the mathematics classroom). However, Stinson extends community and school forces to further describe robust mathematics identities “of African American male students [that] might be best understood as multiplicitous and fragmented as they negotiate sociocultural discourse” (p. 8). Stinson’s research discounts negative perceptions about the learning of African American students. Although, some believe that African American parents do not support their children academically, Stinson provided examples where African Americans (1) have parents that support and emphasize academic success and mathematics success; (2) have teachers who have high expectations and establish relationships outside of the classroom; and (3) do not care about negative labels assigned to them by their less successful peers. The results of this study influence the need that more mathematics educators should have positive perceptions of African American students’ identities in the mathematics classroom.

Pedagogy Related to Equity

Malloy (2002) defines democratic education as a:

process where teachers and students work collaboratively to reconstruct curriculum to include everyone. Each classroom will differ in its attributes because the interactions of democratic classrooms are based on student experiences and community and educational context. Just as this occurs in democratic classrooms, it occurs in mathematics classrooms. There is no one way or context through which mathematics is taught. There are concepts, topics, and processes that must be taught and learned, but individual teachers and learners will approach mathematics based on their needs, preferences, and experiences. Democratic education is accessible to all students, provides students with an avenue through which they can learn substantial mathematics, and can help students become productive and active citizens. (p. 21)

The democratic mathematics classroom incorporates a problem solving curricula, includes multiple instructional strategies that allow all students access to engage in solving problems, provides students equal participation in decisions, and promotes equal

encouragement for success. Malloy (2002) describes three benefits of democratic education in the mathematics classroom: inclusiveness, mathematics understanding, and application of mathematics to the problems in social justice and equity, where social justice involves developing sociopolitical consciousness, sense of agency, and positive social and cultural identities (Gutstein, 2003).

Bob Moses' Algebra Project (Moses & Cobb, 2001) addressed the need for mathematical literacy among African American students as a civil rights issue. In order to be effective and productive citizens in society, Moses believed that African Americans should have access and participate in Algebra. As a civil rights advocate, Moses feverishly petitioned Blacks to register to vote. He argued the votes could change the political landscape in Mississippi. "One-person one vote." With the same urgency, Moses was determined to provide African Americans access to Algebra. He expressed that by learning Algebra, African Americans would be able to take advantage of numerous opportunities. There is power in learning mathematics, and once students understand the power and how it can be applied to other situations outside the scope of "traditional mathematics" students are able to use their mathematical knowledge as a tool to help solve problems of the poor and powerless – for social justice and equity. Thus, in a democratic mathematics classroom students would think critically and use their mathematical knowledge to further understand and change society's social inequities.

Ladson-Billings (1994) conducted a three-year, in-depth ethnographic study that examined the pedagogical practices of eight exemplary teachers. She identified potential participants for her study by asking parents and building principals to list teachers who they considered exemplary. After generating a list of 20 potential participants from both

the parents and principals, Ladson-Billings identified nine individuals who appeared on both lists. All but one agreed to participate in the study.

Ladson-Billings (1994) asserted that teachers must engage in culturally relevant pedagogy that maintains and includes students' culture and moves beyond the negative effects of the dominant culture. Ladson-Billings does not offer a prescriptive list of instructional strategies teachers can use to become culturally relevant. Instead, she offers characteristics of teachers who practice culturally relevant methods, which are summarized in Table 1.

Table 1

Characteristics of teachers who practice culturally relevant methods

<p>Conceptions of Self and Others</p>	<ul style="list-style-type: none"> • Views themselves as an artist, teaching is an art • See themselves as part of a community and teaching as a way of giving back and encourages students to do the same • Believes all students can be successful • Helps students make connections between their local, national, and global identities • Views teaching as the process of pulling knowledge out
<p>Ways teachers structure social interactions</p>	<ul style="list-style-type: none"> • Teacher-student relationship is fluid, humanely equitable, extends to interactions beyond the classroom and into the community • Connects with all students • Encourages a classroom community of learners • Encourages collaboration among students
<p>Identified by their conceptions of knowledge</p>	<ul style="list-style-type: none"> • Knowledge is continuously recreated, recycled, and shared by teachers and students • Knowledge is viewed critically • Teachers are passionate about the content they are teaching • Teachers help student develop necessary skills • Teacher sees excellence as a complex standard that may involve some postulates but takes student diversity and individual differences into account

Ladson-Billings, 1994, p. 34, 55, & 81.

Similar to Ladson-Billings (1994), Walker (1996) reports on the importance of teachers knowing their students' community and knowing *how* to talk to parents within the community to ensure success for all students. A former student and parent comments how the principal educated individuals how to communicate with members in the community:

He [Mr. Dillard, the principal] would say, "When you are in a situation, you don't go in there using a lot of big words and you know the people can't understand you." He always would say, "if I have to use big words, [I can]. If I have to say dis or dat and all that, I can use that too." He wasn't one of those people that kept so high up that he couldn't get in where a person was and understand him...But when you go into a place...and are so high and mighty, parents would stay away from you, because they feel like you think you are better than they are because maybe they didn't get any schooling. But if you know how to mix, and they feel comfortable with you, they will work with you. (Walker, 1996, p. 84)

Not only were teachers instructed *how* to communicate with parents in the community, they were encouraged to become part of the community and make themselves known in the community. This made a positive difference in the lives of the African American students.

Instructional Strategies

Malloy (2009) uses both qualitative (e.g., interviews and classroom observations) and quantitative (e.g., *Reformed Teaching Observation Protocol* – 25 items based on a 5-point Likert scale ranging from 0 – not observed to 4- very descriptive) data to determine what instructional strategies and teachers' dispositions help middle grade African American students gain conceptual understanding in mathematics. Malloy argues African American students must be visible in the mathematics classroom. This is accomplished by grounding instructional strategies in the learning preferences of African American

students and connecting cultural experiences and social justice in African American communities with opportunities to learn. The following table (see Table 2) summarizes the findings.

Table 2

Instructional strategies and Teachers' dispositions

<i>Instructional Practices</i>	
Reflecting on Practice	<ul style="list-style-type: none"> • Blended memorization, procedural, and conceptual tasks • Involved fundamental concepts of the subject in lessons • Respected students' prior knowledge and preconceptions • Were knowledgeable about content • Listened and responded to students to anticipate their understanding and/or misunderstanding
Building Communities of Learners	<ul style="list-style-type: none"> • Encouraged students to generate conjectures, alternative solution strategies, and ways of interpreting evidence • Created a climate of respect for what others had to say • Valued intellectual rigor, constructive criticism, and the challenging of ideas • Encouraged elements of abstraction when important
Giving Students Voice	<ul style="list-style-type: none"> • Acted as a resource person, working to support and enhance student investigations • Saw knowledge and authority in both teachers and students • Encouraged and valued active participation of students • Used learning communities that promoted student-teacher and student-student mathematical interaction
<i>Dispositions</i>	
<ul style="list-style-type: none"> • Believed that all students could learn mathematics • Valued student motivation, involvement, effort, respectful behavior, and responsibility • Demonstrated concern to address the varied learning styles of their students and accommodated instruction based on student learning preferences • Demonstrated that knowledge their students brought into the classroom should be shared • Helped their students feel safe in their classrooms and cared about their students and their learning • Were reflective in their practice 	

Adapted from Malloy (2009), p. 28, 30

All of the above instructional practices and teachers' dispositions highly correlate with Ladson-Billings' (1994) characteristics of culturally relevant teachers.

Although Evertson, Anderson, Anderson, and Brophy (1980) concluded that gains in urban students' achievement and attitudes toward mathematics were positively correlated

with the time their junior high mathematics teachers spent lecturing/demonstrating, having class discussion, assigning a limited amount of seatwork, and asking both fact related questions (mostly fact) and higher cognitive questions that created opportunities for students to respond, Ladson-Billings (1994) argues effective teachers of African American students involves more than just these instructional practices. Successful teachers of African American students promote academic excellence and recognizes students' cultural heritage.

Landsman (2004) described an African American male student who was disruptive and difficult to handle in the classroom. One day the student threatened his teacher and he angrily left the class. The teacher immediately called the principal to schedule a meeting with him and the student. During the meeting, the student could not look the teacher in the eye. The principal inquired what steps needed to be taken so the student could return to class. The teacher looked directly into the African American student's eyes and said he wanted him to start coming to his gifted class. "[You are] too smart for the class [you have] been assigned to" (p. 30). After hearing the positive remark from his teacher, the student switched to the advanced class and started taking school more seriously. The teacher recognized the student's ability and capitalized on it.

Good teaching, then, required them to see each child as an individual and to count the successful engagement of each child in learning as part of the larger ongoing task of contributing to their race and to the human race. Good teachers could help launch a child into a life that would otherwise not have been possible. (Walker, 1996, p. 150)

Mathematics Education Projects

In recent years, there have been several federally funded projects that have been designed to support the learning of all students. These interventions were conducted in

classrooms with large percentages of African American students; however, they focused on providing access to challenging mathematics rather than targeting strategies specific to the needs of African American students. In this section, I describe these interventions and how they influenced the mathematics teaching and learning of African American students.

Increasing the Mathematical Power for All Children and Teachers (Project IMPACT). Project IMPACT, a school-based project located outside Washington DC, focused on students' conceptual mathematical understanding in 21 minority urban schools where 74% of student population was predominately African American, Hispanic, and Asian. Kindergarten through third grade teachers collaborated together in grade level teams with mathematics specialists to create a mathematics culture that allowed students to make sense of mathematics (Campbell, 1996; Campbell & Langrall, 1993). The teachers planned lessons that included meaningful real-life mathematics problems that were designed to challenge the typical student, and they asked students about their ideas on how they would solve mathematics problem (Campbell & Rowan, 1997). Project IMPACT focused on students explaining their thinking and communicating their mathematical ideas. For example, students were asked, "What do you know? What else do you know?... What could we try? Does anyone else notice something else about this problem?...Does anyone else have another idea?" (Campbell & Langrall, 1993, p. 111). As a result of Project IMPACT mathematics teachers reported how their mathematics teaching changed by: (1) extending time spent on mathematics by lengthening their mathematics lessons and (2) making mathematics more interdisciplinary by relating it to other subjects (Campbell & Langrall, 1993). Moreover,

the teachers' conceptions that “*my* students can't do that!” changed as they reflected on the strengths and ideas offered by their students (Campbell & Rowan, 1997). Two key benefits of this intervention include: (1) student involvement in problem solving that encourages students to question and develop mathematical relationships – promoting mathematical understanding; and (2) teachers asking questions, reflecting on students' understandings, and recognizing when to adapt their instruction to foster student learning. Together, these benefits resulted in an equitable classroom environment (Campbell & Langrall, 1993). This intervention emphasized the importance of student engagement and asking higher-level questions—questions that were not typically posed to African American students in mathematics classrooms as described earlier.

Cognitively Guided Instruction (CGI). CGI provides a framework that identifies the processes students are likely to use when solving various types of addition and subtraction problems. This approach assumes mathematics instruction should build on students' prior knowledge and help students analyze their thinking which will in turn result in a deeper understanding of the mathematical concepts. Initially, CGI was not a mathematics intervention specifically for students of color. After its inception, Villasenor and Kepner (1993) designed an intervention to examine if teachers' knowledge of CGI strategies would influence teachers' instruction and their students' achievement. This quasi-experiment involved 24 teachers from a large Mid-western urban district. Twelve classrooms with student populations of 57% to over 98% minority (i.e., African Americans or Hispanic students) were identified as the treatment group, and 12 classrooms with student populations of 58% to over 99% minority were identified as the comparison group. Teachers in the treatment group participated in professional

development that provided opportunities to study the principles of CGI and explore ways to implement the principles in their instruction. The teachers met for 19 hours in the summer and four 2-hour sessions during the school year. During the school year, comparison teachers participated in two one and half hour professional development sessions focused on problem solving without any of the CGI components. The researchers randomly selected six boys and six girls to be interviewed from each of the 24 classrooms – yielding a total of 144 CGI and 144 non-CGI students. The interviewer, trained using the coding instruments of CGI, read the problems to each student and recorded the student's responses. Afterward, the student was given a number fact on a four-by-six card to read and solve. The researchers conducted 82 classroom observations for both the experimental and the comparison groups. The CGI group showed greater achievement in solving arithmetic word problems and used more advanced strategies than the non-CGI group. In addition, the CGI group showed superior achievement in completing the number facts tasks by using advanced strategies. The instructional practices of the CGI teachers included: (a) not focusing on teaching specific strategies or answers; (b) having students work in a variety of settings – small groups, medium groups, and whole groups; (c) reading the problems to the students; and (d) asking students to explain their thinking. The instructional practices of non-CGI teachers followed a general predictable pattern. The lesson started with a short explanation of what the students would learn followed by a demonstration on how to work the problem. The students were then given examples with an explanation as to how to complete the problems on the worksheet. Only one non-CGI teacher deviated from this routine. She, instead, involved the students more and used worksheets less. The non-CGI teachers rarely asked students

to explain their solutions, and the students generally worked alone on worksheets for about 50% to 75% of the time. CGI teachers spent a considerable amount of time teaching word problems that were relevant to the students. However, non-CGI teachers taught specifically from the textbook emphasizing mathematical procedures and their students became proficient in recalling number facts and recalling strategies to use in completing number facts. A belief exists that many minority students and disadvantaged students need to learn basic facts before they are able to problem solve. This study challenged this belief. This study highlighted urban students who were instructed using the CGI approach performed better than students who did not receive CGI instruction. The CGI students not only were able to solve one-step word problems, but they could also solve multi-step word problems and explain their thinking similar to the students who were involved in Project IMPACT.

Project Special Elementary Education for the Disadvantaged (SEED). Project SEED is an intervention project where mathematicians and scientists from universities, research corporations, and the community teach elementary students abstract, conceptually-oriented mathematics concepts where the mathematical content ranged from pre-algebra to beginning concepts of abstract algebra. The goal of the project is to prepare elementary students from minority, disadvantaged communities for success in upper-level secondary and university-level mathematics courses and to increase the number of students who are looking for careers in technological fields (Phillips & Ebrahimi, 1993). Project SEED teaches the entire elementary class, and not just a select few. Unlike Project IMPACT and CGI, Project SEED is a supplementary program taught by SEED instructors instead of regular classroom teachers. Students receive instruction from the SEED specialist four

days a week for about 14 – 16 weeks, during which the SEED specialist incorporates a Socratic group discovery instructional methodology. The instructor teaches using a series of questions directed to individuals or to the class in general. New material is gradually introduced to students. Most of the class time is spent reviewing previous material, introducing new material, or working on application problems related to the concepts previously covered. All students are expected to respond to questions and participate in class discussions. Keeping the students actively involved in the lesson, the instructor rarely provides direct responses to the students. On the fifth day, the regular classroom teacher takes over after participating in the SEED method of instruction and has the choice to either use some of the techniques and strategies used by SEED instructors to teach related material, or teach a different mathematical concept using their own instructional strategies. Typically, the main role of the regular classroom teacher is to teach the “regular mathematics” (Phillips & Ebrahimi, 1993). Project SEED instructors did not spend instructional time on drill and practice, an instructional approach described earlier that was used to teach most African American students. Instead, Project SEED instructors focused the majority of instructional time ensuring students had a conceptual understanding of mathematics.

Webster, Dryden, Liddick, and Green (1999) evaluated the impact of Project SEED instruction on mathematics attitudes and achievement at the third grade level in the Detroit Public schools. This study employed the use of theoretical comparison groups where each student in the experimental group (SEED) was matched to a comparison student not exposed to SEED. Ninety - six percent of regular classroom teachers reported that they gained some new or insightful way to teach mathematical concepts, and 100%

of the teachers stated that they used one or more SEED instructional strategies in their teaching. SEED directly influenced student enthusiasm, class participation, and interest in mathematics as well as improvement in student mathematical performance.

Teachers' Beliefs about African American Students

Barlow and Cates (2006) suggest, "beliefs affect how teachers see their students...thereby impacting [their] instructional practices" (p. 64). Although researchers have described beliefs as a "messy construct" with multiple meanings and interpretations (Aguirre & Speer, 2000; Pajares, 1992; Philipp, 2007), Thompson (1992) documents that teachers' beliefs significantly influence their instructional practices. In other words, teachers' beliefs act as a filter and shape how a teacher structures her classroom environment.

There have been a relatively large number of studies related to teachers' beliefs and affect within the field of mathematics education. See Philipp (2007) for an extensive review. Philipp focused his review of beliefs on four areas: students' mathematical thinking, technology, gender, and changes in beliefs due to the use of mathematics curricula. Based on my research questions, I focused my review of this research area on teachers' beliefs and expectations of African American students. I organize this discussion into three major sections: colorblind worldview, teachers' expectations, and teachers' beliefs.

Colorblind Worldview

Bonilla-Silva (2006) discusses four frames of colorblindness, which include: abstract liberalism, naturalization, cultural racism, and minimization of racism. The frame of abstract liberalism draws on political and economic liberalism and emphasizes choice,

individualism, and equal opportunity. For example, whites justifying their “choice” to send their children to segregated or predominately white schools in suburban neighborhoods appears to demarcate minorities who were also given that “choice”. The frame of naturalization suggests racial phenomena are natural occurrences, where individuals from diverse backgrounds tend to naturally gravitate to individuals with similar backgrounds. The fact that minority students have poor achievement in mathematics is another example of a “natural occurrence” in the United States public schools. The cultural racism frame centers on cultural arguments that categorize minorities as individuals who do not want to learn. Another cultural argument is African American parents do not care about education, that’s why they never show up to school functions. These and other cultural arguments explain the place minorities have in society. The final frame, minimization of racism, suggests that racism and discrimination are no longer eminent factors in today’s society. For example, statements such as, “it’s better now than in the past” (p. 29) permits the acceptance and justification of racial acts toward minorities.

Many educators refuse to acknowledge racial inequities faced by African Americans as one source of decline in mathematics achievement. They contend we live in a *colorblind* society and go as far to argue that if a teacher is a good teacher, they can be good teachers to anybody, anywhere; and from this good teaching equitable outcomes automatically happen (Gay, 2000; Martin, 2007). Many teachers view mathematics as a universal, culture-free subject, and thus contend issues of equity are not factors in the mathematics classroom (Rousseau & Tate, 2003). This colorblind belief facilitates ignorance about the impact of racism in the mathematics classroom. For example,

Rousseau and Tate (2003) observed seven high school mathematics teachers who taught low-track mathematics courses that were overrepresented by students of color, and found that when the teachers were asked about the failure rates of White and African American students in their classes they did not acknowledge that any differences existed.

I would like say in my accelerated class they [African American students] were all like, they were probably fine, like... my other races. In my, see in my pre-algebra, now like Samantha and Kammie, they were Black and they were my A students. But then we had like Mark who was also Black but he never did anything, never brought anything to class, so I didn't really have.... There is no pattern with that.... Had my [accelerated algebra] students not done well, too, then maybe I would see something. But I have had those that did well and those that didn't.... *I don't see any race* [italics added]. (p. 213)

Furthermore, the researchers noticed particular patterns occurring in the mathematics classroom. In one low-track pre-algebra class containing four students (three African American and one White) the teacher utilized a “hands-off” approach as the method of instruction (i.e., the teacher did not provide any help to the students until the students took the initiative to ask for it). Two African American students, the individuals who needed help the most, would sit for full 50-minute class periods without any instruction from or interaction with the teacher. Not surprisingly, the students were unsuccessful. This pattern of allowing students to fail was evident among African American students, particularly African American males. The teachers in this study did not see this pattern as problematic, or how it disproportionately affected African American students.

Teacher Expectations

Teacher expectations influence the structure of classroom environments as well as students' success. For example, Beady and Hansell (1981) report that Black teachers expected their African American students to be more successful in college than White

teachers. The researchers randomly sampled fourth and fifth grade teachers from predominately white and predominately black elementary schools in Michigan. Four hundred forty-one teachers (129 Black and 312 White teachers) completed a questionnaire to assess their perceptions of their students' future and current achievement. The results of factor analysis identified four factors relating to teachers' perceptions of academic achievement and effort and the teachers' expectations of future success in high school and college: (1) expectations of future success in college which accounted for 54% of the variance; (2) elementary students' achievement which accounted for 16% of the variance; (3) elementary students' effort which accounted for 14% of the variance; and (4) expectations of future success in high school which accounted for 9% of the variance.

Research has shown that teacher expectations generally act as a self-fulfilling prophecy (Rosenthal & Jacobson, 1968). Jamar and Pitts (2005) examined the high expectations of Mr. Lee, a white mathematics teacher in an urban school district with over twenty years experience. Mr. Lee believed his students were able to learn meaningful mathematics and respond in positive ways. He used his students' prior knowledge as stepping-stones to new knowledge and communicated to his students that they already had the foundation needed to learn. In addition, he:

- (a) expect[ed his] students to be active participants in their own learning;
- (b) provid[ed] opportunities for students to *understand* concepts prior to learning rules; and
- (c) made it clear that he knew they *could* understand the content and that it was understandable. (Jamar & Pitts, 2005, p. 130)

In light of these high expectations, Mr. Lee's students not only responded favorably to Mr. Lee as a teacher, but also to learning mathematics.

Teachers' Beliefs

Walker (1996) reported how segregated schools in Caswell County, North Carolina provided African Americans with an excellent education despite barriers such as funding and prejudices. The teachers believed their students would be successful. But, teachers state they cannot work with black boys because they are uncontrollable and too hyperactive (Landsman, 2004). Researchers have found that a student's race is a determining factor of how a teacher will treat the student (Thompson, 2010).

Thompson (2009) administered a Mindset Questionnaire to 143 Texas educators and 94 pre-service teachers in California and found that 94% in-service and 90% practicing teachers believed most teachers do not know how to effectively work with African American K – 12 students, thereby hindering success. Furthermore, the questionnaire asked teachers (white and black), pre-service teachers, and administrators about the beliefs of educators of African American students. Fifty to 75% specified that the majority of teachers do not believe African American students are as intelligent as other ethnic groups, and an overwhelming majority of respondents believe that teachers do not treat or view African American students the same as other ethnic groups. The following beliefs about African American students are embedded in American society:

1. Whites are smarter than blacks
2. Blacks do not have the aptitude to do outstanding work
3. Whites know what is best for black students. (Thompson & Lougue, 2005, as cited in Thompson, 2007)

These negative beliefs affect teachers' perceptions of African American students, and ultimately their instruction. According to Thompson (2007) many educators and

policymakers believe that African American students are lazy, incapable and inferior. No matter what type of reform is mandated or implemented, these individuals believe that African American students will never get it. From a study conducted by Thompson (2004) in the summer of 2002, in-service teachers believe African American students do not want to learn. Thompson (2007) further indicates that the following two beliefs are interwoven in the framework of America: whites are superior to all ethnic groups, specifically African Americans and whites deserve to be leaders because they are more intelligent and are hard workers. These beliefs lead to low expectations of African American students, particularly in the mathematics classroom.

Thompson, Warren, and Carter (2004) administered an 80-item questionnaire to 121 high school teachers at an underperforming urban school in California. The statements on the questionnaire were designed to identify the teachers' beliefs, attitudes, and practices that may contribute to students' underachievement. The researchers used a 4-point Likert scale where a four indicated strong agreement and a one indicated strong disagreement. The data was analyzed using bivariate correlations and stepwise multiple regressions. The researchers concluded that teachers who blamed students for inadequate performance (e.g., failing tests and other assignments) had negative attitudes toward students, primarily toward students of color. The teachers expected the majority of their students to be unsuccessful, and believed they did not have the desire to academically succeed. Thus, the teachers did not use multiple instructional strategies to teach the subject matter to their students – they simply relied on a single method, and claimed they were not provided with adequate training to effectively teach the students they have in their classrooms. In addition to blaming students (60%) for their underachievement, the

teachers also blamed the parents (64%). The teachers did not take responsibility to look for opportunities to improve student learning. In other words, the teachers did not believe that their actions facilitated student failure or underachievement. Student underachievement was the result of students or parents refusing to assume responsibility for learning. These teacher beliefs damage the academic and emotional success of students.

Unlike the results of Thompson, Warren, and Carter's (2004) study that based student underachievement solely on nonschool factors, Thompson's (2009) findings on the low performance of African American students included both school and nonschool factors. After analyzing pre-service and in-service teachers responses on why they believed African American students do not do as well as they could in school, Thompson found that the participants blamed school factors more than nonschool factors. The participants believed: (1) low teacher expectations – 60%; (2) poor teaching methods dependent on non-culturally relevant curriculum – 50%; (3) racist school practices – 27%; (4) parents – 27%; (5) teacher unfairness – 22%; (6) students' home life – 19%; and (7) peer pressure – 19% were to blame for low performance of African American students. Results of this study indicate that these school factors inhibiting the success of African American students must be challenged and changed if we want our African American students successful.

In another study, Love and Kruger (2005) examined the beliefs of teachers using a survey adapted from a study of highly effective teachers of African American students conducted by Ladson-Billings (1994). The participants in the study were conveniently sampled from six urban schools that were primarily attended by African American

students. The researchers designed 25 statements on the survey to capture the culturally relevant beliefs and practices of teachers: (1) student cooperation and interaction; (2) commitment to urban education; (3) high respect for students; (4) the importance of students' race, ethnicity, and culture in teaching; and (5) community connections. The other 23 items were characterized as "assimilationist" beliefs. In other words, beliefs that reflects a "teaching style that operates without regard to the students' particular cultural characteristics. [...T]he teacher's role is to ensure that students fit into society" (Ladson-Billings, 1994, p. 22 as cited in Love & Kruger, 2005, p. 89). The researchers organized the statements in six categories: (1) students' race, ethnicity, and culture; (b) knowledge; (c) social relations in and beyond the classroom; (d) teaching as a profession; (e) teaching practice; and (f) students' needs and strengths. The survey was based on a 5-point Likert scale ranging from 0 (strongly disagree) to 4 (strongly agree). The researchers found 95% of the teachers believed that learning from students is just as important as teaching them. Yet, 78% of the teachers believed it was their job to disseminate knowledge. Participants also believed students' race, culture, and ethnicity were important to teaching, but responded they did not associate students with any particular race or culture – they only saw children. This statement affirmed the notion of colorblindness described by Rousseau and Tate (2003).

In a subsequent study, the researchers included two of the six schools and 50 elementary classroom teachers. The survey items from the first study were correlated with achievement scores of 1,432 students. The achievement scale scores were from the advance-skill components for mathematics, reading, and language arts tests of the ITBS

(Iowa Test of Basic Skills). The belief that all students can succeed was positively correlated to students' mathematics achievement scores (Love & Krueger, 2005).

Teachers' Knowledge of Equity

As mentioned in chapter 1, virtually no research has been conducted examining teachers' knowledge base of equity, specifically mathematics teachers' knowledge of equity in teaching mathematics to African American students. In the search of the literature I was able to locate numerous studies on teacher knowledge and equity independent of each other. After exhausting the key word search of teacher knowledge (e.g., knowledge base, teacher knowledge, and wisdom of practice) with the intersection of equity, I located one study, which further highlights that this area of research is underdeveloped. I discuss the study below.

Achinstein and Athanases (2005) report the knowledge base mentor teachers need to guide beginning teachers toward equity and diversity in the classroom. The participants, members of the Leadership Network for Teacher Induction (772 mentors and 2750 new teachers from 60 different school districts in Northern California) were given a questionnaire and asked to respond to "what do mentors need to know and be able to do to help new teachers focus on issues of diversity and equity in teaching?" (p. 847), and give an example from their teaching practice. Pedagogical knowledge for equity, which included knowledge of how to teach diverse students (e.g., having high expectations, building a classroom community, differentiating instruction to meet individual needs, and knowing how curriculum supports all student learning through integrating cultural, racial, and linguistic content) and knowledge of ways to instruct teachers in mentor sessions (e.g., focus on teaching the student and not the subject; help teachers analyze equitable

learning opportunities that occur during instruction) were identified as most important for mentoring. In addition, mentor teachers needed to have (1) knowledge of contexts; (2) knowledge of learners; and (3) knowledge of themselves (i.e., identifying their beliefs, values, and practices when working with diverse students).

Drawing on data from a larger study, Achinstein and Athanases (2005) describe the knowledge base of equity in action. The participants included a white, female mentor teacher (Sonya) who was identified as an expert on equity, specifically as it related to English language learners, and a young, white female beginning teacher (Maggie) who taught at an elementary school with 96% Latino students. In order to determine who would teach either the high, average, or low ability fourth grade class, the teachers at Maggie's school drew straws. Maggie drew the shortest straw, and received the low-ability class. Maggie did not challenge her students and would "water" down instruction by reading out loud to her ELL students without giving them the opportunity. Sonya expressed the need to differentiate instruction with the students as well as maintain high expectations and constantly looked for openings that would allow her to intervene. Sonya faced challenges in the mentor-mentee relationship (i.e., having mentee teacher reflect on the expectations of diverse students while not casting blame). Table 3 summarizes the knowledge base for equity needed to mentor new teachers.

Table 3

Knowledge base for equity

Knowledge Domain				
	Pedagogy	Contexts	Learners	Self
Targeting students	Wide repertoire of strategies to serve all learners; Repertoire of strategies to serve culturally and linguistically diverse youth and to promote equity	Local school culture: student, parent, community; Broader social & structural issues of inequity and discrimination	Assessment of students' funds of knowledge and challenges to deficit views; Learning theory and culturally responsive learning theory	Mentors' understanding of self related to student diversity and equity; Awareness of own biases, stances, and interactions with students
Targeting teachers	With repertoire of mentoring strategies and stances for observation, assessment, feedback, critique in mentoring conversations that guide teaching reform; Commitments and practices to focus the novice on challenges of inequity in the classroom	Embedded professional contexts; Broader social contexts of schooling and teaching; Leadership and change agency	Assessment of novice assets and needs about issues of equity; New teacher as adult learner; Novice knowledge base, strategies, & cultural competence; Novice's reflectivity level & receptivity to change	Focusing the novice on own identity vis a vis student diversity

(adapted from Achinstein & Athanases, 2005, p. 857)

But, the question yet remains: How do elementary mathematics teachers use their knowledge of equity in teaching mathematics to African American students?

Summary

I have focused my research study on examining elementary teachers' knowledge as it relates to equity in teaching mathematics to African American students. Therefore, I reviewed research literature focusing on: inequity related to African Americans, teaching African American students, teachers' beliefs of African American students, and teachers' knowledge related to equity. This literature demonstrates teachers' beliefs, knowledge,

and practices influence the teaching and learning of mathematics for African American students. Unfortunately, race hinders opportunity to learn and ultimately student achievement. Yet, the studies that focused on the learning styles and identities of African American students as well as the intervention efforts show that African American students can be successful in U.S. mathematics classrooms. This will require a change from a deficit view of teaching and learning to a focus on equitable pedagogies including access to challenging mathematics.

In recent years, the literature related to equity has been expanding. Yet, a large number of articles would be classified as advocacy, policy, or practitioner pieces, rather than empirical studies, especially in relation to teachers' knowledge in the field of mathematics education. Thus, this study was designed to address this gap in the literature. I conceptualize the specialized knowledge base of equity, specifically in relation to teaching elementary mathematics to African American students. In the next chapter, I discuss the research methods for the study.

CHAPTER 3: METHOD

The design of this study uses qualitative methods to examine elementary mathematics teachers' knowledge, beliefs, and pedagogy related to equity with African American students. More specifically, I use a case study method to conceptualize elementary teachers' knowledge of equity and how they enact that knowledge with African American students in the mathematics classroom as I aim to answer the following research questions:

1. What knowledge related to equity in teaching African American students do successful elementary mathematics teachers draw upon?
2. What beliefs related to (a) teaching African American students and (b) teaching mathematics to African American students influence the mathematics teaching of successful elementary mathematics teachers?

In this chapter, I describe the case study method, data collection, and data analysis, for the study.

Case Study Method

In this study, qualitative data was collected to conceptualize elementary mathematics teachers' knowledge of equity using a case study method. Yin (2003) contends:

Case study inquiry copes with the technically distinctive situation in which there will be many more variables of interest than data points, as one result relies on multiple sources of evidence, with data needing to converge in a triangulating fashion, and as another result benefits from the prior development of theoretical propositions to guide data collection and analysis. (p. 13)

The focus of case study research is to describe the unique cases and interpret emergent themes that differentiate or unite settings and/or participants (Yin, 2003). In

case studies, the researcher uses multiple data sources to construct a holistic and meaningful representation of personal experiences (Denzin & Lincoln, 2005). Case studies are preferred when (a) exploratory, “how,” or “why” questions are being posed, (b) the investigator has little control over events, and (c) the focus is on a contemporary phenomenon within some real-life context (Yin, 2003). Additionally, Yin asserts, “A case study is an empirical inquiry that investigates a contemporary phenomenon with its real-life context, especially when the boundaries between phenomenon and context are not clearly evident” (p. 13). Essentially, it is the “study of the particularity and complexity” (Stake, 1995, p. xi) of a phenomenon within a bounded system (Merriam, 1988).

Stake (1995; 2005) argues that there are three types of case studies: intrinsic, instrumental, and collective. Researchers use intrinsic case studies when they have a personal interest in understanding a specific phenomenon. The case is not generalizable to other contexts. Instead, it only provides knowledge about a particular case under investigation. Contrary to intrinsic case study, an instrumental case study provides the researcher with a general understanding of a larger phenomenon. The particular case is not the priority, but understanding the larger, more global phenomenon is the purpose of the investigation. Similar to an instrumental case study, a collective case study is to better understand some phenomenon by using a collection of multiple cases.

Merriam (1988) further delineates four characteristics of case study research: (1) particularistic – that is, it focuses on a particular phenomenon; (2) descriptive – that is, the product is a “thick” description of the phenomenon; (3) heuristic – that is, it develops, extends, or confirms the understanding of the phenomenon; and (4) inductive – that is, it

depends on inductive reasoning. The final product of the case study research is descriptive, interpretative, or evaluative.

I utilized a descriptive, instrumental case study design for my research study. I am more interested in the larger phenomenon of teachers' knowledge of equity issues, knowledge of equity pedagogy, and beliefs, and not individual teachers in their specific context. I collected, analyzed, and constructed findings for these cases using the Knowledge of Equity in Teaching Framework, which I described in chapter 1.

During the past two years, I have worked as a graduate research assistant on an NSF-funded research project, Researching Science and Mathematics Teacher Learning in Alternative Certification Models (ReSMAR²T), which has been focused on investigating teacher knowledge and how that knowledge is enacted in practice. I will draw on this work including the ReSMAR²T data collection instruments and methods although with modifications in order to explicitly highlight equity within the mathematics context. I describe the data collection and analysis procedures in the following sections.

Data collection

Thirteen successful elementary mathematics teachers from five school districts participated in this study as I qualitatively investigated teachers' knowledge of equity issues, knowledge of equity pedagogy, and beliefs to further understand elementary mathematics teachers' knowledge related to equity in teaching mathematics to African American students. I used interviews and observations to understand what knowledge of equity elementary mathematics teachers draw upon in teaching mathematics to African American students. In the following subsections, I describe participant selection, the participants, and data collection methods.

Participant Selection

I purposively selected 13 participants to participate in this study. Purposive sampling “is based on the assumption that one wants to discover, understand, gain insight; therefore one needs to select a sample from which one can learn the most” (Merriam, 1988, p. 48). Patton (2002) claims the power of purposeful sampling is the result of *information-rich cases*. “Information-rich cases are those from which one can learn a great deal about issues of central importance to the purpose of inquiry” (Patton, 2002, p. 230). I utilized a combination of snowball (i.e., selecting participants from knowledgeable individuals who recommend people they believe will provide rich information) and criterion (i.e., selecting participants who meet a specific criterion) sampling to select participants for the study.

I contacted school district administrators in four districts, Webster Public Schools, Khanna Public Schools, Hartville Public Schools, and Johnson Public Schools, (all names of districts and people are pseudonyms) to identify potential participants for the study. We communicated in person, via e-mail, and/or telephone to identify teachers who met the following criteria:

- a. They teach mathematics in grades 3-5, or grade 6 if under the umbrella of an elementary school.
- b. Their mathematics class is composed of at least 20% African American students.
- c. They have a minimum of 4 years of teaching experience.
- d. They are recommended, by knowledgeable mathematics educators based on their competence in teaching African American students.

- e. They are recommended based on mathematics achievement of African American students on state and/or local assessments.

Unfortunately, I was not able to find enough participants that met all five criteria. As a result, 8 participants met criteria a-e while 5 participants only met criteria a-d.

After receiving permission from the Webster Public School District Chief Academic Officer to conduct the proposed research, I along with my dissertation chair met with the district elementary mathematics coordinator to identify potential participants. (See Figure 1 for district's demographic data.) The mathematics coordinator collated the average percentage mathematics achievement scores on district assessments for African American students, Caucasian students, and their percentage difference by teacher over three consecutive academic years for grades three, four, and five. African American students' average percentage on the district assessments had to be 70% or above before the teachers were considered as potential participants for the study. This criterion resulted in a small percentage of teachers. From this list, my dissertation chair who had experience facilitating professional development in this district and the mathematics coordinator identified ten teachers whom they believed had a positive rapport with their African American students. From the ten, I selected seven teachers with the highest mathematics achievement scores for their African American students. Out of the seven teachers who were approached for participation, three teachers gave consent: Mrs. Lewis, Ms. Jenkins, and Ms. Hale.

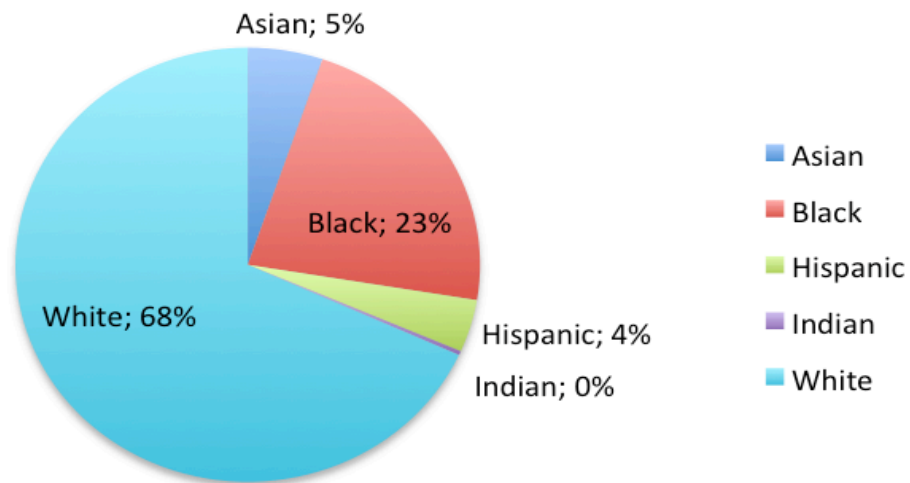


Figure 7. Webster school district demographic data.

After receiving permission from the Superintendent of Khanna Public Schools to conduct research, I met with the superintendent who identified two schools that consistently met annual yearly progress (AYP) on the state assessment in mathematics. I then spoke with the building principals of each school and they identified six potential participants. (See Figure 2 for district’s demographic data) Of these six teachers, three teachers declined and three agreed to participate: Mrs. Knox, Mrs. Mitchell, and Mrs. Savage.

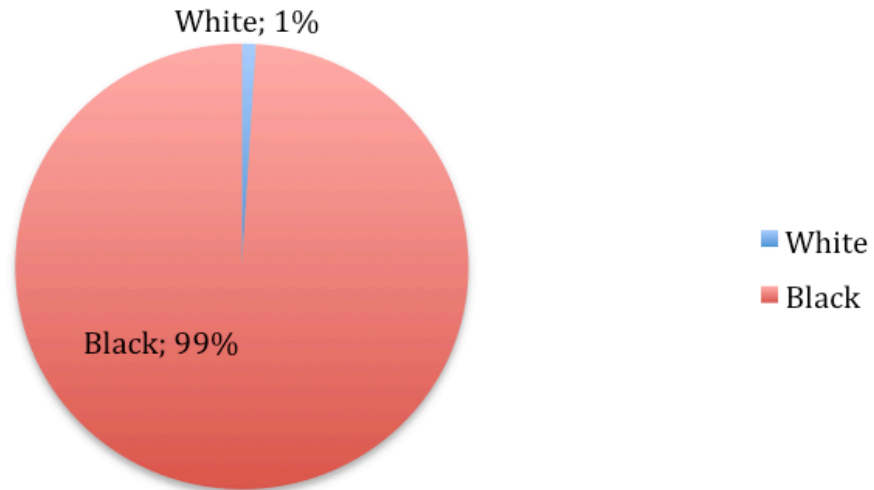


Figure 8. Khanna school district demographic data.

After receiving permission from Hartville Public Schools Interim Superintendent to conduct research, I contacted the mathematics coordinator who identified seven teachers whose African American students had high average achievement scores on the district assessment (75% and above). She also confirmed along with the building principals that these teachers have a positive rapport with their African American students. (See Figure 3 for district's demographic data) Through their recommendations I identified two teachers of the seven who were willing to participate: Mrs. Jones and Mrs. Thomas.

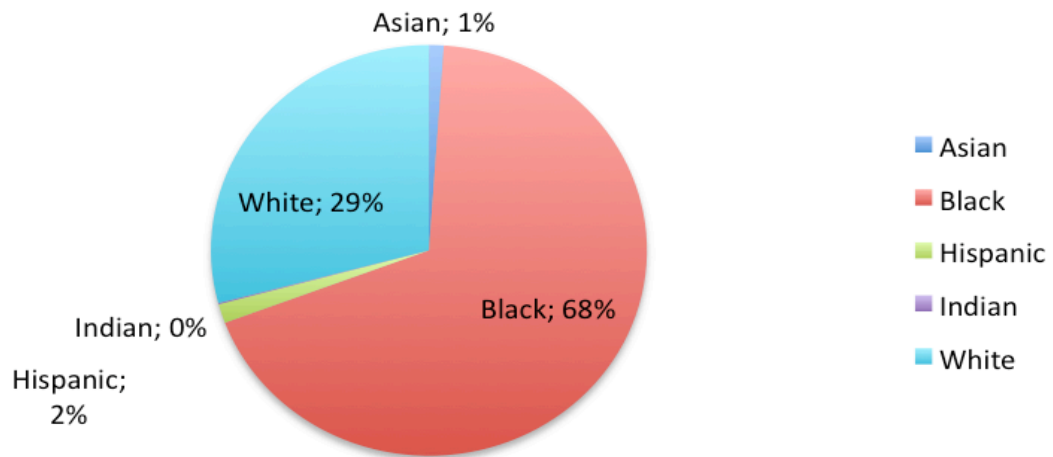


Figure 9. Hartville school district demographic data.

After receiving permission from Johnson Public Schools Research Review Committee in the Quality Improvement and Accountability Department, I contacted the Director of Quality Improvement and Accountability to help identify potential teachers to participate in the study based on the mathematics achievement data of African American students. After an extended period, I received information regarding the percentage of African American students in each classroom. At this time and after careful consideration, I modified the selection criteria for the participants to participate in the study. The participants now had to meet criteria a-d, since I did not receive the achievement data from the district. I then contacted the Coordinator of Cultural Diversity of the Johnson Public School district to confirm the participants I selected were successful teaching African American students. (See Figure 4 for district’s demographic data) Through his recommendations I identified one teacher out of nine who was willing to participate in the study: Mr. Franklin.

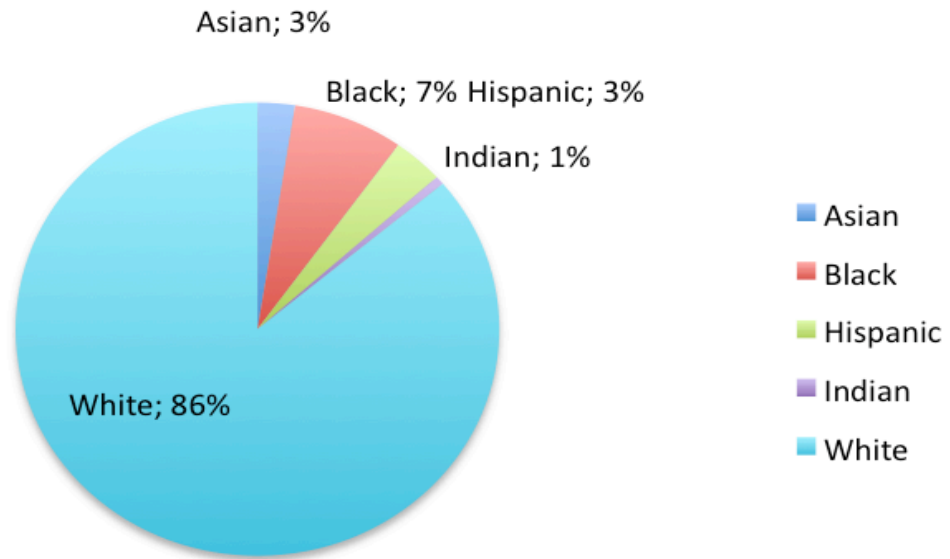


Figure 10. Johnson school district demographic data.

I did not obtain district approval for the remaining participants who were willing to participate. Instead, I relied on the recommendations of a University Mathematics Education faculty member who conducted numerous professional development workshops within this urban district. Like Mr. Franklin, these participants met the modified criteria a-d. All of the participants taught in Stephens School District. (See Figure 5 for district’s demographic data) I identified four participants out of eight who were willing to participate in the study: Mrs. De Vries, Mrs. Stevens, Mrs. Wilkins, and Mrs. Fewell.

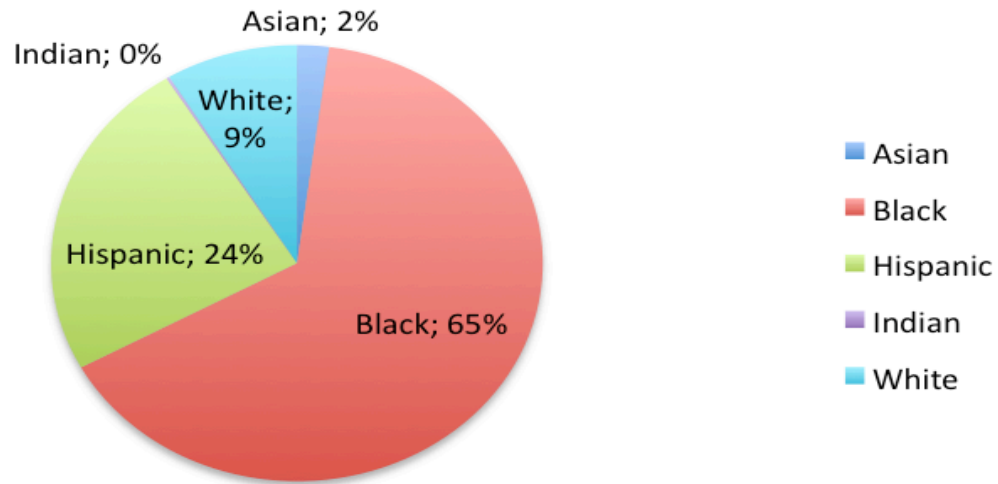


Figure 11. Stephens school district demographic data.

During the recruitment process all the teachers were given a consent letter detailing the description of the study and the time commitments required. A copy of the consent letter sent to potential teachers is provided in Appendix A.

Participant Descriptions

When I first met the participants, specifically the African American participants, they all introduced themselves as Mrs. So and So. It is interesting to note that the Caucasian participants introduced themselves using their first and last name. Typically, in the African American culture when an African American is first introduced to an older African American he or she would not address the older African American by their first name. Instead, the older African American would be referred to as Mr. or Mrs. So and So. It is a sign of respect. So, for the purpose of this study, all the participants are addressed as Mr. or Mrs. So and So. In Table 4, I provide more descriptive information about each participant.

Table 4

Participants

Teacher	Ethnicity	Grade Level Taught during Study	School District Context	Percent of African American Students Enrolled in District	Years Teaching Experience	Participation Based on Achievement Scores
Mrs. Lewis	Caucasian	Fifth	Webster School District, Public, Small City	22.6%	4	Yes
Ms. Jenkins	Caucasian	Third	Webster School District, Public, Small City	22.6%	6	Yes
Ms. Hale	Caucasian	Fourth	Webster School District, Public, Small City	22.6%	4	Yes
Mrs. Knox	African American	Third	Khanna School District, Public, Urban	99.2%	11	Yes
Mrs. Mitchell	African American	Sixth	Khanna School District, Public, Urban	99.2%	20 plus	Yes
Mrs. Savage	Caucasian	Fourth	Khanna School District, Public, Urban	99.2%	28	Yes
Mrs. Jones	Caucasian	Third	Hartville School District, Public, Suburban	68.1%	12	Yes
Mrs. Thomas	African American	Third	Hartville School District, Public, Suburban	68.1%	13	Yes
Mr. Franklin	Caucasian	Third	Johnson School District, Public, Mid-size town	7.4%	5	No
Mrs. De Vries	Hispanic	Third	Stephens School District, Public, Urban	64.9%	4	No
Mrs. Stevens	Caucasian	Fifth	Stephens School District, Public, Urban	64.9%	23	No
Mrs. Wilkins	African American	Fifth	Stephens School District, Public, Urban	64.9%	8	No
Mrs. Fewell	African American	Fifth	Stephens School District, Public, Urban	64.9%	9	No

Data Collection Methods

The primary data sources for all participants included initial and final interviews. In addition, I observed and videorecorded Mrs. Thomas teach eight mathematics lessons during the months of November/December 2009 and January 2010 (see Appendix B for letter of consent and student release form). I wrote field notes during each observation and then followed up with four stimulated-recall interviews.

Initial interview. I designed a semi-structured interview (see Appendix C) to determine elementary mathematics teachers' knowledge related to equity in teaching mathematics to African American students. Semi-structured interviews are guided by a list of questions to be explored (Merriam, 1988; Patton, 2002) that allowed me to spontaneously word questions and probe for additional ideas and/or clarification to establish a shared understanding. During the initial interview, I also collected information regarding participants' teaching background and experiences, their knowledge of equity issues, knowledge of equity pedagogy, and beliefs about teaching African American students. The initial interview lasted approximately one hour.

Videotaped classroom observations. I observed, videotaped, and took field notes of mathematics lessons twice a week for 4 weeks in Mrs. Thomas' classroom. I focused the camera on Mrs. Thomas to capture her pedagogy, written images on the whiteboard and chart paper, and interactions particularly with African American students. These images served as points of discussion in order to understand her knowledge of equity and beliefs about African American students. Each mathematics lesson lasted 60 to 75 minutes.

Stimulated-recall interview. Stimulated-recall interviews involve replaying video clips of a teacher's lesson to stimulate a discussion on their thought process and decision-

making (Calderhead, 1981). Teachers draw on their knowledge as they make decisions during instruction. As a result, I displayed and discussed specific video clips to discuss Mrs. Thomas' knowledge, beliefs, and pedagogy related to equity, and teaching African American students specifically. The stimulated-recall interview method enabled me to probe teachers' knowledge and beliefs as they are enacted during instruction. By discussing parts of her decision-making while teaching via stimulated-recall interview, I gained an understanding of her enacted knowledge. The questions posed were unstructured, but focused on African American students' understanding of the mathematical concept, how the instructional strategies used helped or hindered the success and understanding of African American students, and beliefs of how African American students learn mathematics best and effective ways to instruct African American students (see Appendix E). Mrs. Thomas participated in four stimulated-recall interviews, where each interview lasted approximately 35-50 minutes.

Final interview. I conducted a semi-structured final interview with all participants to further understand their knowledge of equity pedagogy and beliefs about African American students. Participants were interviewed for approximately one hour. Questions during the final interview included: (a) What do your African American students find engaging? What facilitates their participation? (b) How would you describe an effective mathematics teacher of African American students? (c) You have been asked to give a presentation to your colleagues on what facilitates and hinders the success of African American students. What would you discuss? and (d) If you could design the way mathematics teacher education programs prepare teachers to be more effective with African American students, what would you include? (See Appendix D)

Data Analysis

After I transcribed all the interviews, I analyzed the data using a data reduction approach (Miles & Huberman, 1994) along with a constant comparative method (Glaser, 1965; Glaser & Strauss, 1967). Using a constant comparative approach to data analysis, I compared incident to incident analyzing the data for similarities and differences (Charmaz, 2006). I analyzed the data via triangulation of multiple data sources, which increased the validity of the study (Patton, 2002). I describe the data analysis in seven phases below.

Phase 1

After each interview I recorded my thoughts, ideas, questions, and direction for further data collection in the form of memos (Strauss & Corbin, 1998). I compared the ideas of each interview to determine how I would answer my research questions and what knowledge of equity in teaching mathematics to African American students was highlighted. I used this information to determine which teachers I wanted to conduct a more in-depth case study using videorecorded observations. I initially asked three teachers, but only one consented.

Phase 2

After conducting audio-recorded interviews, I transcribed the data. The transcripts were then uploaded into QSR NVivo 8 software and coded using a microanalysis (i.e., detailed line-by-line analysis) with nodes related to the three components of the Equity in Teaching Framework: teachers' knowledge of equity issues, beliefs, and knowledge of equity pedagogy. I used the coding categories shown in Table 5.

Table 5

Coding categories for teachers' knowledge of equity in teaching

<p>Teachers' Knowledge of Equity</p>	<ul style="list-style-type: none"> • knowledge about structural inequities that persist in larger societal contexts where schools are situated • knowledge related the influence of race, ethnicity, language and class on teaching and learning
<p>Teachers' Beliefs</p>	<ul style="list-style-type: none"> • productive beliefs specifically related to African American students • how African American students learn • effective teaching practices for African American students • productive beliefs related to themselves as teachers and the roles they play as they teach mathematics
<p>Teachers' Knowledge of Equity Pedagogy</p>	<ul style="list-style-type: none"> • Culturally relevant pedagogy <ul style="list-style-type: none"> • view themselves as part of a community • help students to make connections between their racial, cultural, local, national, and global identities • establish relationships with students that extend beyond the classroom environment • establish a community of learners • believe knowledge is constantly recycled, re-created, and shared by students and themselves – it is not static • view teaching as students developing their knowledge • use a variety of instructional strategies • Cultural competence <ul style="list-style-type: none"> • knowledge about their own culture and the role it has in their lives • knowledge of students' cultures • understand the necessity to <i>study their students</i> • ability to communicate (both verbal and nonverbal), understand, and interact with people from different cultures. • Critical consciousness <ul style="list-style-type: none"> • knowledge of the larger sociopolitical context (i.e., knowledge of political and social realities in which they live beyond the television and newspaper articles) • invest in students and understand students are important for who they are and who they can become • plan and implement academic experiences that connect students to the larger social context • believe the success of students has consequences for their quality of life

Phase 3

After the initial coding, other themes emerged beyond the coding categories listed in Table 5. I then conducted a second layer of coding with these emerging themes. The coding categories and the new themes allowed me to develop an extensive coding

dictionary (see Appendix F), which was shared with two different individuals to code an interview transcript. All discrepancies were resolved and clarified.

Phase 4

After coding all of the interview transcripts, I selected three additional participants to write in-depth cases based on their interview data. I selected Mrs. Wilkins, Mrs. Mitchell, and Mrs. Savage based on both contrasting differences and similarities to the remaining nine participants knowledge of equity in teaching mathematics to African American students. I wanted to highlight the challenges Mrs. Wilkins faced in her class. Moreover, I wanted to share how Mrs. Savage, a Caucasian teacher, develops and implements her knowledge of equity in teaching. Finally, I selected Mrs. Mitchell because she had similar patterns in her knowledge as the other participants. I was able to meet and interview two of the participants, Mrs. Mitchell and Mrs. Savage, in their class, which gave me a deeper understanding of their knowledge in the context of their classroom. Although I was unable to physically meet Mrs. Wilkins or observe the makeup of her class, the interviews with her lasted a total of four hours, which I feel gave me a deep understanding of her knowledge of equity in teaching African American students.

Phase 5

I created profiles of the four teachers (i.e., Mrs. Wilkins, Mrs. Mitchell, Mrs. Savage, and Mrs. Thomas) whom I selected to write cases about their knowledge of equity to provide a “thick description” (Geertz, 1973; Patton, 2002) of their knowledge.

A thick description does more than record what a person is doing. It goes beyond mere fact and surface appearances. It presents detail, context, emotion, and the webs of social relationships that join persons to one another. Thick description evokes emotionality and self-feelings. It inserts history into experience. It establishes the significance of an experience, or

the sequence of events, for the person or persons in question. In thick description, the voices, feelings, actions, and meanings of interacting people are heard. (Denzin, 1989, p. 83, as cited in Patton, 2002, p. 503)

I described the teacher's background and experience and discussed quotes that described their knowledge using the components of the Knowledge of Equity in Teaching Framework. To do this, I queried the knowledge component codes using QSR NVivo 8 software. I queried all of the interviews for these four teachers. Two doctoral students and a faculty member occasionally checked coded portions of the transcripts to ensure reliability.

Phase 6

Using chart paper, I mapped out the teachers' knowledge of equity as I read and reread each profile. I then used this and the profile data to create cases of the teachers' knowledge of equity in teaching based on the three components (i.e., knowledge of equity issues, beliefs, and knowledge of equity pedagogy). At this point, I looked for saturation in the data of the remaining nine participants. I identified knowledge of equity of the nine participants that was not brought out by the four case studies.

Phase 7

After writing the four case studies and a description of additional knowledge and beliefs of the remaining nine participants, I categorized all of the quotes from all 13 participants into a table for each component (i.e., knowledge of equity issues, beliefs, and knowledge of equity pedagogy) of the Knowledge of Equity in Teaching Framework. For example, if a quote referred to teachers' beliefs about how African American students learn, it was placed in that subsection in the table. I then free coded the data to identify

the themes as the final stage of analysis. Reliability was confirmed with another faculty member.

Summary

Practically no research has examined mathematics teachers' knowledge related to equity. Moreover, frameworks conceptualizing teacher knowledge have ignored knowledge related to equity. The case study method allowed me to investigate this phenomenon in its naturalistic setting. Furthermore, the collection and analyses of initial interviews, video recorded observations, stimulated-recall interviews, and final interviews allowed for innovative work and examination of elementary mathematics teachers' knowledge of equity. In chapter 4, I discuss the findings.

CHAPTER 4: RESULTS AND DISCUSSION

In this study, I examined the knowledge and beliefs within cases and across cases. To investigate the knowledge and beliefs within cases I selected four participants to examine from a variety of contexts. An examination of these four cases also allowed me to investigate whether there were relationships among the components of the Knowledge of Equity in Teaching Framework. I then examined the knowledge and beliefs across all 13 participants. I describe the knowledge and beliefs of the remaining 9 participants after a description of the knowledge and beliefs of the first four participants. I used the framework to guide the data analysis and description of the findings.

In this chapter, I document findings that resulted from this study on elementary teachers' knowledge as it relates to equity in the instruction of mathematics to African American students. In this study, I sought to answer the following research questions:

1. What knowledge related to equity in teaching African American students do successful elementary mathematics teachers draw upon?
2. What beliefs related to (a) teaching African American students and (b) teaching mathematics to African American students influence the mathematics teaching of successful elementary mathematics teachers?

In this chapter, I provide an in-depth look at four cases that illustrate different teaching contexts as well as different beliefs and knowledge. I then present additional data from the remaining nine participants. I report the findings using the three major components of the Knowledge of Equity in Teaching Framework (i.e., participants' knowledge of equity issues, beliefs, and knowledge of equity pedagogy). I conclude with a discussion of the findings.

Mrs. Wilkins

Mrs. Wilkins, an African American woman, graduated with an undergraduate degree in education; however, she decided to pursue other career options upon graduation. She began writing for a magazine in Atlanta. Eventually, she accepted a position as a preschool teacher. Her responsibilities included teaching reading to three year olds. Mrs. Wilkins felt successful in that position and made the decision to pursue teaching at the elementary level. She did not hold the appropriate certifications so she enrolled in an alternative certification program at a local university. Upon securing certification, she accepted a position as an elementary teacher in an urban district in the Midwest. During the past eight years, Mrs. Wilkins has taught kindergarten through fifth grade at two different schools within this district. Currently, she teaches fifth grade at a French Magnet School that includes a strong emphasis on learning French, in addition to other subjects. This school reports a student population that is 90.7% African American. Mrs. Wilkins states that she has accomplished many things in life and she has had opportunities to pursue other options, yet she feels compelled to teach and make a difference in the lives of her students. Although she recognizes that teaching African American students is challenging work, Mrs. Wilkins' passion for the children is apparent as she talks about them:

I feel an obligation. It's like if I don't teach these kids, as hard as it is, who will teach them? You see what I'm saying? And it's DIFFICULT. It's difficult. But, I don't want to leave them. I can't leave them. (Initial Interview, 2010)

Mrs. Wilkins' Knowledge of Equity Issues

Mrs. Wilkins team-teaches mathematics with another teacher whom she referred to as Courtney. She explained that Courtney is a “Teach for America” teacher who has been at the school for two years. Mrs. Wilkins believes her race is not a factor when teaching her African American students; however, she contends it is a factor for Courtney. She explains:

Race makes a difference, I think, because the “Teach for America” teacher is white. And so in that classroom, it’s like under the circumstances, I think race plays a big part. But I don’t think that race plays a part on the black teachers’ perspective, you know from my perspective. It does from the white teachers’ perspective. And that’s the same way with the 5th grade teacher. I think they can have more difficulty with the students. (Initial Interview, 2010)

She further comments, “I do think that race matters more so for the white teachers teaching the black students versus black teachers teaching the black students” (Initial Interview, 2010). She recalled a time when a principal in her district decided to recruit several young white teachers to come teach. They started teaching in August, but they left the school by the time winter break arrived. They could not handle the kids. Mrs. Wilkins continues:

I just think that because it’s an obvious difference. You know what I’m saying? It’s an obvious difference. And culturally there’s a difference, physically there’s a difference. For instance, my students say that the “Teach for America” teacher doesn’t like them. And they say that well she’s always yelling at them, but I don’t yell...(Initial Interview, 2010)

The above quotes further illustrate that Mrs. Wilkins recognizes that race matters and influences how teachers teach and relate to African American students. For example, Courtney is unable to handle her African American students. As a result, she engages in an unproductive pedagogical practice—yelling. In other words, race is a factor because

the physical differences are noticeable. A statement like this may suggest that Mrs. Wilkins believes that black teachers will be able to relate to their black students whereas white teachers will not. However, she recognizes that this is not always the case. She realizes some white teachers connect with their black students. She explains:

Mrs. Gaither had a relationship with the black students just like she was black, it was like she was black, you know. She knew about where to go to get fried turkey on Walnut (laughter). It was like, and I think she lived somewhere near our school. So, I know she had that relationship. And I know of a teacher, a white teacher, when I was in high school his name was Frank Hillme. And this man, it's like you can tell him what's right. You know what I'm saying? You also knew that he wanted the best for you as a person. (Initial Interview, 2010)

This quote highlights qualities Mrs. Wilkins believed white teachers need in order to establish relationships with their black students. Mrs. Gaither was able to establish a relationship with her black students by becoming part of the community near the school. She was vested in the community in which she lived. Further, Mr. Hillme was approachable and honest with his students. Additionally, Mrs. Wilkins had experiences with other white teachers who had been successful in building relationships with their black students, and many of them exemplify similar characteristics.

As Mrs. Wilkins reflected on teaching different grade levels, she identified kindergarten as her favorite grade to teach. Surprisingly, this was not based on the age of the children or the content to be taught, but rather the experiences the children had prior to kindergarten. Mrs. Wilkins knew that students were shaped by their experiences—positive and negative—as they progressed through school. She explains:

I loved kindergarten because I was the first teacher. And I knew I could make those students love to learn. I get so excited about them learning. You know we can look at ants, you name it, and we would want to learn about it because they [the students] were fresh. They hadn't been contaminated. They hadn't been contaminated by teachers who didn't

want to teach them. They hadn't been contaminated by teachers who were tired and didn't feel like being bothered by them. And then work ethic, you see the reason that I loved kindergarten so, is because I could take them so far beyond what anybody expected because it was their first time in school. I had my kindergartners doing all sorts of things because it was like they were blank slates. They didn't have any prejudices. They didn't have any doubts about what they could or couldn't do. That's why I loved kindergarten so. You know it's about a time, like when they are in third grade, a lot of times they just hate school. (Final Interview, 2010)

This quote illustrates Mrs. Wilkins passion for teaching as she motivates, engages, and excites her students in the learning process. She influences her students to believe in themselves by helping them develop confidence. Her recognition of ineffective teaching practices in elementary schools, and injustices in the school system justifies why it is critical for her to have high expectations for her students. Although Mrs. Wilkins believes kindergarten is the ideal level to teach, she describes when teaching other grade levels teachers cannot make assumptions about students' capabilities and let those stereotypes contaminate or influence instruction. She elaborates:

I think you can't let your preconceived notions about students, you can't let them come into the classroom with you. Sometimes deep down we may think, we may have opinions that we don't verbalize, but they're there... And I think, if you have those stereotypes about the student's abilities to achieve, it's like what you believe about them, it manifests itself in the way that you interact with them. And so if you think that they're not capable, or you think they're low achieving [that's how you will instruct them]. (Initial Interview, 2010)

Mrs. Wilkins knows teachers, including her, have biases. However, she understands you have to identify them, and then, work to eliminate them. Although Mrs. Wilkins believes black and white children are culturally different, she argues they are the same because both the black and white parents want the best for their children. However, due to the inequities faced by many black parents, they are unable to afford to give their child the same opportunity as white parents.

It's like black children and white children are the same, oh now there are cultural differences, but their parents want the best for them. Sometimes the pressures of life keep people from doing certain things. And then sometimes people's priorities are in the wrong place, although fundamentally the black parents want the same as white parents want for their children. But then how you make it happen they seem to see that difference. Some parents know that or I'll say it like this, maybe the white parent know okay I'm going to take this money and I'm going to get a tutor for my child to make sure that they get into MIT or wherever. And the black parents may not have the money, but it doesn't mean that fundamentally they don't want the same thing for their children. It's just can I make it happen or can I not make it happen. (Initial Interview, 2010)

Mrs. Wilkins acknowledged there are factors that may hinder the success of African American students in mathematics. Mrs. Wilkins explained that one factor inhibiting the success of African American students in mathematics is the language gap among African American students. She explains that white children, on average, come to school with a vocabulary consisting of at least 10,000 words, compared to 3,000 words for black children. She elaborates:

Today and yesterday, when the math teacher gave the lesson, and one of the questions said something like which group sold twice as many apples as group D. And the children didn't understand the word twice. And you would think surely they know what twice means but they didn't. There were several that didn't know what twice meant. And so if you don't break down the vocabulary, then that's part of the reason they're not successful because they don't understand what the question or words are saying. (Final Interview, 2010)

Another factor is teachers not liking the subject themselves. Thus, if they don't necessarily enjoy mathematics, then they can convey that message to their students causing their students to not like mathematics either. Finally, teachers are not equipped with the mathematical knowledge to pass down to their students.

We talk about the requirements of teachers in mathematics where what they know can be limited. It's like where are the students supposed to learn about mathematics? You know what I'm saying? If you, if you have teachers who aren't well prepared, and no fault of their own because

programs of study across the nation don't have or don't require teachers to take a lot of math classes. It's like you have that's one aspect of it...[So] I do think it has a lot to do with teacher knowledge. (Final Interview, 2010)

Mrs. Wilkins recognized the gaps in her mathematical understanding, and sought ways to fill those gaps in her knowledge. She refused to have the blood of her students on her hands because she lacked the knowledge.

And so that's why I'm constantly in classes. I take classes with Dr. Vivian all the time. And I take all kinds of classes...because I don't ever want to be a disservice to anybody's child because I don't know something. So if I don't know, I'm going to find out how I can learn it. And then with the addition of smartboards and the internet, I learned some concepts, I did my research outside of the classroom...And then, so it was like I just found a way to make sure that the students knew what they needed to know. I wasn't willing to, I didn't want to have that blood on my hands, you know. (Final Interview, 2010)

Mrs. Wilkins suggests if teachers did an excellent job teaching fewer concepts than were required at each grade level, then all the next teacher would have to do is build on the students' knowledge. Unfortunately, she says that teachers are not always committed to doing that. Therefore, gaps exist in students' learning. Mrs. Wilkins describes how her students did not understand place value and they did not know about it. Mrs. Wilkins concurs that this is possible because if teachers do not understand the mathematical content, they cannot help the students understand. Then add this on top of students "misbehaving TOO, oh like, oh my goodness" (Final Interview, 2010).

Mrs. Wilkins' Beliefs

Mrs. Wilkins believes some of her African American students are more concerned about their peers' perception of them than learning.

I've seen kids who will not do one ounce of work. They don't care that you give them an F. They don't care. They don't care. They're not going to do it because they refuse to be laughed at. It seems like whom they sit around, the people in their group or who sits at their table, if there is

anybody at their table who laughs at them, they will not do any work. I've seen it over and over. And I've only, to my knowledge it's with girls. I know three girls right now that I can think of where it was extreme cases where it's one in the classroom now. I had a little girl two years in a row, she just would not do it because and I would try to put her by somebody who I felt was helpful, but she wouldn't do anything. She would just sit there. And it was like I talked to her grandmother, but it's like if she felt they were going to laugh, she would not put herself out there like that. (Initial Interview, 2010)

Mrs. Wilkins realizes the role peer perception and peer interaction has on her students' learning. She knows some of her students choose not to engage in the learning process because they fear embarrassment. However, this makes her persistent to make sure they learn and succeed in life because she has "a heart for them" (Final Interview, 2010).

Every child that's placed in my care, I'm going to give that child the best. You know the best I have to give. If I don't have it to give, I'm going to figure out a way to get it. Somebody is going to come and help me, help you. (Initial Interview, 2010)

She further comments she has more invested in her students because they represent her as an African American. They do not necessarily represent the other teachers in her school who are White, African, or Haitian. They represent and reflect her because she is African American just like them. So, whatever her black students do is a reflection on her and more globally, the black people as a race.

The thing is that my expectation for those students I think is different from most white teachers I know. In that it's like you represent me. When somebody sees you, they see me. And that is true for the White teacher too, like that's Mrs. So and So's class, so you are still required to represent that teacher. But I think it's different, it's deeper for me because they're black, I'm black. It's like look, black people don't have to act like fools. This is honesty right here. They don't have to act like a fool. You can sit down and listen and learn because you are capable of doing this. So when I get upset, if my voice is loud it's from the perspective of how you represent us as a race of people. It's how you represent us because you see the dynamics in the school are really different because the African teachers are still different from the African American teachers. And then you have the white teachers. So, it's like the students, they represent me

more than anybody else, any other adult in the classroom. You see what I'm saying? So it's like I have a personal stake in how they do. (Initial Interview, 2010)

Mrs. Wilkins believes she has a vested interest in what her students accomplish.

Therefore, she teaches her African American students how to function and be successful adults in society. She comments:

I think the most joy comes in knowing that when they become adults that they will become confident people in terms of like money management and just confident in all things that relate to mathematics, but in the, in their day-to-day lives. I just enjoy knowing that in the end there's going to be a difference in this group of people, you know. Yeah, that there's going to be a difference in them that they will be able to go in the store and calculate percentages off on things. And that kind of thing, the rest of their lives would be better for them. (Final Interview, 2010)

However, Mrs. Wilkins sees beyond the academics, and believes she has to prepare her African American students to live in a Eurocentric society.

It seems like being so much more than just a teacher. Like I don't just teach them academics, but I have to teach them life skills. And I think this may be the difference between the black teacher and the white teacher too is that I know that I have to make these students learn to respect authority. (Initial Interview, 2010)

Mrs. Wilkins argues that excuses cannot be made, and expectations lowered for African American students because of their circumstances and their environment. Teachers should instead hold these students to a higher standard.

I think in the end it boils down to expectations because it's sort of like this is how I see it. I expect my son, my biological son or daughter to achieve. I don't expect my son to disrespect any teacher. This is what I've seen though, even with that principal at southeast. It's all that bleeding heart thing, 'Well they don't know any better.' Yes, they do! They've been in school all of these years. Every year somebody is telling them what is expected...I was talking about that principal that's at the worse school in the whole district, and it was like, if kids are wrong, she made excuses saying that they didn't know right from wrong. But they do know right from wrong. They do know. They know what is expected of them. They know what they should do and what they shouldn't do. They know those

things. But if you, it's sort of like this, you have a niece. Okay, I'm white. I have a niece. Now, I'm not going to expect my niece to cuss out my mother, you see. So why would you think that this student cussing out somebody is okay? You don't think that's okay for your niece. Well it's not okay for them because what you want for your child, and the children in your family [you] want the same thing for these children. You see, and that's the difference that I notice. It's so well you just explain it, well they don't know. Yes, they do know! They know. They know. And to say that they don't know is a gross error. They do know. And if you don't expect that out of your children, don't expect it out of them. Don't say it's okay because of their situation, well they're poor or they're this. No! You don't cuss out people. That's not how it works. (Initial Interview, 2010)

This quote highlights that Mrs. Wilkins believes that some teachers hold different expectations for white and black students. The expectations are lower for black students because of their circumstances. So, they are expected to continue to live beneath their privilege. However, the expectations for white students are much higher—society expects them to be accountable and respectful. Meanwhile, blacks are expected to be disrespectful and unruly. This should not be the case. Black students should be held accountable to the same high standards as white students.

Mrs. Wilkins believes teachers must manage students' behaviors in order to teach them. If they are out of control, then it is a challenge to teach them, and learning will not take place.

I think it's like as much as possible you have to harness the behavior because if you can do that, then they're teachable. This is what I discovered. Anything that you teach the children, you show them how and then you assess them on what you taught them, they will do it. They can do it, but it's like you got to get to that point where you can do it, where you can present the lesson to them. And it's just harnessing that behavior. It depends on the environment that you're in, like if you were in an environment where the children enjoy learning, where they know what's expected of them. You have to have procedures in place. I think when you have that and you have where the students have a sense of place, then instruction can flow. But if you have obstacles in those areas, it's like you have to work really hard to harness it. (Final Interview, 2010)

Mrs. Wilkins found that harnessing students' behavior was more challenging than teaching the mathematics content, particularly with her older African American students. She did not perceive behavior or content to be an issue with her younger students, but she sees it as a problem with her older students. Mrs. Wilkins refuses to use the unproductive pedagogical practice of yelling at her students, like Courtney, to get them under control. She explains:

I'm not going to scream because to me yelling is an indication that you are out of control that you're out of control as the adult. I understand why teachers do it because the goal is to get in control, but I don't think that you actually become in control just because you're talking above them. (Initial Interview, 2010)

And she does not control her students' behavior based on conditions. For example, she does not reward her students for being quiet. Instead, she expects her African American students to behave. She describes:

The difference between she (the white teacher) and I, she buys candy. She gives them, it's like bribery. So her kids are good, but that's with the expectation that I'm going to get some candy. You know what I'm saying? And I refuse to buy candy. My thing is you are going to behave like you have sense because you are supposed to. And you are a human being. You come to school to learn. And I'm not spending one cent of money on candy to get you to act right. (Initial Interview, 2010)

Mrs. Wilkins recognizes some of her students act out in class because they do not understand the mathematics lesson, and they will try everything in their power to redirect the focus of the class.

It's like this, and that's the other reason, I talked about these reasons for the behavior is because if I can't do this, then I'm going to make you forget about doing it. I'm going to make everybody else forget about doing it because I'm going to tell jokes. I'm going to say off the wall things. I'm just going to do anything I can to get your attention away from the task at hand. (Final Interview, 2010)

In other words, Mrs. Wilkins realizes some of her students use acting out as an avoidance tactic to get out of completing an assignment because they do not know how to do it. She elaborates:

This is what I've discovered when the student acts out it's because they don't want to do whatever it is. Not that they don't want to do it, usually they lack the ability to do whatever it is the task or whatever the task is. So that's why they're acting out because they don't really know how to come up to you and say you know I don't know how to do this, and I need to be tutored after school. They don't know how to say that to you. So they do things to get your focus off of the lesson. Get your focus off of them that's what I've discovered. (Final Interview, 2010)

And she knows that some of her students act out because they feel like teachers are not concerned about them.

I just know that somehow by intuition, students know that you care about them. So if you see them as people, and not even as students, but as people then you can develop a level of respect for them that it transcends the curriculum. Then you can get that out of them because sometime they can act out because if they think that you don't like them, then that's why they are acting out. The very reason, because they think you don't like them. (Initial Interview, 2010)

Mrs. Wilkins believes she cannot give up on her African American students. She is committed to their success because they are a part of her. She elaborates:

With the black children I think that there is an emotional tie. You know what I'm saying? That's the thing about equity; it's emotional for me. It's like look, I don't know they become *my* children. You know what I'm saying? They become my children and Katrina (Hispanic student) was my child, just like Erica (White student), too... The goal is you teach every child that you have, and every child that you have becomes yours. But, what makes the relationship different is that the student makes me theirs as well. Do you see what I'm saying? But it's like, you take them as yours and they take you as theirs. You know it's sort of like when they're doing some work, and then all of a sudden they say *momma*. You know that level of comfort that comes about. You see they have to be in a comfortable state to call you somebody that is enduring to them. (Initial Interview, 2010)

In summary, Mrs. Wilkins believes relationships make a difference with her students.

Mrs. Wilkins' Knowledge of Equity Pedagogy

Mrs. Wilkins always felt she was better at writing than in mathematics when she was in school, although she performed better in mathematics. She recalls having an African American teacher for Algebra, and remembers asking what she is supposed to do with “this.” But, her teacher could not give her an answer. So, as an adult she took a professional development class in which a facilitator used Algebra tiles to teach Algebra. From that experience, Mrs. Wilkins’ confidence in mathematics increased dramatically. She had fun learning the mathematics. She immediately went back to school and showed her fifth grade students how to do Algebra using the Algebra tiles. Her purpose for teaching is not focused on just preparing students for the next grade. She looks to their future and wants to make sure she has established the love of mathematics in her students so they can pass it down to their own children. “The goal for me is to make sure that all the students can function as adults [and] they acquire a love for mathematics they will share with their children” (Final Interview, 2010). Mrs. Wilkins wants her students to develop an appreciation for mathematics, and realize it influences their quality of life.

With this understanding, Mrs. Wilkins makes her mathematics lessons relevant. She realizes from her own experience, if an instructor is covering material that she considers irrelevant, she is not interested.

It [the mathematics lesson] has to be relevant to them. And I think teachers have a better chance at producing better results when it does become relevant. Even with me sometime, when Dr. Vivian does her brainteasers in math, and if it’s not relevant, I become one of the students. I become a reluctant thinker. That’s what I call them, a reluctant thinker because well I don’t necessarily care about the answer to this and so I might do something else while she’s saying do the brain teasers. But it’s just something that’s going to be beneficial, if I see the benefit in it, then I might put myself out there. (Final Interview, 2010)

Mrs. Wilkins makes connections with her African American students' cultural and local identities to engage them in the mathematics lesson. For instance,

I always use examples where you're purchasing hot chips because they love hot chips. So, it's like oh, I better find out how to count this money because you know I want to buy hot chips. So it's relevant to them. Hot chips are relevant. But just counting money to some degree is relevant, but when you put it in the, put it in the framework of purchasing hot chips, then you have my interest! (Final Interview, 2010)

Mrs. Wilkins realizes the importance of engaging her students by making her lessons relevant, but even though she may consider the material relevant, some of her students still have difficulties understanding the mathematical concepts. Mrs. Wilkins discusses three different instructional approaches she uses to help them succeed. The first approach she uses is pulling the child to the side and speaking to him privately, as not to embarrass him, about the difficulties he is experiencing. Mrs. Wilkins does not just talk with the child, but she lets the child know that she is going to help him become better in mathematics. She sends books and other materials home with the child to make it more fun and ultimately have them experience success. Mrs. Wilkins believes students should have fun while learning mathematics. Second, Mrs. Wilkins uses a textbook from the student's previous grade with lower level exercises to help the child learn a particular mathematical concept. She comments she does not compromise rigor, or dumb down the curriculum when she does this because students learn the same things over and over again. The students are still learning the same concept, but with fewer frustrations. Mrs. Wilkins maintains they are successful and they understand. Lastly, Mrs. Wilkins monitors students for understanding, an instructional strategy designed for special education teachers. Mrs. Wilkins clarifies:

I think that every teacher should have training in special education strategies because I think all of the kids are special ed in some kind of way. I'm not saying, I'm saying that the strategies that you use, I think they should be used all the time, intervention strategies, they should be used, you know just like regulars for anybody. For instance, an instructional intervention strategy, I think every student should be monitored for understanding continuously so misunderstanding can be clarified and corrected immediately. That's like what I was saying, the "Teach for America" teacher that while she was providing the instruction I was going around looking at each paper. And I saw that several kids missed the same answers, and they put the same answer there because they all had the same misconception. And students can have a lot of misconceptions in mathematics, and so you have to be on the look out for them. So it's like the strategy that you use for special ed students I think you should use them for regulars. (Final Interview, 2010)

Sometimes during mathematics instruction Mrs. Wilkins would allow her math wizard, an Ethiopian boy, assist her in teaching the class. Having the math wizard in class really excites her students, because the math wizard loves to work on mathematics problems, which fascinates her students.

We could do a lot of interesting things because it was like having a second teacher in the classroom. He helped, he was like a, he was a peer tutor. And he was able to help students understand, I don't know in that kid kind of way. (Initial Interview, 2010)

Mrs. Wilkins capitalizes on the mathematical knowledge of her students, by having them share and help other students in the classroom.

Mrs. Wilkins realizes that sometimes she moves through the mathematical material too fast and she loses her students in the process. She explains:

I discovered that sometimes I'm talking and I'm actually talking over their heads. So then I'll say did you understand what I said? It's like you can say something and the students they actually don't understand what you said. Now they're sitting there, they don't know what you said. And so you have to go back. And you have to explain it differently or you have to use words that that they understand. You think that they, it's like you think that they know, but they really don't know. (Final Interview, 2010)

Therefore, Mrs. Wilkins does not see any value in trying to keep to the district's pace. She believes if she does try to maintain the district's pace, then all she is doing is "surface teaching" which she relates to the mathematics curriculum. "The goal is to go deeper...with fewer subjects" (Final Interview, 2010). With this as the goal, Mrs. Wilkins informs her students who rush through their work that:

It's of no value to you if you finish and it's all wrong. You just want to finish. Well it's the process that's important, the fact that you understand how to do this. That's more important to me than you having a bunch of wrong answers on your paper. And you say I'm done, if you don't understand, then what's the use of you doing it? (Final Interview, 2010)

Mrs. Wilkins knows the importance of being stern with her students, but also communicating that she cares about them.

You do have to be really stern because if you don't, they will laugh and play the whole math lesson away. They will. They will just waste the time...It's sort of like you have to be stern in order to get them to do what you asked them to do. But, you have to be stern, but you still have to let them know that you care about them too. Because if you're stern and they think you don't care about them you have a different kind of problem—you have to deal with the hostility from them. (Final Interview, 2010)

Mrs. Wilkins recalls a time when she had to be stern with one of her students:

I told that little girl like look, I come from the same place you come from. I wear African head wrap, and I wear it everyday, but I'm not from Africa. I'm from the hood just like you are. And you can't talk to me like that *anymore*. (Final Interview, 2010)

Mrs. Wilkins feels it is her responsibility to "guide them in the direction that they should be in" (Initial Interview, 2010). As she guides her students, she harnesses their behavior in a caring manner. Mrs. Wilkins is not stern to the point that she is mean; she wants to instill a level of respect. She still let's her students know that she cares and wants the best for them, and they have to respect authority.

After looping with her students in third and fourth grade, Mrs. Wilkins felt prepared to teach them fifth grade. However, that opportunity never came. Friday before school started Mrs. Wilkins' principal informed her that she was going to teach the French teacher's class because the French teacher was detained in France dealing with visa related issues. Mrs. Wilkins was not mentally prepared to teach this group of students, although she was not responsible for teaching them French. She had physically and mentally prepared herself to teach the group of students she had for two years. Now she felt she had no time to prepare for a new group of students. Although she was black and her students were black, Mrs. Wilkins was unable to make a connection with her students. She had no desire to teach them. Mrs. Wilkins formulated a negative opinion about them believing they were the worst in the school. She explains:

Now in the beginning they also said that about me [that she didn't like them]. But it was true. I didn't like them. I didn't because they were the worst group in the whole school. And at the last minute I found out that I had to teach them. I also thought that the French teacher was coming back. I don't know. I'm just being honest. (Initial Interview, 2010)

It was so bad the previous year that over half of the students did not re-enroll the following academic year. Mrs. Wilkins was under the impression that this move was temporary, and she would soon return to her "real" class. Therefore, she did not invest in the students the first weeks of school. Later she realized that this class was going to be her class for the rest of the year, and she was going to be held accountable for them.

You have a different stake in it when you think that somebody else is coming to take over the class. You know what I'm saying? Like you're temporary, so like when you're on a job and you've given your notice. You know that relief you feel, oh, I'm leaving. You know, so initially I began the position like that, of teaching them like that because they say the French teacher is coming. She's going to be here in two weeks. So I'm thinking I just started things off for her. I went through my natural procedures, but the students' perception was that I wasn't their teacher.

You see they had that perception, and I had it too that I wasn't going to be their teacher. But then after a month, it dawned on me and they begin to accept well, she's not coming... And then it just finally, I had to come to the point that these are my students. So when you start to perceive them as your students, you take *full* responsibility for everything that they do. It's like you're responsible for their test scores. You're responsible for their behavior. You're responsible for everything. You're held accountable. (Initial Interview, 2010)

Once Mrs. Wilkins realized she had to assume full responsibility of the class she did not want, she understood how important building relationships and relinquishing preconceived beliefs was to successfully teach the students. She articulates:

It's like you have to know the students because it's like this, as long as I didn't like them and they didn't like me, learning wasn't going to take place. And they could see it on me. They could. They knew. I had one little girl in the class, her name was Tonja... But this little girl, she just makes me laugh. It's like, she's the one, she say's, what did she say? She says things like, "Your spirit says to me that you don't like that." She says things like that. And so you can't hide anything from this particular age group. So I had to deal with them from a real, from a REAL, real level because my emotions were part of teaching this group. I did not want to teach them. So I guess you have to be real with them. You have to be honest. You have to let them, without being personal, but you have to let them know who you are. And then they will let you know who they are. It's like making a friend without being a friend. (Initial Interview, 2010)

Mrs. Wilkins describes that teachers have to accept students for who they are and treat them as people, instead of students. If they are seen as people, then we respect and value their opinions. She recalls the 1970s television show 'Welcome Back, Kotter' and describes how the different students had different characters, but they were all accepted.

Mrs. Wilkins perceives:

Black children on the whole, I know this is a generalization, but it's true (laughter) they are loud. They are LOUD. Not all of them because you have different personalities. Like there are some people who are quiet and introverted people, but I would say if you had to make a general characteristic of a school, our students are loud. (Initial Interview, 2010)

But, she recognized that she had to accept them for who they are, even though she wanted them to sit down and be quiet. Mrs. Wilkins realized that she could not impose her perception on how students should behave. She had to accept them for who they are. However, this can only be accomplished if you have a relationship with them. And you develop that relationship by having conversations with them. You have to get to know them. But, that did not take place until Mrs. Wilkins was honest with herself and her students.

We just had to finally just have one of these situations, one of those “Come to Jesus” meetings in order for things to change. Things did change when I told you, it’s like when I accepted them, then they accepted me. The situation has changed. It’s not like that anymore. (Initial Interview, 2010)

After taking the time to accept and build relationships with her students, Mrs. Wilkins maintains, “students are more comfortable with someone who is like them” (Initial Interview, 2010).

Mrs. Wilkins’ Knowledge of Equity in Teaching

Mrs. Wilkins’ knowledge of equity in teaching focuses on knowledge that teachers, both black and white, have negative biases and stereotypes towards African American students that influences their teaching. However, she does not allow these negative prejudices to influence her instruction. Instead, she believes the African American students in her class are *her* students and relationships make a difference. Thus, in her pedagogy she builds positive relationships with her African American students. In this context, Figure 12 represents how Mrs. Wilkins’ knowledge of equity issues, beliefs, and knowledge of equity pedagogy are intertwined.

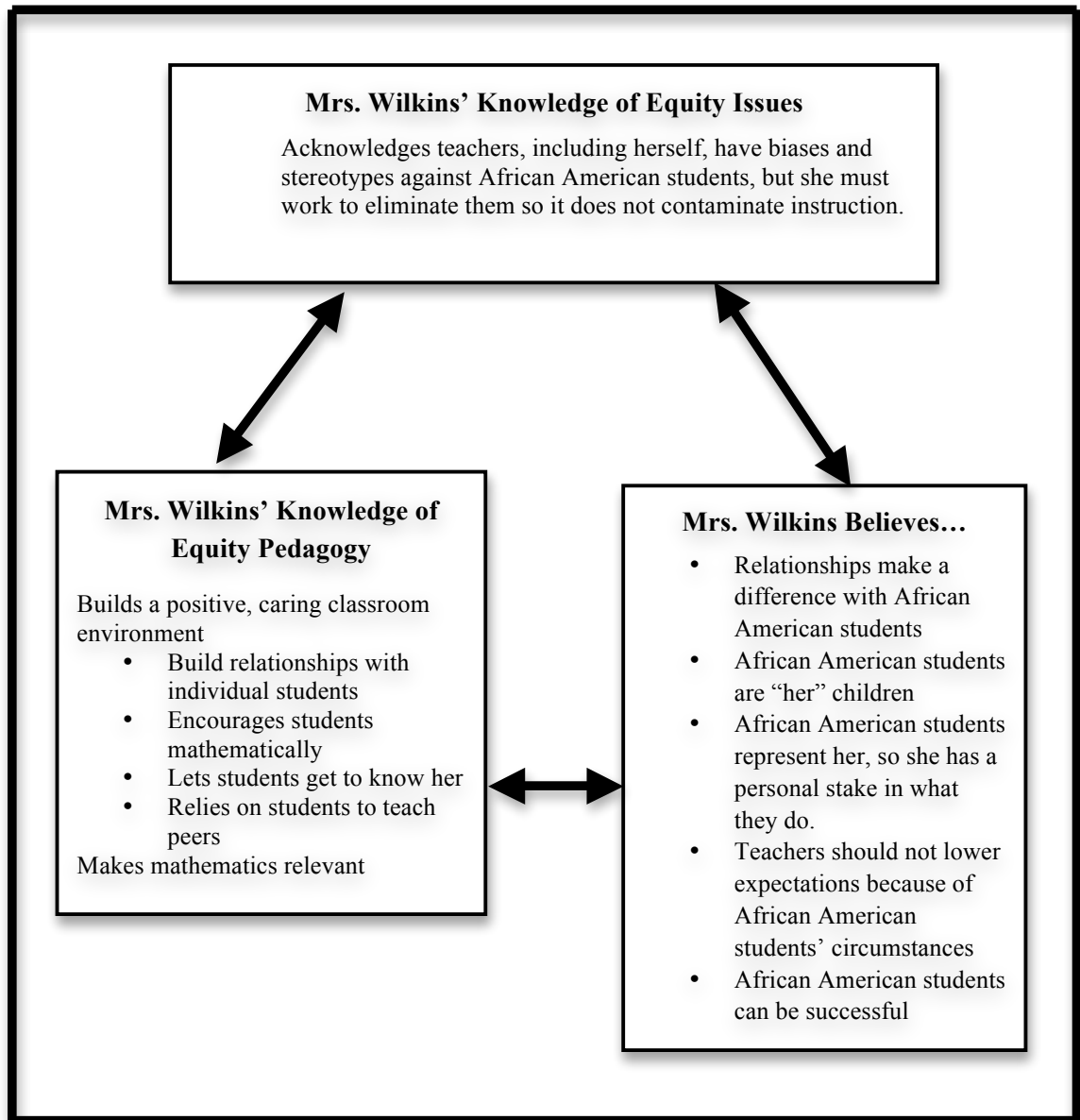


Figure 12. Mrs. Wilkins' knowledge of equity in teaching.

Mrs. Mitchell

Mrs. Mitchell, an African American woman, began her teaching career at a Montessori school over 20 years ago. The Montessori school did not separate students into classes according to grade levels. Instead, students were placed in classes based on

their abilities. Mrs. Mitchell's class contained students of various ages and ethnicities. Eventually, Mrs. Mitchell left the Montessori school. She accepted a position at a Catholic school, where the reported student enrollment was 100% African American. She taught 5th and 6th grade at this school until she decided she needed a change. She then accepted a position as an elementary teacher in a public school in an urban district in the Midwest. During the past 16 years, Mrs. Mitchell has taught fourth through sixth grade at the same school within this district. Currently, this school reports a student population that is 98.5% African American.

Upon entering Mrs. Mitchell's classroom, you will see a replica of "Mrs. Mitchell," a two and a half foot African American doll with two braided pigtails (see Figure 13). "Mrs. Mitchell" is decorated with pins and other memorabilia she has received from her students throughout her teaching career.



Figure 13. Mrs. Mitchell.

Hanging from the ceiling adjacent to "Mrs. Mitchell" stands another two and a half foot African American doll dressed in Easter pastels wearing a matching bonnet. Mrs. Mitchell refers to her as the "Class Doll" (see Figure 14). Mrs. Mitchell states that as the

year progresses the “Class Doll” will be covered with pictures and positive, special notes written by members of the class. Mrs. Mitchell believes students should support and encourage each other. She uses the “Class Doll” as a means to promote that support and encouragement among her students.



Figure 14. Class doll.

Mrs. Mitchell has student work and previous students’ accolades covering the walls throughout her classroom. In the front of her classroom, Mrs. Mitchell has a bulletin board that she refers to as her “brag wall” (see Figure 15). A kente border, which is an African pattern, surrounds the “brag wall.” Each color on the kente border has a symbolic meaning. Within the borders, Mrs. Mitchell posts her former students’ graduation announcements, pictures of professional basketball players, and the school district’s valedictorian. Mrs. Mitchell wants her current students to realize that these accomplished adults once sat in the same seats they sit in, and they have the potential to achieve great things in their lives, too.



Figure 15. Brag wall.

Mrs. Mitchell's Knowledge of Equity Issues

Mrs. Mitchell believes that teachers who are not accustomed to teaching African American students may misinterpret their actions. She explains:

I do believe that sometimes if you have never been around an African American child or an African American person you may not understand some of their behaviors. And they may not mean anything by it by talking loud, they may not mean anything by it, by moving around, but to you since you are so accustomed to a certain way it might seem to be a problem, whereas for me as an African American I try to understand them from my background because I know how I was as a child. (Initial Interview, 2009)

A statement like this suggests that Mrs. Mitchell believes that white teachers who are not typically around African Americans interpret their actions through their Eurocentric culture. This misinterpretation of cultures may “categorily put them [African Americans] in behavior problems, whereas, they are just reaching out for attention. They may be

reaching out for whatever the situation may be and it might not be so much about behavior” (Initial Interview, 2009). Mrs. Mitchell identifies with her African American students and relates to their experiences. However, Mrs. Mitchell admits students sometimes inform her that her own cultural experiences are outdated. Yet, she listens to her students and expects them to “teach her” so she is able to continue to relate and communicate with them. She explains:

I think I understand what they’re doing sometimes a little bit more. Well, however, here lately with so many things changing you know, I’ve been told ‘now Ms. [Mitchell], that’s skeet. Nobody does that anymore. That’s old fashioned’ you know, and I’m like oh really, that’s already old fashioned?! But you know it’s an adjustment I try to adjust. I think that by me being an African American I can understand them a little better, but sometimes I don’t understand why and I’ll ask, explain to me, somebody please explain this to me because I don’t understand, you know, so. But I try. I try. (Initial Interview, 2009)

Not only does Mrs. Mitchell recognize cultural differences within the same race of people, she acknowledges that prejudices exist between individuals of different races. Mrs. Mitchell recalls a time when one of her white students began the school year with some of the same prejudices as his parents. It was not until that child played with another African American child and interacted with an African American teacher did he realize the prejudices were not justified. Mrs. Mitchell elaborates:

I never taught in a predominately Caucasian classroom. But, I can only imagine one of the things that I would want to do is pull them all together and let them know that the same blood that runs in your body runs in mine. And life is about accepting differences and getting along with one another and sometimes what you may like and what I may like may be different and that’s okay. But we have to respect one another. (Initial Interview, 2009)

This quote illustrates that even though there are physical differences between African Americans and whites, they are both from the same race—the human race. Therefore, there must be mutual respect for one another.

Mrs. Mitchell asserts, “Don’t be scared to reach out and touch” (Final Interview, 2009). Do not allow negative biases and stereotypes communicated by previous teachers about students influence how you will interact with students. She explains:

I don’t necessarily suggest that you talk to a previous teacher because I don’t want to form that mental image about a student, especially if it’s negative you know. I want to form my own opinion and sometimes when you hear things from other teachers you already got your pre-assessment about this child, whereas they may have had a bad year last year, but guess what they come in here and they’re totally a different person. [I] don’t want that preconceived idea. (Initial Interview, 2009)

Mrs. Mitchell understands the importance of building a relationship with students and assessing their needs based on her interactions with students rather than forming opinions solely based on messages conveyed by former teachers.

Mrs. Mitchell’s Beliefs

Mrs. Mitchell believes it is important to involve parents in the educational process. At the end of the first quarter her school has mandatory parent teacher conferences, but she contends it is essential to meet parents before then. Thus, at mid-quarter she invites parents to come and help develop “strategies that could prevent and enhance their child[’s]” (Initial Interview, 2009) understanding. Some parents are not able to make their scheduled conferences due to work schedules and other obligations. As a result, Mrs. Mitchell has had conferences at nine o’clock at night, on Sundays, and at Ponderosa. During the conference, Mrs. Mitchell wants to first make sure the parents are comfortable by explaining it is a “privilege to work with their child” (Initial Interview,

2009). She feels it is necessary to let them know that they are a team working together on their child's educational journey. Mrs. Mitchell tries to have positive communication with parents by occasionally sending home praise notes or calling them to let them know that their children worked really hard in class. She feels this helps parents realize that she will work with them and not against them.

Not only does Mrs. Mitchell believe it is important to develop relationships with parents, she believes it is equally, if not more important to have relationships with her students because "kids can feel when you're genuine with them" (Final Interview, 2009).

Mrs. Mitchell explains:

You got to get to know these babies it's just they'll do anything for you if they think that you are on their side. When they find out, you know, she's there for me they'll do whatever. If they feel neglected, if they feel like you know, you are just being mean, you know, or you don't understand them, then they will shut down. (Initial Interview, 2009)

During the first week of school Mrs. Mitchell wants her students to know that she is their mother, counselor, grandmother, and a range of other people in the community. Mrs. Mitchell realizes that her students sometimes come to school with a lot of baggage, and she wants her students to know she is there for them, to listen to them. She notices that as her relationships with students strengthen, some of them mistakenly call her "Momma."

Mrs. Mitchell also believes that she is successful with her students "because the kids know that I am real" (Final Interview, 2009) and consistent. She clarifies:

If that means, if Ms. [Mitchell] walks in here and tries to do a backwards flip, and sometimes the key is like, okay Ms. [Mitchell] you said if we get this problem you're going to do x, y, and z. And one of the things that's really, really important is your word. If you tell the kids you're going to do something, then do it. Consistency is the key. You have to be consistent. If you tell them you're not going here, you are not going to be able to just, because they are good that day, don't flip the script and go back on your word because it's too much inconsistency. (Initial Interview, 2009)

As Mrs. Mitchell reflected over her teaching career, she acknowledged that she learned to be flexible from that experience. She recalls:

When I first started, I was looking for my little teacher strategies and all my psychologists and all those wonderful people's strategies to kick in. You know they said, you know, Pavlov and his salivating dogs. I give you a treat that means you are going to be good. But it doesn't work that way... You can have a well-to-do plan, and you come in here, and I mean no disrespect to Piaget and Sigmund Freud. No disrespect to none of my people, but you have to be flexible. You have to be willing to change because you can come in here and think that you got this wonderful plan going on and somebody else come in here and say, 'Oh no, Ms. [Mitchell], this is the way it's going to go today.' And you have to adjust. Flexibility is the key. Flexibility. (Initial Interview, 2009)

Mrs. Mitchell believes some ideas sound good in theory, but in reality, you have to be prepared for whatever situation that arises. She emphasized this idea in both interviews:

I think sometimes when we go through the teaching process we're so used to trying to follow the manual dot by dot, script by script that you're afraid to jump out of the box. You need to be able to jump out of the box because that's the only way that you're going to be effective. (Final Interview, 2009)

Furthermore, she believes teachers who are flexible are effective in teaching mathematics to African American students. She explains:

I would say that a teacher that understands that a first time that you present something, it may not work. You may have to go back and present it a different way so that they understand it on their level. And once you get them to feel like you're right there with them that helps eliminate the fear of making a mistake, the fear of being wrong, and so forth. And then they sometimes work a little harder. So for a teacher, I would say, that you just keep pulling at it. You just have to keep trying different strategies to enhance the learning for the different students. (Final Interview, 2009)

For example, Mrs. Mitchell recalled a time when she was teaching fractions and a few of her students were struggling. She believed she had designed a dynamic lesson on fractions in which her students determined the fraction of M & M's each color

represented. After she observed student misunderstandings during that lesson, she considered other approaches to help her students understand. She elaborates:

I might have to go back and revamp that whole lesson and maybe try an algorithm. Maybe try something with my manipulatives. Maybe try getting the group together and looking at how many girls out of the whole group have on red. Just pull from whatever angle to help the kids. (Final Interview, 2009)

Mrs. Mitchell believes all her students can learn. She organizes and adjusts her instruction according to the needs of each child. Mrs. Mitchell constantly thinks about and reflects on her lessons so that she can make adjustments for the following day. She understands that some of her students struggle with mathematics and are not all *A* students. Mrs. Mitchell realizes she cannot provide the same instruction to all her students because they have different experiences and knowledge and they learn differently. She encourages her students on a regular basis,

Tomorrow is going to be a better day than today. You know if we had a good day or a bad day, but tomorrow is going to be a better day and you just keep reinforcing that with the kids, and you know I feel like it helps. (Final Interview, 2009)

She believes all her students are successful. “Today you walked in, and guess what you couldn’t even multiply two times two. But look at you now. You’re able to do prime factorization of any product” (Initial Interview, 2009). During the mathematics lesson, Mrs. Mitchell believes her students are highly engaged, motivated, and excited. Mrs. Mitchell contends that when her students are engaged and connect mathematics to their life experiences, they learn mathematics. To facilitate student engagement in the mathematics classroom, Mrs. Mitchell believes that teachers should talk less so that students can be the predominate talkers. She comments her students love group

discussions. Mrs. Mitchell believes African American students learn mathematics through reinforcement, praise, perseverance, and repetition. She explains:

I think the groups, and the mini lessons, and the conferences, the one-on-one conferences that we try to do in the classroom help them a whole lot, but they need that immediate feedback. They need that praise. They need to know that, you know, like the other day I had a student, we were doing prime factorization and this young man was just on target. He was going for every aspect that you could think of and at the end of class [I let him know that] I was very proud of him, some good mathematical thinking going on. He just started to shine, you know. So, they need that praise to build their little confidence. (Initial Interview, 2009)

Once students receive praise, Mrs. Mitchell believes they are more likely to try a little harder because they realize they are successful. Mrs. Mitchell contends that her students learn from their mistakes. She wants them to know that it is okay to make mistakes. No one is perfect, and the purpose for them being in class is to learn. Mrs. Mitchell also believes as her students communicate and discuss the mathematical concepts, their understanding will deepen. She encourages her students to talk to their parents about what they learned in class. She believes the more you talk about mathematics the more you understand it. She wants her students to explain to their parents the mathematical ideas they learned. For example, she wants them to discuss what they did with factors or how they can determine what days have at least two events occurring simultaneously by using the least common multiple.

Although Mrs. Mitchell believes in the success of all of her students, she finds it challenging when her students do not learn. She wants to “make” them understand. She explains:

I guess the most challenging aspect of teaching [mathematics] is realizing that no matter what you do, sometimes you just can't help everybody. And that's a weakness of mine because I'm always trying to lead the horse to the water, and even though I know you can't make them drink it, I'm

always trying to push his head down. You know what I'm saying? And that's the hardest part for me is letting go because I don't want to let go. I always feel like I got to try something else. I got to try this. I got to try that. And that's the hardest part for me. (Final Interview, 2009)

Yet, Mrs. Mitchell does not “blame” the students when they do not perform well in mathematics. She recognizes that there are other influences. For example, she believes her teaching may hinder student success at times. As a result, she continuously looks for ways to improve her instruction. She reflected on a time when 75% of her students scored a 60 or below on a test. She acknowledged that the students' low performance was the result of her instruction and that she needed to approach the concepts from a different angle. She understands that if she implements a variety of strategies, more students will understand. But, she admits sometimes she does not have sufficient time to do all that she wants to accomplish. In addition, she recognizes that students hear messages about mathematics that hinder their success. For example, she has found that some parents say they were never good at mathematics, or that mathematics was not their favorite subject. Mrs. Mitchell believes that hurts her instruction every time because it puts a stigma on the child. The child recognizes that it is okay for him not to be good at mathematics because “Momma said she wasn't good” (Initial Interview, 2009). But, Mrs. Mitchell contends she still must move this “baby from point A to Z” (Initial Interview, 2009) so he or she can be successful. Finally, Mrs. Mitchell understands that her students' previous experiences with mathematics influence their success in her classroom. She explains:

I do believe that depending on the background from which they're coming from, number one that has a lot to do with it. And depending on what they had in the past and what they've done in the past, kindergarten through fifth grade. If you're somewhere sitting in the corner because of your behavior, you haven't had the opportunity to express yourself or perhaps you weren't listening then it kind of shows up by the time they get to me. (Final Interview, 2009)

Above all, Mrs. Mitchell strongly believes in the success of all of her students.

Mrs. Mitchell's Knowledge of Equity Pedagogy

Mrs. Mitchell uses a variety of instructional strategies to meet the needs of her students. Her pedagogy does not consist of treating everyone the same because each of her students has different needs and skills. For example, she describes a situation where she has a student in her class who struggles with multiplication facts, and another student who does not. It would not be effective to use the same approach with both students, so she implements different strategies so both students succeed and build their mathematical understanding. But, in order to know the “correct” approach, Mrs. Mitchell emphasizes you must know your students. “What works for this one that’s causing this problem may not be the same way it may work for the one that’s quiet and that’s shut down” (Initial Interview, 2009). Mrs. Mitchell identifies with her students. As a result, she adjusts her instruction to capitalize on their strengths and personalities. She explains:

I think as an African American I’m kind of able to understand my students a little bit more. Because sometimes we get loud, sometimes we like to talk, sometimes we like to move. And one of the things that I try to do is I try to focus in on that strength. Okay, you like to talk. Okay, you are going to be the reporter...or I give them those leadership roles. I try to jump in from that aspect...Depending on what their strength is, I try to key on accordingly. (Initial Interview, 2009)

Mrs. Mitchell recalls having a couple of students in her mathematics class where no matter what she tried she could not get through to them. But, she did not give up. She understood their success was important to their quality of life. She eventually discovered that one of the boys was interested in aviation. So, instead of trying to instruct him from the textbook, Mrs. Mitchell focused several of her mathematics lessons around airplanes and aviation material. This made a dramatic difference in the little boy’s understanding.

From that point, the little boy was able to share his mathematical thinking from an aviation point of view.

During mathematics instruction, Mrs. Mitchell's focus is to bring the material down to the students' level, and then take them to the next level by connecting the mathematics to students' experiences and what is occurring in their community. She explains:

If I bring something where they can relate to it such as a rapper or something that's going on on TV that's on their level, then they're surprised that I even know you know, and heaven forbid for somebody see me in the mall or I have a student in the mall and I say now make sure you're counting that change right! You know, something like that, it just amazes them. That's how I get them. I'm just like you! (Final interview, 2009)

Mrs. Mitchell also relates her mathematical instruction to the local supermarket. For example, she states she went to Aldi's and spent \$9.52. She then asks how much change should she receive from \$20.00. Additionally, Mrs. Mitchell has her students create a cookbook to help them develop an understanding of fractions. The students have to locate recipes to include in the cookbook and explain what they must do if their recipe indicates it will serve six, and they wanted to invite 18 people over for dinner. By having students complete activities that are relevant to them, Mrs. Mitchell knows her students will experience success. She comments, "If you come in as a low achiever, you'll go out as a high achiever, or believing that you can do it" (Final Interview, 2009).

Mrs. Mitchell is flexible in her instruction when teaching mathematics to African American students. She takes the time to revisit concepts she notices her students are having difficulties with. She is not satisfied until she has at least 98% of the class who understands. For example, if she notices her students are struggling with square numbers, she continuously integrates that idea with other mathematical content she is teaching,

until her students understand. Mrs. Mitchell makes sure she allows time during the lesson for her students to explain their mathematical thinking. Communication is important in her classroom. Mrs. Mitchell understands that some teachers are used to the “rigor of a quiet classroom, but sometimes good communication takes place when the kids are talking about what you’re learning in the classroom” (Final Interview, 2009). Mrs. Mitchell sometimes has to direct good communication in her mathematics classroom. She emphasizes that her students use the correct mathematical language when they share their thinking. Mrs. Mitchell explains:

The mathematical language is very important. Sometimes we’ll say you’re using a five-dollar word. I need a 100-dollar word. If we’re talking about fractions I need for you to be saying simplify. I need for you to be saying denominator, numerator so that the person listening to you knows that you know what you’re talking about. (Final Interview, 2009)

Mrs. Mitchell recalls a time when a student was explaining how he worked a problem (see Figure 16). She reminded him of the importance of using correct mathematical language.

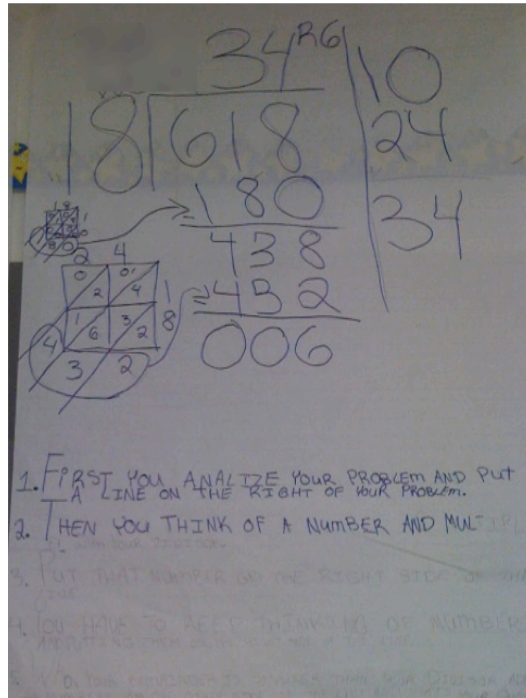


Figure 16. Students' mathematical thinking.

Mrs. Mitchell comments:

I told them in class I know that you are really smart, however when you're talking when you're explaining your problems you have to make sure that you use the right mathematical language so that other people know how smart you are. So he says, 'first you analyze (laughter) your problem'. Whoa, you're showing out now! So he's telling how to analyze. He's explaining to the class and he says you have to keep your thinking of numbers by putting them to the right side, so that's what he is doing here. (Initial Interview, 2009)

Mrs. Mitchell recognizes the benefits of students sharing their mathematical thinking.

Figure 17 shows evidence of students' mathematical thinking.

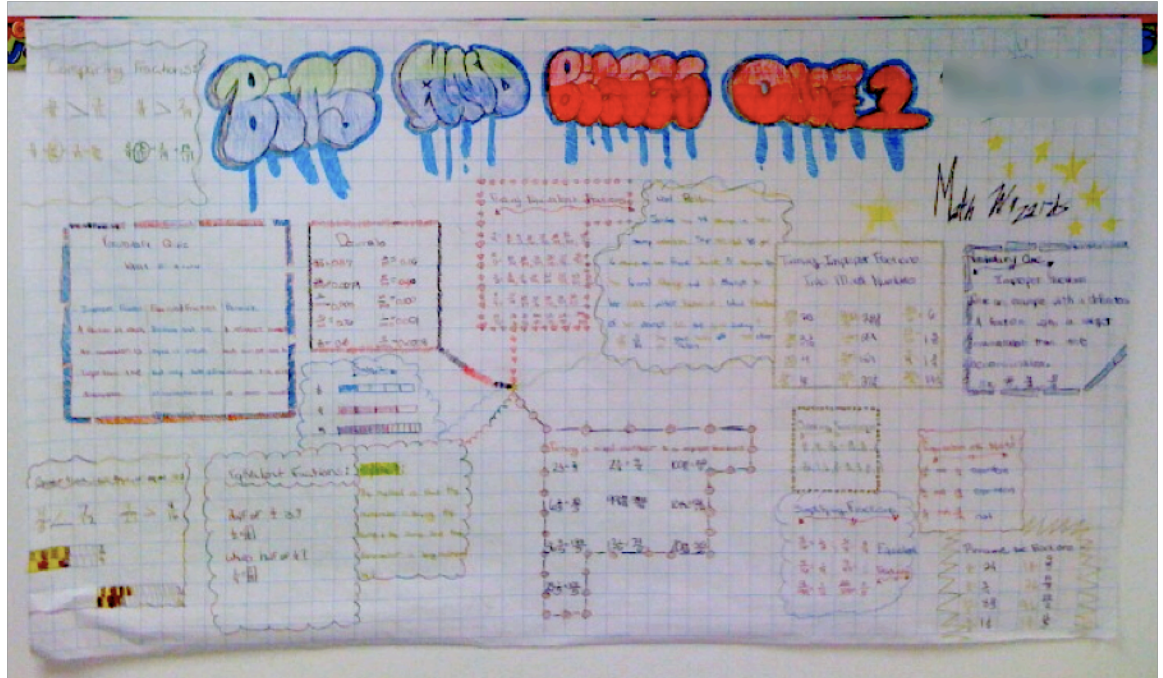


Figure 17. Evidence of mathematical thinking.

In Mrs. Mitchell's mathematics classroom, her students solve problems in multiple ways, they also explain how they solve problems and analyze different solution strategies. Mrs. Mitchell believes these instructional practices help struggling students learn mathematical ideas. As Mrs. Mitchell encourages her students to share their thinking with their peers, she interjects by asking students clarifying questions. For instance, she may ask them to expound on their explanation or inform the student that she was following the explanation to a point, but then got confused. She may follow this statement with a question asking the student to further explain what will occur next. This allows all the students to become engaged in learning the mathematical concepts as well as deepen their mathematical knowledge.

Mrs. Mitchell has established a community of learners in her classroom, and she sees herself as part of that community of building mathematical knowledge. She describes:

We are a team, and with every team you have a coach and you have players. You are the players, and I am the coach. I am coming up with the plays that we are going to have and it's important for you to try to implement them to the best of your ability. However, I want them to also know that I am open. (Initial Interview, 2009)

Mrs. Mitchell makes every effort to know every member of her team, and she extends those relationships outside the classroom. She takes the time to attend her students' basketball and football games. This extended relationship has an impact on the students and the relationship they have with Mrs. Mitchell. She explains:

There's nothing more exciting then to have a child, and I am just in sweat pants on a Saturday in the rain watching the game, and the child walk up and introduce me as his teacher to the coach... You know like I said, it's been fortunate that I've been able to attend some of the kid's games. They're so happy to see Ms. [Mitchell] there on a Saturday morning at 8:00, you know, out there with one eye open, one eye closed, but I'm there. And that makes a big difference because they then come back to school and say Ms. [Mitchell] came to my game, you know, it's okay. (Initial Interview, 2009)

She recognizes that some of her "players" come to school with extra "baggage" that other typical players do not have. She realizes that some of the situations "her babies" are faced with are hard. She recalls a situation that happened with a student she had two or three years ago. She explained that the student always came to class extremely tired and was constantly falling asleep. All her teachers were reprimanding her for falling asleep in class. Mrs. Mitchell remembers pulling her aside to discuss why she continuously falls asleep. The student informed Mrs. Mitchell that her mom was terminally ill. This 12-year old child was responsible for taking care of four or five brothers and sisters. She was cooking, cleaning, and doing all the chores an adult would do. Mrs. Mitchell remarks:

That's a lot for an adult let alone a baby of 12 years old. You know so situations like that I try to be more understanding you know and share that with my colleagues so that they know what this baby is faced with because that's a whole lot, you know. (Initial Interview, 2009)

Mrs. Mitchell handles off task and disruptive behavior in a similar context. She reminds students of the class slogan: “We want to be the conductors and not the caboose of the train” (Final Interview, 2009). She does not want to embarrass students, so she takes the time to pull them aside and has private conversations with them. Mrs. Mitchell does not do this as a formality. She listens to her students because sometimes students feel like people do not understand them. But, Mrs. Mitchell understands. She uses this information to help determine the child’s strengths. She does not give up on the child because she says, “That person may be your best group leader” (Initial Interview, 2009). Mrs. Mitchell reiterates that it is important to know your students because some students who appear off task are just doing some deep level thinking.

Mrs. Mitchell uses a variety of assessment strategies during instruction (i.e., group discussions, projects, district wide tests, and other formal and informal assessments), but she believes “the best assessment is just listening to your students and talking to them one on one” (Final Interview, 2009). Mrs. Mitchell recognizes that students sometimes do not exhibit the same mathematical knowledge on tests as they do in class discussions. Instead of allowing the test to illustrate the child’s understanding or lack of understanding, Mrs. Mitchell conferences with the student because she knows what he is capable of achieving.

She explains:

I noticed that for whatever the reason, in class you had a good discussion about this here. However when I noticed your paper it didn’t demonstrate all of that mathematical knowledge that you know. Was there something going on? And you’ll be surprised. Maybe they had a bad day that morning. Maybe they had problems coming to school that day. And sometimes you have to go back and reassess depending on the baggage that they’re carrying or the problems that they may have had before they took the test. So you may have to go back and reassess it. (Final Interview, 2009)

Mrs. Mitchell has high expectations for her students. She wants them to be able to problem solve no matter what type of problem they encounter. She wants them to try, try, and try again. Never give up. If they do not know the answer, she wants them to seek out people and other resources that will help them find the answer. She informs her students they cannot give her A work on Monday and C work on Tuesday. She expects excellence everyday. She not only wants her students to do well in her class, she also expects them to do well and succeed in life.

My ultimate goal for all of my students is yes I want them to do good on the [state] test. Yes, I want you to do good on the indicator fives, and the unit tests and all of the things that we assess out here in the district, but ultimately I want to see you 10, 20 years from now and you say you own your own business, you're a doctor, you're working on your PhD, and you are able to count your change, you know. That's my ultimate goal. (Initial Interview, 2009)

Mrs. Mitchell invests in her students' future by allowing time in class for students to think and talk about colleges they want to attend. She has her students write letters to colleges and universities requesting information on the requirements needed for enrollment. She discusses the information with the students so they understand what they need to do to prepare. She wants her African American students to function in the real world and become productive citizens of society and realize the knowledge they obtain is applied to everyday life situations. This is Mrs. Mitchell's reward.

Mrs. Mitchell's Knowledge of Equity in Teaching

Mrs. Mitchell's knowledge of equity in teaching focuses on teachers having knowledge of African American culture and using it to correctly and positively interpret the actions of African American students. Consequently, Mrs. Mitchell believes teachers must get to know these "babies" and adapt instruction to meet the needs of the students.

In this context, Figure 18 represents how Mrs. Mitchell's knowledge of equity issues, beliefs, and knowledge of equity pedagogy are intertwined.

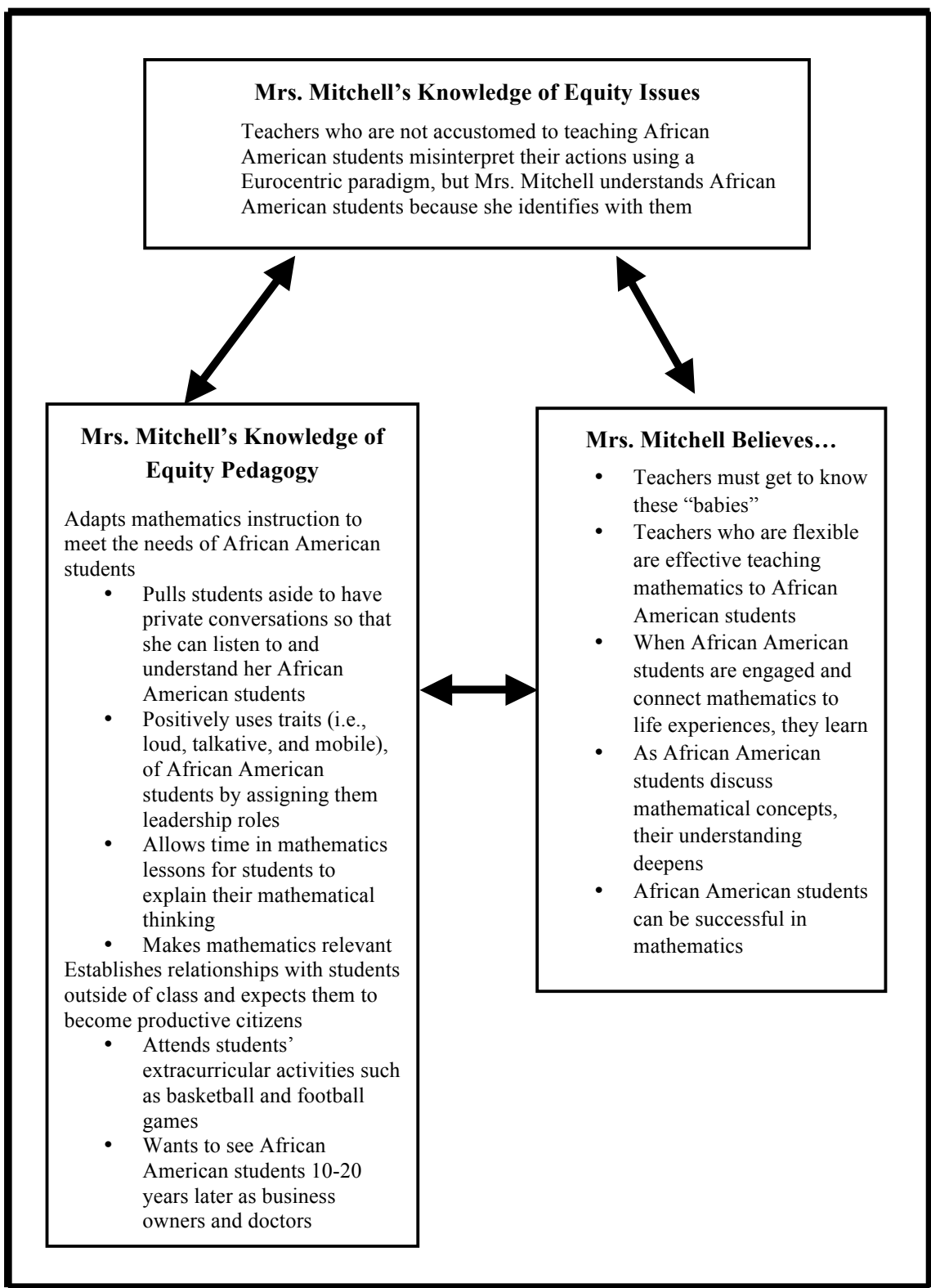


Figure 18. Mrs. Mitchell's knowledge of equity in teaching.

Mrs. Savage

Mrs. Savage, a Caucasian woman, began her teaching career at a Lutheran school 28 years ago. After teaching there for three years, she resigned to raise a family; however she continued to substitute teach in the district. Eventually, Mrs. Savage returned to full-time teaching and accepted a position as an elementary school teacher in an urban district in the Midwest. During the past twenty years, Mrs. Savage taught third, fourth, and sixth grade. Currently, she teaches fourth grade at a school that reports a student population that is 99.1% African American. At her school the fourth grade is departmentalized in mathematics and communication arts. As a result, Mrs. Savage teaches a morning and afternoon mathematics class, as well as other subjects. Mrs. Savage has seen significant improvements in her students' mathematical achievement over the past few years. Mrs. Savage states that she has always taught predominately African American students, and she would not change. "That's where I feel comfortable" (Initial Interview, 2009).

Mrs. Savage's Knowledge of Equity Issues

Mrs. Savage recognizes that race is a factor with some African American parents.

She explains:

I am not going to lie, there are some that I feel like I don't have the respect of because of who I am because I am white and their child is black. Most parents who got to know me I don't think feel that way, but I feel like anyplace you get judged. It goes on both sides, you know. Whites might judge blacks, and blacks judge whites too. (Initial Interview, 2009)

Not only does Mrs. Savage notice the effect her race has on African American parents, it influences the interaction between her and some of her students. Mrs. Savage describes:

I feel like I don't get through. There are some students I feel like they don't do well with me. And I feel like that's been a barrier the whole time. I don't think the kids the other kids in the class feel that way. I think it is something they come with precognition they come with from home. Tell

you the truth I had one child [say] ‘my momma told me that I didn’t have to listen to no white teacher.’ So, you know I’ve heard all those arguments before you know white teachers can’t teach black children. I’m like okay, well does that mean that black teachers can’t teach white kids? Does it go the other way? (Initial Interview, 2009)

Mrs. Savage realizes some people cannot or do not want to get past race. At times she does not know how to handle these types of situations, so she seeks the advice of the African American teachers with whom she teaches. She comments, “There’s a couple of teachers here, we’re very comfortable talking about racial things. Is this because of this or is it something else? Or were they raised that way?” (Initial Interview, 2009) Mrs. Savage understands the implications race has on teaching predominately African American students, so she has invested time to read about African American history and culture.

She explains:

[The book was about] how they were treated and how they were deceived so much by white people through their lives that it really opened my eyes as to where that feeling of mistrust comes from, that lack of trust in a white person. It kind of made me realize this is something that has been brought through generation. And it’s not something that I need to take personally, but it’s something that they were brought up as a generation that you just can’t trust white people. I don’t think that everybody believes that way. Trust me, I don’t believe that way at all. But, I think there’s a lot of people [who do]. So doing some reading, more literature type stories of the past and stuff like that I try to get some balance. (Initial Interview, 2009)

Mrs. Savage takes the initiative to study African American culture. She realizes she has not experienced, nor had to deal with the social realities of being black in today’s society, so she understands the necessity to learn more and discuss it. She elaborates:

I always try, I always try to ask and learn more and understand. That’s who I am, you know. And I think talking about it eliminates, well it eliminates fear. It also brings understanding and appreciation. Just knowing somebody’s background gives you a little bit of insight as where they’re coming from. And so it helps you deal with them better, and teach them better. (Initial Interview, 2009)

Mrs. Savage recalled a situation when a white boy wanted to fit in with his African American classmates. In an attempt to become part of the group, this boy began to repeat phrases he heard the black boys say. The black boys became upset and the white boy could not understand why they were angry with him. He did not understand the situation or see the racial overtones in his statements, whereas, the black students did. Mrs. Savage did not ignore the situation, but rather decided to talk with the white boy one-on-one. She explained:

Certain people are very sensitive about that. And they're raised feeling they have to defend themselves against white people. We shouldn't have to feel that way. We shouldn't have to feel that way, but some people still do. And some people have a right to feel that way because of their past. So I tried to explain to him as best I could you just have to watch, you can't say certain things around certain people. (Initial Interview, 2009)

This white child had to learn what talk was acceptable and unacceptable to use when interacting with his black peers as Mrs. Savage knew her role was to help him learn about these important social interactions.

Mrs. Savage's Beliefs

As a white teacher teaching black kids, Mrs. Savage believes she needs to justify her actions in her mathematics classroom. She explains:

Sometimes I feel like I have to establish a little bit more credibility. And I have to defend my actions sometimes to the parents a little bit more than I noticed. Like other teachers, like my [African American] partner who will have the same children and the same problems and things like that. Until she confirms that they're happening in her room, sometimes the parents don't really want to believe me, or it's me that's the problem and not the child. (Initial Interview, 2009)

Mrs. Savage believes once parents get to know her, they no longer see color. Many have requested her to be their child's teacher. Yet, Mrs. Savage asserts race does not have any

effect on her teaching. She maintains she would never teach a person differently because he or she is African American.

Mrs. Savage lived in the community where she teaches for several years. This surprised many of the African American teachers at her school as they assumed she lived in a more affluent, white neighborhood. However, Mrs. Savage desired to raise her own children in a diverse community. Consequently, when her children entered middle and high school, Mrs. Savage decided to move to a multicultural neighborhood so that her children would attend classes with African American, White, Asian, and Native Americans students. She did not want her children to be in a predominantly white school nor did she want them in a school where they would be the only white children in their classes. She wanted them to be around others who looked like them, similar to what black families want for their children. This move enlightened Mrs. Savage's understanding of African Americans. She noticed the African Americans in her current neighborhood seem to value and respect education more than the parents in her former community. She elaborates:

They seem to have more respect for the education and what it brings. More aware that there is a possibility and there's a place for achievement. They're much more focused on the child maybe going to college rather than just getting a job. They want, they seem to have maybe bigger dreams. (Initial Interview, 2009)

Mrs. Savage believes the parents in her former neighborhood are primarily concerned about their children getting a job rather than attending college. Mrs. Savage recognizes the African American parents in her present community seem to have more hope and aspirations for their children. Additionally, Mrs. Savage believes she receives a higher level of respect and courtesy from African Americans in her current neighborhood. For

example, if she accidentally bumped her cart into a cart pushed by an African American at the local grocery store in her current neighborhood, they would both say excuse me and move on. However, if this incident occurred in her former community, she would say excuse me, and the African American would give her this “nose up look” (Initial Interview, 2009). Through this experience, Mrs. Savage believes the factors hindering the success of African American students in mathematics has more to do with their socio-economic background than race. Yet, she acknowledges more African Americans have low socio-economic status. Mrs. Savage clarifies:

I have certainly seen, and I guess being where my kids go to school at, even though it's still very mixed. In fact, my child is the minority is still the minority, but the economic level is much higher. I mean it's not tons higher, but yeah, it's higher. Most of the people are homeowners instead of renters. Most of the people are I would say at least 50% have a mother and father living at home, just a little bit, a lot more stability. Most of the parents work rather than be, a lower percentage would be free and reduced lunch, that kind of thing. So I notice a difference [in their performance]. (Initial Interview, 2009)

Mrs. Savage believes her students' low socio-economic status limits their experiences and understanding. For instance, she explained that many of her students do not have an understanding or concept of an ocean or salt water. Mrs. Savage believes it is important for students to make connections to the concepts, so she brings in pictures and artifacts, and tells stories to broaden their knowledge.

Mrs. Savage believes it is important to provide her students immediate feedback. She used to give students feedback two days after they turned in an assignment. She realized this was not helpful to her or her students. Now, Mrs. Savage gives feedback the same day, if possible, or the next day. This allows her to know who does or does not understand the mathematical concepts and to modify instruction appropriately. Moreover,

Mrs. Savage contends she learned to be more confident in her own abilities and skills. As a result, she is no longer tied to her textbook. She knows the big picture, ways to accomplish it, and resources that are helpful. She focuses her attention on identifying goals for each lesson and making sure every student builds understanding.

Mrs. Savage believes she needs to reach all of her students. Unfortunately, the demands of state tests pressure her to move through mathematics topics at unrealistic paces. This is problematic because she regularly encounters situations where half her students understand a concept, but the others do not. To address this conflict, she hosts 10 to 15 minute mini-workshops for students who do not understand. Mrs. Savage argues that the educational system puts too much stress and pressure on students. They cannot be kids.

Mrs. Savage believes teachers cannot be so rigid in their classroom structure to “make” students conform to the traditional style of learning. She explains:

I have one student who works better if he stands up and wiggles. And he could do it fine, but he has to stand up and wiggle, and then he can focus. So let him stand up and wiggle...I think just when a student isn't conforming to the way you want, maybe a strategy, then you have to kind of take and lead them as far as what works for them to learn to do it, and then go with that a little bit. (Final Interview, 2009)

Mrs. Savage believes effective mathematics teachers of African Americans are versatile. She elaborates:

Somebody who takes in individual needs of students. Somebody who has diverse strategies so the children get to see things from many different aspects. Takes in their different learning styles. Takes into consideration that we don't all learn on the same pace and that we sometimes need freedom to express and to share our thoughts and to say what we're thinking back. Somebody who can provide some immediate feedback. (Final Interview, 2009)

But, she realizes that even the most versatile teacher experiences challenges during his/her teaching career. Mrs. Savage believes one of her main challenges is lack of parental support. Nothing changes after she informs parents that their children are not completing homework assignments. Mrs. Savage believes that parents should follow up with their children to ensure that they complete their assignments. However, she understands that some parents do not have the mathematical knowledge to help their children. Some parents have approached her with apologies such as, “I just can’t do math. I don’t know math. I’m sorry that I can’t help them with their homework” (Final Interview, 2009). As a result, she takes time to “teach” parents the mathematical concepts covered in class by sending home examples on how to complete the homework to empower parents with the knowledge necessary to help their children.

Mrs. Savage enjoys teaching mathematics to her African American students and has discovered her students understand mathematical concepts better when she relates it to money. As a result, she designs her mathematics lessons around contexts that students can relate to such as money. For example, to help her students build understanding for the fraction, one-fourth, Mrs. Savage uses quarters and dollars. She then waits until she sees “those light bulbs come on and kids faces, ‘oh, I get that now.’ That’s the thrill of it to me” (Final Interview, 2009). Mrs. Savage just lives for those moments. She feels excitement when her students realize they have accomplished something. As a result, she emphasizes accomplishments with her students. At the beginning of the year, Mrs. Savage writes a long division problem on the board for her students to solve. She knows that her students will not be successful and she encourages them as they look at her in dismay. At the end of the year, she reminds them of the long division problem she gave at

the beginning of the year. She joyfully acknowledges that they can now easily solve that problem. Her students came into her classroom without the knowledge or ability to solve it, but they leave with knowledge. Mrs. Savage believes this is her reward.

Mrs. Savage believes her students are excited about learning mathematics. They enjoy working, playing games, and completing projects on the computers in the classroom. She believes they are eager to learn and willing to accomplish tasks. When Mrs. Savage informs her students that they will learn “Algebra” similar to their older brothers and sisters, they can hardly wait. Mrs. Savage explains,

So there’s excitement and anticipation. When do we get to learn how to do this? (Initial Interview, 2009)... You know, we talk about algebra. They think it’s a big thing at this age. I’m doing algebra like my cousin does or my big brother does. Just to show that we have this big word that’s really not that hard, and just feeling that they can do things. (Final Interview, 2009)

Mrs. Savage contends that students who experience success are more willing to take risks and attempt challenging problems. She realizes her students may need different structures to learn. She clarifies:

Some of us just need one-on-one and need that assurance or need it explained to us in another way. Some of us don’t learn as well in large groups. Some of us learn better in a small group... Sometimes some of my best students they just need that little extra one-on-one, and once they get it they can run with it. (Final Interview, 2009)

Mrs. Savage believes it is important for students to be creative and express their cultural identity in the mathematics classroom. She recalls a time when her students developed a beat and rhythm to help them learn their multiplication facts. Mrs. Savage contends some of her students cannot focus and work in a quiet classroom. They need music or some other “noise,” to work productively so she allows them to sing quietly to themselves. She believes this helps students’ concentration, and ultimately their learning. Mrs. Savage

acknowledges her African American students learn mathematics better when they have the opportunity to engage in hands-on activities, such as when they can feel, see, and touch things. Mrs. Savage also believes her students need mathematics activities that require movement.

Mrs. Savage believes her students can be successful and she will do what it takes to help them achieve. Unfortunately, many of her students come to class with “attitudes” and they have a difficult time accepting correction. They become angry and defensive when their teachers indicate that they are working a problem incorrectly. Mrs. Savage does not take the children’s negative reactions personally. Instead, she calmly explains what she is trying to accomplish so that the students understand the purpose of a task.

When I asked Mrs. Savage about advice she would give pre-service teachers about teaching African American students, her passion and focus on the children was evident:

Make sure they would have a component on how to manage kids in groups, how to manage different needs, how to manage attitudes of kids, and things like that. I would show them, demonstrate different strategies you can use. And when the strategies, when you have a troublesome child in a group, how are you going to work with that? How are you going to deal with that child? If they can’t manage their own behavior, then it’s very difficult for them to learn. (Final Interview, 2009)

Mrs. Savage’s Knowledge of Equity Pedagogy

Mrs. Savage uses a variety of instructional strategies when she is teaching mathematics to her African American students. In the section above, I discussed many of them, but in this section I will elaborate more on other instructional strategies. In the classroom, a computer monitor resides on top of each student’s desk. This physical arrangement makes it difficult for students to work in larger groups. As a result, Mrs. Savage typically asks her students to work in pairs. She finds smaller groups of two

results in more productive work and less arguing. At the beginning of the school year, Mrs. Savage assigns students five different sets of partners based on pattern block shapes. She selects the hexagon, rhombus, and triangle partners, while her students choose the square and trapezoid partners. The hexagon partners are based on students' mathematical performance. Mrs. Savage selects a high-performing and low-performing student to be hexagon partners. The rhombus partners consist of a girl and a boy. The triangle partners are individuals who exhibit similar mathematical abilities. Depending on the activity, Mrs. Savage determines which set of partners to use. She finds using partners allows students to share and extend their mathematical knowledge and understanding. She explains:

I tell them too, you know, you understand it by teaching somebody else. It reinforces your knowledge and proves how much you understand. Sometimes I can say things and [they don't understand], but when somebody else says it, it's just a little different. Then all of a sudden, 'Oh, I get it.' So, we do a lot of partner type work. (Initial Interview, 2009)

Mrs. Savage uses partners to establish a community of learners in her classroom. All the students are responsible for ensuring the success of other members in their community. If one student does not understand, Mrs. Savage partners him with another student who understands and he/she assumes the role of the teacher.

Mrs. Savage frequently changes activities during mathematics instruction. She spends 10 to 15 minutes on an activity to encourage student engagement. Mrs. Savage realizes her students are at different levels in their mathematical understanding. She implements strategies that improve and broaden their knowledge. She recognizes there are no "cookie cutter" strategies in teaching. One size does not fit all. She figures out where students are in their understanding, and builds on it. She recalls teaching her

students multi-digit multiplication. A few of her students knew all of their multiplication facts, whereas others only knew their 2s, 3s, and 4s. Instead of working on basic facts with the students who were not fluent, Mrs. Savage had them multiply larger numbers such as—25 times 24. As a result, she did not deny them the opportunity to deepen their understanding. Additionally, Mrs. Savage was able to build on the understanding of the students who knew their basic facts by giving them problems like 89 times 62. Mrs. Savage takes her students from where they are mathematically and moves them forward. She comments, “You can make all the excuses and complain about why this or why that is taking place. But, you got what you got, and move them on from there” (Final Interview, 2009). Mrs. Savage provides her students with at least two different ways to solve a problem. For instance, when Mrs. Savage teaches multiplication, she teaches the traditional algorithm using partial products as well as the lattice method. Once she presents both approaches, she allows the students to select the method that works best for them. Mrs. Savage generally finds they select the lattice method because it is easy to remember and it works for them.

Mrs. Savage’s mathematics lessons do not focus on whole group discussions because she finds it decreases the participation of her African American students. When you are in a group discussion it is very easy to sit back, listen, and not do anything. She uses a lot of hands-on activities and manipulatives to engage her students in the mathematical process. Mrs. Savage uses “slates,” dry erase whiteboards, during instruction to help her students stay focused and engaged. She puts a problem on the board and the students work the solution on their slates. Once they work the problem they hold it up to receive immediate feedback to verify if their answers are correct. If the student notice that their

answers differ significantly from the rest of the class, without feeling embarrassed, they pull their slates down to rework the problem. Mrs. Savage uses this approach to assess which students does and does not understand the mathematical concept. If several students have incorrect approaches or answers, Mrs. Savage stops and discusses why it was wrong as well as effective strategies for solving it. She then, gives them a similar problem so students have the opportunities to apply the ideas that were discussed.

Mrs. Savage acknowledges she uses homework to provide feedback to her students. She does not assign a letter grade; instead students receive a grade based on effort. They receive a point for turning it in on time, a point for trying their best, and a point for completing all the sections. Their homework averages to about 20% of their overall grade. Mrs. Savage realizes her students may not completely understand the material, but it is important to always put forth your best effort because when you put something in, you get something out.

Mrs. Savage expects her students to reach their highest potential and be successful. She looks for all students to have at least 80% mastery on every skill she teaches. When her students exhibit high performance she awards them by putting up a big banner and brags how smart they are. She has high expectations for them, and wants to instill in them confidence and the realization they can achieve. When Mrs. Savage notices students struggling with a mathematical concept, she pulls them aside and works with them in a small group. Since they love working with the slates, she uses the slates to discuss the mathematical process. Mrs. Savage balances her instruction by attending to the needs of the “typical” student. When she first started teaching, she focused her instruction on her lowest performing students. But, this caused her to lose sight of her high achievers. Now,

when she believes the “typical” students understand, she moves on. She does not want to spend a lot of time on remedial content. She wants all of her students engaged. To meet the needs of all her students Mrs. Savage assigns unit projects. “I have some kids who just do the basics, and some kids put more into it because they have the time. They have the desire and use their creativity, and take it one step further” (Initial Interview, 2009). Mrs. Savage designs the projects so they are relevant to the students’ lives. For example, following the decimal and money unit, Mrs. Savage tells her students they have \$100 to spend at Wal-Mart. Using the computer, sales ads, or other resources, students must select items to purchase and explain how and why they made those decisions. Moreover, Mrs. Savage has her students design a shape book to become familiar with architectural design and geometrical shapes. Students use the computer to make pictures of their shapes, and go around the school taking pictures with a digital camera of how their shapes are used. Once they collect all the pictures, the students create a powerpoint to share with their peers. Mrs. Savage connects mathematics to the students’ world, and provides opportunities for them to share their knowledge.

As Mrs. Savage reflected over her teaching career, she acknowledged that her methods for teaching mathematics to her African American students have changed. She recalls “stand[ing] in front of the class [and] show[ing] them how to do a problem, give them 20 problems, and say okay do these. Then give another 24 for homework” (Final Interview, 2009). She does not do that anymore. Mrs. Savage, instead, believes her instructional strategies focus on developing students’ mathematical understanding. She contends the days of “drill and kill” are over. She comments, “I find that you could find what you need to know in 10 problems as easy as you can in 25” (Initial Interview,

2009). Yet, when she teaches her students a new algorithm, she might assign a few more problems for practice.

Mrs. Savage adjusts her instruction according to the needs of her students. She gives them the support they need. She understands that some students have a difficult time and feel overwhelmed when they are assigned a large number of problems to complete. As a result, she reduces the assignment by selecting a variety of problems, but does not water down the material they need to know. Mrs. Savage acknowledges that students will experience frustration when learning a new concept. She reminds her students that even though they all have different talents and abilities, they are all capable of understanding and that understanding is not always immediate.

Mrs. Savage understands that typically students do not appreciate negative attention from a teacher such as when a teacher tells a student to pay attention in front of the whole class. In these cases, the students feel they have to save face in front of their peers and they will disrupt the class. Consequently, if Mrs. Savage encounters a child who appears to be off task, she will quietly speak to the child individually. She finds this approach usually works.

Mrs. Savage's Knowledge of Equity in Teaching

Mrs. Savage's knowledge of equity in teaching focuses on her ability to relate and connect with African American students as a White teacher. Although she has not experienced the social realities of being African American in today's society, she has invested time reading, studying, and asking questions to better understand. She believes teachers need to be flexible and restructure their classroom environment to meet the needs of African American students. Hence, in her pedagogy she adapts her instruction to

effectively support the mathematical learning of African American students. In this context, Figure 19 represents how Mrs. Savage’s knowledge of equity issues, beliefs, and knowledge of equity pedagogy are interconnected.

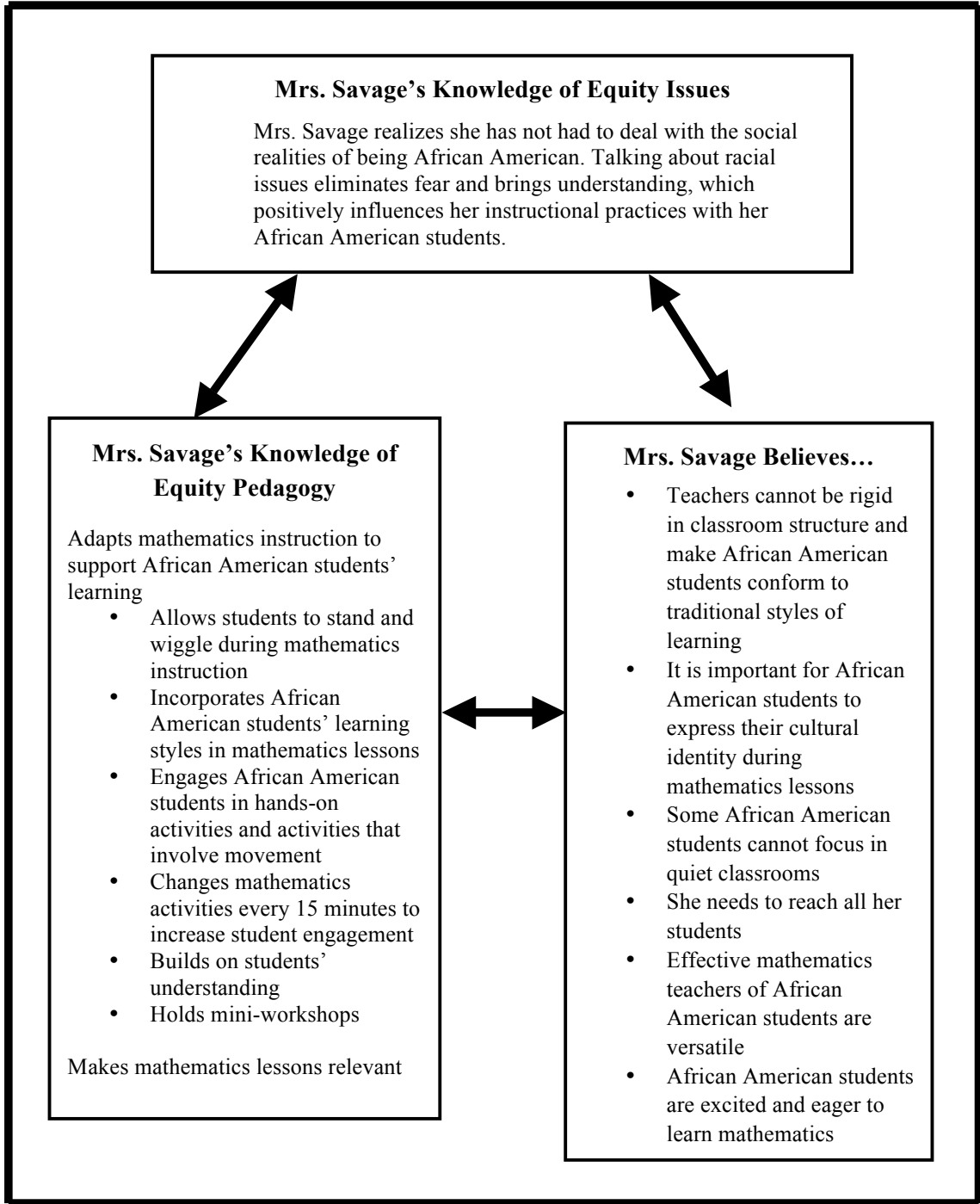


Figure 19. Mrs. Savage’s knowledge of equity in teaching.

Mrs. Thomas

Mrs. Thomas, an African American woman, began her teaching career 13 years ago at a school in the eastern section of the United States. She started as a long-term substitute, but eventually was employed full time. She taught kindergarten and first grade and looped with her students. Her students predominately came from two parent, middle-class families. Mrs. Thomas reports the elementary school had an enrollment of approximately 99% African American students. After three years, Mrs. Thomas left the school district, due to her husband's job transfer, and began teaching at a school in the northeastern portion of the United States. Although the reported enrollment was the same as her previous district, Mrs. Thomas experienced a culture shock. She expected that the students would be similar to those who attended her former school. However, the school had high student mobility, so the students in Mrs. Thomas' classroom at the end of year were not the same students who began the school year with her. Moreover, the majority of the students qualified for either free or reduced lunch. She contends it was the most challenging group of students she ever taught. After spending three years in this district, Mrs. Thomas moved to the Midwest to teach. She reported the student enrollment in this district was about 85% African American, 10% Latino, and 5% Caucasian. She taught in this school district for five years. After Mrs. Thomas' husband received another job transfer, she accepted a position as an elementary teacher in a suburban district in the Midwest. During the past four years, Mrs. Thomas has taught third grade at the same school within this district. Currently, this school reports a student population that is 30.1% African American.

Upon entering Mrs. Thomas' classroom you will notice students' desks arranged in groups of four. Mrs. Thomas intentionally separates all of her African American students so they do not work together. She does the same thing with the boys and girls in her classroom. Her students sit in groups of boy, girl, boy, girl. Additionally, she organizes each team so that it includes a high-achieving and a low-achieving student. Mrs. Thomas contends this structure facilitates the participation of every student.

Mrs. Thomas' Knowledge of Equity Issues

Mrs. Thomas believes race is a factor in the classroom. She remembers a situation when a Caucasian parent entered her classroom to discuss her child's progress. As the parent entered the classroom, she approached the assistant teacher who was white, although she knew Mrs. Thomas was the teacher. Mrs. Thomas overheard the parent introduce herself to her aide, and the aide introduced herself as the assistant teacher. Mrs. Thomas noticed that the parent was hesitant to speak to her. Finally, the parent rudely asked Mrs. Thomas, "Well, how long have you been teaching? I'm not used to a teacher like you" (Initial Interview, 2009). Mrs. Thomas inquired about what she meant by that comment. The parent replied, "Well, teachers should be older, more experienced, and fat" (Initial Interview, 2009). Mrs. Thomas knew this comment did not have anything to do with age because the child's kindergarten teacher was about Mrs. Thomas' age. Mrs. Thomas explains, "It's just that, I don't want to say ignorant. But, yeah it was just, I had to deal with a lot" (Initial Interview, 2009). This quote illustrates that racism still exists in educational settings.

Mrs. Thomas believes many teachers of African American students do not understand their culture and misinterpret their actions. As a result, they are essentially penalized for their African American identities. Mrs. Thomas explains:

When we're teaching African American students, a lot of times we punish African American students for behaviors that they've been conditioned to. A student who goes to the principal's office for shouting out in class for disruptive behavior when the student was participating, the student was disrespectful or because the student was shouting out and the teacher had rules. And one of the things was we had to reconsider our rules based on the needs of the students. So, it's like you can't make students conform to a society when it's something that they're doing in their own home. And it's something that is considered normal, or when they go to a church it's considered normal. When they are sitting at a dinner table everybody talks over each other. We're not saying that it's the way to function, but it's the way of understanding. (Stim-recall 1, 2009)

A statement like this suggests that Mrs. Thomas believes that teachers, white or black, are indoctrinated to filter students' actions through Eurocentric culture and beliefs. This culture dictates what is valued and how students need to behave and respond in a classroom setting. Mrs. Thomas read a study revealing that many African American students are categorized and labeled as ADHD because they move around a lot. But, they are generally misdiagnosed. Mrs. Thomas elaborates:

I guess we've [African Americans] been known to like move around more, more active. There was a study...when they looked at it, they just talked about culture in terms of they move around more at home you know that's what they're used to. Even like with the whole call and response, you know, in church, in African American church they're much more likely to move around, dance more, whereas you go to another church. (Stim-recall 2, 2010)

As a result, Mrs. Thomas allows her students to get up and move around without fear of being punished. She works hard to try to help her white colleagues realize they need to understand African American culture and build relationships with students. Mrs. Thomas expresses,

A [white] teacher thinks, well if I pay more attention to this student is because it's the white guilt. I heard that before also. And so, and that's not, I think that they are missing the mark. Like I don't think they understand. They think well, if I, I don't want to give special treatment to African American students. And it's not special treatment, it's just understanding differences. There are differences. I mean I can't help it. There are differences. (Final Interview, 2010)

This quote illustrates that Mrs. Thomas believes white teachers feel they need to treat all of their students the same. However, she knows that equal treatment is not possible.

Teachers need to understand there are differences and use those differences to support and build students' knowledge. But, many teachers do not feel comfortable speaking about and dealing with racial issues. Mrs. Thomas explains:

I [white teacher] say something like rap music they may think that I'm trying to belittle them or anything. And I [Mrs. Thomas] said, well it has nothing to do with rap music. I don't like it either, but just try to understand where they're coming from. Sometime, and just trying to get to know them. And just because they do things differently or they do things that you don't approve of. (Final Interview, 2010)

Mrs. Thomas understands that many teachers are used to teaching students who look like them. She asserts teachers should not make African American students feel inferior because of their culture. She clarifies:

When you have students in the classroom and they use a lot of slang or Ebonics, don't say well, that's incorrect grammar. Just say well, I notice that you used this word. Let's code switch. When is it appropriate for you to use a word, and when it's appropriate to not use it? So, you will see in the classroom setting it would be probably not appropriate to use it. On the playground with your friends, okay it's appropriate to use it. At home it's appropriate to use it. If you're at a job interview, it's not appropriate. But we're going to show you when you can use it and when it's appropriate. (Stim-recall 1, 2009)

Mrs. Thomas emphasizes teachers need to understand and accept cultural differences. She recalls having a student from the Middle Eastern culture who celebrates Ramadan. During Ramadan, you are not allowed to eat. Mrs. Thomas explained to some of her

colleagues that she does not plan to give a test while her student is celebrating Ramadan. Mrs. Thomas remembers the teachers saying, “Well that’s not my fault. I think it’s just crazy to have kids not eat, and what are the parents doing to the kids?” (Final Interview, 2010) They were not willing to take the time to learn and research about the child’s culture or to make accommodations for the child. Mrs. Thomas believes that other geographical locations in the U.S. have more diverse cultures than the Midwest. As a result, many teachers in the Midwest expect everyone to act the same. She elaborates:

Sometimes teachers on coastal, like bicoastal states like in California or Washington DC, a lot of times those teachers in the mainstream culture, they pretty much they understand. And I think they are much more successful with African American students than I would say teachers here in the Midwest where you don’t see more of different cultures. So it’s very difficult for them to see it. They can’t see it they have a hard time visualizing it. It’s very difficult to make them understand. (Final Interview, 2010)

Mrs. Thomas believes teachers need to understand because it influences how they instruct African Americans. She recalls white teachers would often tell her that their husbands do not understand them. Mrs. Thomas explains to her colleagues that their husbands’ experiences shape their worldview, and they see the world through a man’s perspective, rather than a woman’s perspective. Mrs. Thomas makes the connection for her white colleagues. She emphasizes:

That’s how African Americans see the world, from their perspective. You know, their perceptions shape their worldview also. And so a lot of times you may see it, but he may not see it. And a lot of times we [African Americans] may see it, but you may not see. But, it doesn’t mean that it’s not there. (Final Interview, 2010)

Mrs. Thomas understands that until we get teachers to acknowledge it and see it, then we cannot move forward. She recognizes that it is easier for someone like her, who is not from the dominant culture or race to understand, than it is for someone from the

mainstream culture. But, she realizes you have to know where students are coming from to develop a relationship with them.

Mrs. Thomas' Beliefs

Mrs. Thomas believes open communication and parental involvement are key components to students' academic success. At the beginning of the school year, she sends home a letter containing her e-mail address and phone number. She informs the parents that they are free to contact her anytime. If the parents are divorced, she communicates with both. At her last open house, 18 parents (out of 20) attended. Mrs. Thomas compared this open house turnout to her former schools' where typically only one or two parents attended. She believes that students perform better if their parents are more involved with their children's education. When students disrupt the class or ignore directions, she warns the students that she will contact their parents. This, in turn, influences student behavior if the students care about their parents' reactions. But, in some cases, students simply do not care if their parents are contacted. Mrs. Thomas recalls when she did contact some parents, they insulted and yelled at her. "Why are you calling for? What did she do?" (Initial Interview, 2009) Although some of the parents were rude and disrespectful, Mrs. Thomas wanted to keep the line of communication open. As a result, Mrs. Thomas sent positive notes home to parents, even when the child was misbehaving. Her heart went out to the kids. "It just made me cry" (Initial Interview, 2009). She realizes the importance of parental involvement and how it influences the child's education.

Mrs. Thomas believes that parents should work with school personnel to ensure their children receive a high-quality education. In addition, she believes parents need to work

with their children in their homes to help extend their mathematical understanding. For example, she asks her four-year-old daughter to divide a package of M & M's into equal groups. Once her daughter separates them into groups, Mrs. Thomas poses questions such as, "How many groups do you have?" to further develop her daughter's mathematical knowledge. Mrs. Thomas watched white parents in her community and noticed that many of them turn everything into a teaching opportunity. Yet, she believes many African American parents do not create those types of opportunities because they are not aware that they should or they do not know how. As a result, Mrs. Thomas believes it is important that schools create opportunities (e.g., through parent nights) to help educate parents so that they can make significant contributions to their children's education.

Mrs. Thomas believes effective mathematics teachers of African American students understand why individual African American students act in certain ways and what makes them happy. An effective teacher learns these aspects when he/she builds and establishes relationships with students. Mrs. Thomas explains:

We don't want to stereotype them and say oh well since African American students are like this, I will teach like that because sometimes they don't fit a stereotype. There really isn't a stereotype. It's just that sometimes culturally in a household you know you just respond to things differently. Some students may talk in an aggressive way, but an aggressive way is joking. And if you don't understand that then you are always making that student have some kind of consequence. So, I think just understanding students culturally, where they're coming from, and when students do certain things it may not be an aggressive behavior, it's just who they are. If you pretty much have that relationship with that student and understand who those students are, then I think you'll be an effective teacher. (Final Interview, 2010)

Once Mrs. Thomas establishes relationships with her students, Mrs. Thomas contends her students cooperate because they trust her. They feel they can relate to her. She knows the students feel comfortable with her when they begin to call her "Mommy" (Final

Interview, 2010) or they will say that she reminds them of an aunt or cousin. She believes her identity and cultural background allows her to make mathematics relevant. She clarifies, “If we go back to me being an African American, when I present something they think it’s relevant because I’m doing it. Because they can trust me. I have that face that’s familiar to them” (Final Interview, 2010).

Mrs. Thomas believes that lessons must be relevant. Additionally, students must understand the purpose of the lesson and the expectations required for learning. Mrs. Thomas contends most teachers stop their lessons too soon. They believe that if they follow their lesson and everything is organized, everything will come out perfectly. But, that is the time you see low achievement. Mrs. Thomas elaborates:

You see the test scores or you see certain students, especially African American students in certain areas are either failing and failing in terms of their scores and that education gap is just getting wider and wider. And they say well I’ve done everything, I do everything, and they’re still not learning. Well, yes they are learning, they’re not learning the way you want them to learn. And based on that, they’re failing. (Final Interview, 2010)

Mrs. Thomas contends African American students learn mathematics best when they solve mathematics problems that are related to the children’s life experiences. As a result, Mrs. Thomas creates mathematics lessons using stories that her students share with her. For example, one of her students talked about a trip he made to the store to purchase an item. She had the class pretend they were going to the store to purchase a pack of gum and then posed problems about the amount of change the cashier returned. Mrs. Thomas finds that when she relates mathematics to real life experiences, her students are more successful. Further, Mrs. Thomas believes when she relates mathematics to something the students enjoy, this connection enhances their mathematical knowledge. For example,

one of her male students likes to dance. Mrs. Thomas used the context of the number of beats he used while dancing to help him build understanding for multiplication. Mrs. Thomas recognized that he was able to do the mathematics because it made sense to him.

Mrs. Thomas believes that some of her African American students learn better when they work with their peers. She currently has an African American boy who struggles with understanding her explanations; however this child is more successful when one of his peers explains the same content. Mrs. Thomas clarifies:

Sometimes just other kids, like I'm a teacher and so it's hard for me to explain it like a kid. But sometimes kids explain in their kid language and they're able to pick up on it a little bit better. (Stim-recall 1, 2009)

Furthermore, Mrs. Thomas believes her African American students are visual and tactile learners. Mrs. Thomas believes her non-African American students also learn in a similar manner, yet she contends that her African American students have "unique learning styles" (Final Interview, 2010). She describes a student who constantly hears music when none is playing, and he likes to move. Mrs. Thomas realizes that if this boy is seated while she explains a mathematical concept, she loses him. To accommodate his learning culture, she incorporates movement during her mathematics lessons. She describes:

I try to incorporate, you know having the kids move around a lot and do a lot of clapping so they can try to remember the song or do something with rhythms to help them. I think that African American students, they participate more. They say, 'ooh this is fun.' They don't say, 'this is boring.' ... So I think that one of the things that I know is they like to move around because I know I like it. I know if someone is presenting I don't want to have to have sit down and listen to someone. I want to move around. I get more out of it. So, I think about how I learn and my learning style and I try to incorporate that with every kid. (Initial Interview, 2009)

Mrs. Thomas recognizes that some teachers, particularly white teachers, believe they

should not treat students differently based on their culture and learning preferences. Mrs.

Thomas asserts:

It's, you know, sometimes we're [African Americans] just different. You just have to accept it. And some teachers feel, well I need to teach, I need to treat all my children equally. But there's no such thing as an equal training. You know you have to educate the child, and each child learns differently. So if you have a child who is a visual learner, then you're not going to read something to a child and expect a child to get it. If you have a child who is a tactile learner, you aren't going to have a child look at pictures. That child has to be feeling and touching. And so if you understand the different learning styles, then you understand the different life styles and different cultures also affect learning. And you have to be able to understand that. (Final Interview, 2010)

Mrs. Thomas believes all of her students benefit from movement, clapping, and rhythms, not just her African American students. She does not require her students to be quiet and sit all of the time, as illustrated in Figure 20. She thinks that teachers who require students to sit all of the time are worried about control. As a result, Mrs. Thomas gives her students the freedom to get up and move around when needed. She explains:

I think that's what's missing in a lot of schools that they want them to grow up so quickly and that they can't be a kid. And that's all they're doing. It's like telling a dog not to bark, you know. So kids want to have fun and talk for six hours out of the day. To have them just sit is very difficult to do. It's just my philosophy. You know they need to be kids, and when they can be kids every opportunity for them to be a kid, then I will give them that opportunity to do that, as long as they meet my objective. And that's what very important. (Stim-recall 2, 2010)



Figure 20. Mrs. Thomas' students standing as they solve mathematical problems.

Mrs. Thomas believes that African American students must be active in the mathematics classroom in order to achieve success. She thinks they should play mathematical games, discuss what they learn, and participate in hands-on activities and math workshops. Mrs. Thomas contends that if you “start off with doing, and then more about knowing. Everything will fall into place” (Final Interview, 2010). In other words, teachers need to begin instruction by building conceptual understanding of mathematical concepts. Mrs. Thomas explains:

Kids become robotic with math. And they will say okay, you add the 6 plus 2 then you add this and then you put it together, but they don't understand what it means. And so they have to talk while they're doing it. So, they are talking about it, doing it to go with what they're saying, and incorporating the vocabulary words. And they put all of that together, they learn their best. (Initial Interview, 2009)

Mrs. Thomas believes all students can learn mathematics. Mrs. Thomas does not want students to experience frustration or say that mathematics is hard because they have to solve a problem one particular way. She believes this is one of the reasons why there is an achievement gap in mathematics between African American students and other ethnicities. Consequently, Mrs. Thomas encourages students to use a variety of strategies to solve mathematics problems. She recalled a time when one of her African American students struggled to solve subtraction problems. He began to use a number line and counted up to solve subtraction problems. This approach worked for him and he was able to get the correct answer. Mrs. Thomas elaborates:

So that's why at this point I want them to be able to, of course, add, and of course subtract, but I want them to be successful, also. So, if they become successful, they are more likely to try it. And once they are successful with one strategy, I say you know you did such a great job with this strategy, let's see if you can do it this way. And they're more than likely to try it because they were successful with one strategy. (Stim-recall 1, 2009)

Mrs. Thomas wants her students to understand there are many different ways to solve mathematics problems. When she gives her students a multiplication problem, some of them use their fact knowledge, some draw pictures, while others use repeated addition. They all end up with the same result although they use different strategies. Mrs. Thomas adds, "That's what I love about it, the possibilities. It's something I can always apply. It's not in a bubble, but I can use it" (Final Interview, 2010). But, Mrs. Thomas does not want to limit her mathematics instruction to learning basic computation. She believes it is critical for her students to learn more so that they can be successful in the 21st century. She explains:

You can graduate from high school learning the basics, but not the higher level thinking, like matrices, calculus to get you into the 21st century. You know green type jobs that we're supposed to have... We have to get into,

you know, what is beyond mathematics number sense. You know, why numbers are a certain way. And why it makes sense and always finding a way to incorporate it with real life experiences. (Initial Interview, 2009)

Mrs. Thomas wants her students to excel in mathematics. To accomplish this, Mrs. Thomas believes it is important for students to correctly enunciate and understand the mathematical language. Mrs. Thomas has her students clap the syllables of the mathematical terms to ensure correct pronunciation of the word. For example, quad (clap)-dri (clap)-lat (clap)-er (clap) –al (clap): quadrilateral. Mrs. Thomas then discusses the meaning of these mathematical terms. Additionally, Mrs. Thomas believes it is important for students to know that it is okay if they do not understand a concept or the mathematical language. She wants her students to feel comfortable enough to communicate their misunderstandings so she is able to help them. Above all else, Mrs. Thomas wants her students to be successful.

Mrs. Thomas not only uses clapping to build students' mathematical vocabulary, she believes it is an effective strategy for getting students' attention. Whenever there are multiple activities occurring in the classroom, Mrs. Thomas starts clapping to get her students' attention. She varies the rhythm and tone of the claps. She believes sometimes students just start clapping and continue focusing on the task they were doing. Mrs. Thomas slows down her rhythm and claps softly. The students realize they need to stop and pay attention.

Mrs. Thomas believes a course focused on teaching diverse students and one dealing with classroom management for the diverse learners will help prepare elementary mathematics teachers to teach African American students. If she had the opportunity to select the professors who would teach these courses, she would choose professors from a

variety of cultural backgrounds. She feels it is important to learn from someone who has experienced the social realities of race and racism and can explain how it influences teacher practices and beliefs in the school environment. Furthermore, Mrs. Thomas believes pre-service teachers should experience what it is like to be a minority. For example, she suggests Caucasians need to individually enter a community that is all African American and take notes on their feelings and behaviors as they interact with others as the only white person in the group. Once the “experiment” is finished, Mrs. Thomas suggests discussing their experiences as a group as well as the implications for their future classrooms.

Mrs. Thomas’ Knowledge of Equity Pedagogy

The sections above illustrate some of Mrs. Thomas’ equity pedagogy. In addition, Mrs. Thomas understands the value of establishing classroom norms and routines at the beginning of the academic year. She recalls switching from third grade to kindergarten her first year of teaching because enrollment was down. She began teaching kindergarten, but she did not take the time to set up her classroom norms. She spent the remaining of the school year “catching up.” She explains, “That was a horrible experience, but that taught me that I needed to spend like the first three, four weeks of school just focusing on routines and procedures. Everything else will pretty much work itself out” (Stim-recall 3, 2010). During the first three weeks, Mrs. Thomas integrates the classroom norms with the mathematics lessons. She does not primarily focus on the mathematical content during this period, but she takes the first mathematics unit to discuss classroom routines. She plans her tasks to model what students need to do when someone explains his or her mathematical thinking. For instance, Mrs. Thomas informs her students they must pay

attention to what their peers are doing and/or saying. It is a matter of respect. Mrs. Thomas believes students should respect her as well as each other. Additionally, she demonstrates how students switch from table to table using what she coined as the one, two, three move. Mrs. Thomas explains:

I'm the type of person, I will allow you to stand up if you need to work, but chaos is something that I can't handle. The one, two, three move, I like it because it's very quick. If I say one, you're supposed to get ready. That's all you have to do, get ready. And then two, they stand up. I like for my chairs to be pushed in. So, it's very important that they push in their chairs. So on two if I say two, then they know that's what they have to do. And then prior to that I tell them which direction they're going. And most of the time they go in a counterclockwise direction based on the movement, based on the table number. On three, they switch. (Stim-recall 4, 2010)

The students then practice the norms until they are established. Mrs. Thomas comments, "It took me longer at the beginning of the year just because we had to go over those routines, but now it's better. I don't have to stop the class because of a behavioral issue" (Stim-recall 3, 2010).

Mrs. Thomas begins every mathematics lesson after lunch, and takes time to build a sense of community among her students.

Mrs. Thomas: Good afternoon boys and girls.

Students: (in unison) Good afternoon Ms. [Thomas].

Mrs. Thomas: How are you guys doing this afternoon?

Students: (in unison) Good. Thank you for asking. How are you doing this afternoon?

Mrs. Thomas: I'm doing great (Day 3 video, 2009).

Mrs. Thomas uses a variety of instructional strategies to help her students develop their mathematical knowledge. She understands the African American culture and adapts her instruction to meet their needs. She explains:

When you're teaching students, especially students in the African American community, they like to shout out answers. Instead of penalizing them for shouting out answers, make it part of your lesson. So there are times when shouting out is okay. And I let them know that they don't have to sit and wait on me to call you out or wait for a spinner. Sometime they just have to get it out...So I give them the opportunity to shout it out. (Stim-recall 1, 2009)

Mrs. Thomas recognizes this strategy is also effective with her non-African American students. She comments, "They love it" (Stim-recall 1, 2009). Further, Mrs. Thomas engages African American students by capitalizing on their cultural identity. She understands that part of the African American culture is participating in a call and response environment. For example, when a pastor makes a point in an African American church, the congregation responds with, "Amen," "preach," "say it," etc. An informal dialogue occurs between the pastor and the congregation as the pastor delivers the message. During a mathematics lesson, Mrs. Thomas presented her students with a subtraction problem to solve using a strategy called sheets and strips. The problem posed to the students was "Jessie has 234 marbles. Kim has 187 marbles. How many more marbles does Jessie have than Kim?" They completed solving the problem up to the ones place as illustrated in Figure 21.

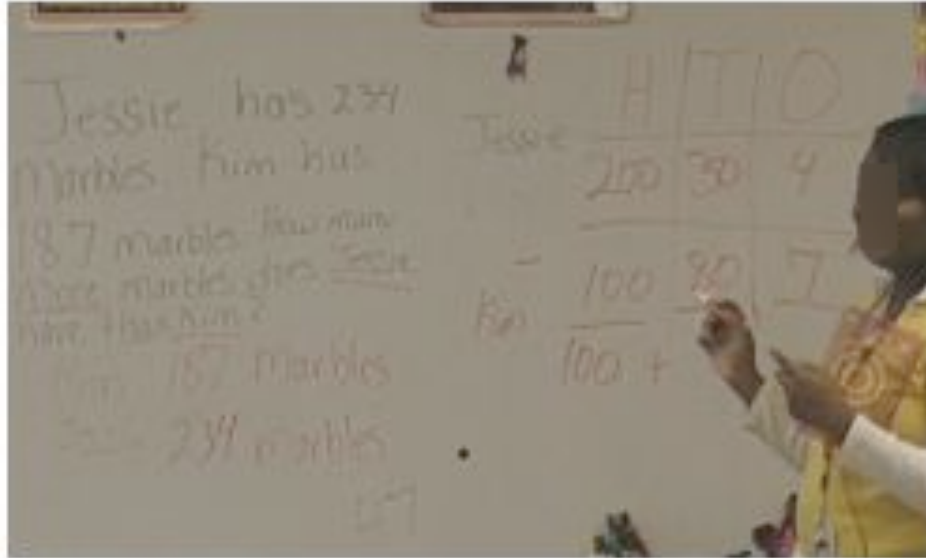


Figure 21. The marble problem.

The following dialogue takes place:

Mrs. Thomas: Now, how many ones do we have to take away?

Students: (unison) Seven.

Mrs. Thomas: We have to take away seven. Can we take away seven from up here?

Students: (some students) No, we can't do it Ms. [Thomas].

Mrs. Thomas: I can't hear you.

Students: (unison) We can't do it Ms. [Thomas].

Mrs. Thomas: Why not?

Students: (unison) Because you can't take a bigger number away from a smaller number.

Mrs. Thomas: Exactly. We only have four here, but we have eight here. And when we cross off, we won't have enough (Day 2 video, 2009).

These instructional strategies facilitate the participation of Mrs. Thomas' African

American students.

Mrs. Thomas remarks, “Sometimes, unfortunately, you can’t get the students to learn the way that you want them to learn it, but you have to find a way to make them successful (Final Interview, 2010). Mrs. Thomas understands that when she builds on her students’ strengths and makes the mathematical content relevant, her students are successful. But, to accomplish this, she must know her students. Mrs. Thomas clarifies:

I need to figure out you know what do they excel in? What do they do great in? I do that for every student. And so for the African American students, I need to figure out what they excel in. What gets them excited? Is it music, clapping, pictures, a funny joke, a story?...If I know students can add, but they have problems subtracting, then until they learn the algorithm of subtraction, have them count up. So, in order for them to be successful, I have to see what they can do. And once I can figure out what they can do, then I use that as a strategy to help them become successful until they can figure out what that standard algorithm of subtraction is. (Final Interview, 2010)

Mrs. Thomas recognizes that developing mathematical understanding is not about teaching a lesson. It is about educating the child. Mrs. Thomas describes the difference:

Making a lesson is pretty much a lesson that’s in the textbook. It says this is what we’re going to do. You are going to do A. You are going to do B. And then once you’re finished, the students are going to work. And after the students work, you’re going to collect their work. And then you’re going to discuss it. That’s what making a lesson is. Now educating the child is trying to get from the lesson plan to making sure that the student understands. And it’s a big step from figuring out what your lesson plan is. Making that lesson, and then figuring out did that child learn. (Final Interview, 2010)

Mrs. Thomas does not want her students to fail. She identifies with her African American students and seeks to find why they are not performing well in mathematics. She explains:

African American students I look at it, I can’t help it because I’m black. But, you know, I do look at the kids that are not doing well on the Tongston, or not doing well on tests. And if they are African American,

then I need to know why they're not doing well. Because I look at them as if they're my kids also. If it's a situation where the African American students aren't doing well and the Caucasian students are doing well, then I have to think okay why is that... So, I look at it and then I see okay, is it because they're African American or is it because of other factors? (Initial Interview, 2009)

Mrs. Thomas plans her mathematics lessons with her students in mind so they are successful. She asks herself:

What can I do to make sure that Jayden is successful while I'm planning this lesson? And not like oh, today I guess I will focus on multiplication. If I'm planning this lesson, what can I do to make sure that my Derrick is successful? He doesn't understand subtraction. So how will he understand this? Well, I need to make sure that I use pictures so he can figure it out. So that's what you're doing, you're looking at all of the students. I think that's why I am more successful than some of the teachers because I always make sure that I keep those kids in mind. You think of the child in mind as opposed to think of okay what am I supposed to do? There is a difference. (Final Interview, 2010)

Mrs. Thomas thinks about how she can give her students opportunity to move during her mathematics lessons. For example, she recalled teaching a multiplication lesson designed for students to sit at their desks and write items that come in twos, threes, fours, and all the way to twelve. Mrs. Thomas believed her students would have been bored and unmotivated completing this activity. As a result, she adapted the lesson so the students moved around from group to group identifying items that come in twos, threes, etc. She knew her students would be more engaged in the lesson with this change. She achieved the same goal as the original lesson, and she was able to get her students moving and more involved. Mrs. Thomas wants all her students to learn. As a result, she comments, "If you can learn by standing, then that's fine. It doesn't bother me. I'm not the teacher where all students have to sit down and be quiet" (Stim-recall 2, 2010). Mrs. Thomas remarks, "I do pay attention to how they're learning" (Initial Interview, 2009), and

believes it is imperative that she integrates ideas into her daily plans that will facilitate learning.

Mrs. Thomas establishes a community of learners by encouraging all of her students to become active participants in the mathematical lessons, as illustrated in Figure 22.



Figure 22. Mrs. Thomas’ students actively participating in a mathematical task.

She understands that some students know the game: if I do not raise my hand, the teacher will not call on me. Mrs. Thomas also recognizes if students raise their hands, teachers are more inclined to call on those individuals. In Mrs. Thomas’ classroom, students sit in groups of four, which she refers to as “tables.” She assigns each table a number, and she assigns each student a number. Mrs. Thomas uses the “magic spinner” to randomly select students because she does not want her students to think she is “picking on” them. She spins the “magic spinner” twice. The first spin determines the table number, and the second spin determines the student number. For example, if the “magic spinner” lands on four, and then on two, Mrs. Thomas calls on Student 2 at Table 4 to answer the question.

This method has increased the participation of her African American students. She discovered her students are prone to ask more questions when she uses the “magic spinner” because they realize it raises their chances of being called to respond. The “magic spinner” holds them accountable for their learning. Mrs. Thomas acknowledges the “magic spinner” is not always random. She uses it to determine what students understand and do not understand.

In Mrs. Thomas’ classroom, everyone must discuss his or her mathematical strategies. They cannot simply say, “Oh I did the problem, here it is.” They must explain their strategies to their peers and make sure their peers understand. In other words, students assume the role of the teacher. For example, Mrs. Thomas has students partner up, where one partner acts as the teacher and the other is the student. The “teacher” teaches the concept and the student asks questions, especially if they are struggling with the mathematical concept. When the teacher finishes teaching, the students switch roles and the student explains the same strategy his or her “teacher” taught. Once students complete the task, they give the thumbs up signal to inform Mrs. Thomas they are finished. This instructional approach not only gives students ownership in developing their mathematical knowledge, it also deepens their mathematical understanding.

Mrs. Thomas incorporates mathematics throughout the school day by creating problems that motivate her students. Mrs. Thomas emphasizes that teachers should take advantage of doing mathematics whenever they can. It helps students become interested and realize mathematics is applicable to real life situations. For example, her class collects paw prints. The class trades 15 paw prints for one giant paw print. Mrs. Thomas informs her students they need 10 giant paw prints to have a party. Then she asks, “How

many paw prints will we have collected if we get 10 [giant paw prints]?” (Initial Interview, 2009) Mrs. Thomas’ students solved this problem with enthusiasm and excitement. Mrs. Thomas recalls everyone, African American students, students with IEPs, and white students, used multiple strategies to solve the problem. Some added 15 ten times, others drew circles, while others broke up the fifteens into tens and fives to add more efficiently. Mrs. Thomas says she uses this activity as a stepping-stone for learning multiplication. She comments, “You remember when we had to use the paw? And then they already have the background information and it doesn’t feel like you’re starting from scratch. So I think that really helps” (Initial Interview, 2009).

Mrs. Thomas uses a variety of assessment strategies to determine whether students are making sense of the mathematics. She implements both formal and informal assessments, but she learns the most from observing her students and listening to them discuss the mathematical concepts during their math talk. She uses this information to guide her instruction on whether or not she needs to go back and readdress some concepts. Mrs. Thomas elaborates, “Most of the instruction is based on the assessment. And most of the assessments are informal. So that helps me with instruction” (Final Interview, 2010).

Mrs. Thomas expects her students to succeed. She realizes all of her students are not *A* students, yet she understands that her students do not leave her class with the same knowledge they came in with. She describes a student’s performance: “If you look at his test scores they may not be the highest in the class, but he’s making gains, leaps and bounds. That’s something that I’m very proud of” (Final Interview, 2010). She wants her students to pass third grade so they move to 4th grade, yet she desires more for her

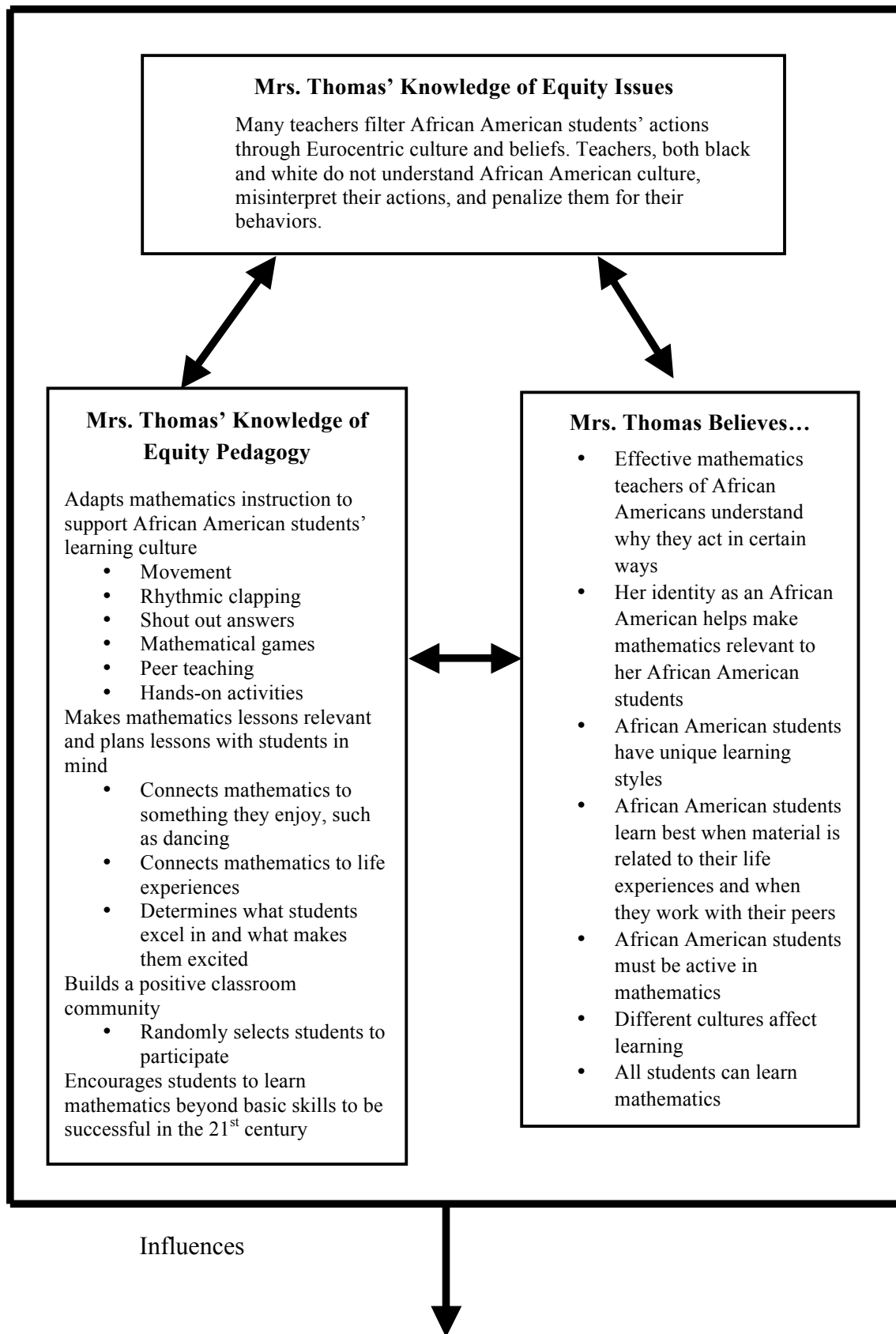
students. She explains:

I think about where they'll be you know 20 years from now. How will they compete in this type of economy? And you know, how will they handle college and get scholarships? That's the big thing. We're trying to get them to see beyond just the basics, and why everything means something. Why everything means this, and why this means that, not only for math, but for any subject. So, I look at my kids, I want them to be able to do well in 10 years and give them all the skills that they need. (Initial Interview, 2009)

Above all, Mrs. Thomas aspires to equip her students with the mathematical knowledge they need to successfully compete in today's society.

Mrs. Thomas' Knowledge of Equity in Teaching

Mrs. Thomas' knowledge of equity in teaching focuses on knowledge that teachers, both black and white, are indoctrinated to structure the mathematics classroom and filter African American students actions through Eurocentric culture and beliefs. But, Mrs. Thomas uses the cultural capital of her African American students to help them become successful in the mathematics classroom. As an effective mathematics teacher of African American students, she believes she understands why African American students act in certain ways. Thus, in her pedagogy she positively incorporates those "actions," which are manifested in her social processes. In this context, Figure 23 represents how Mrs. Thomas' social processes are influenced by the interconnection among her knowledge of equity issues, beliefs and knowledge of equity pedagogy.



Mrs. Thomas' Social Processes

- African American students are actively engaged in mathematics
- Students freely move around without fear of being punished
- Mrs. Thomas rotates groups using the one, two, three move
- Students solve mathematics problems using multiple strategies
- Students pay attention to what peers are saying and doing
- Everyone discusses mathematical strategies

Figure 23. Mrs. Thomas' knowledge of equity in teaching.

The Other Nine Participants

In this section I focus on ideas related to knowledge of equity issues, beliefs, and knowledge of equity pedagogy that were not elaborated on or discussed in the previous case studies. I begin with a brief overview of these nine participants (see Table 6).

Table 6

Overview of Nine Participants.

Teacher	Ethnicity	Grade Level Taught during Study	District	Years of Teaching Experience	Participation Based on Achievement Scores
Mrs. Jones	Caucasian	Third	Suburban Public	12	Yes
Mrs. Stevens	Caucasian	Fifth	Urban Public	23	No
Ms. Jenkins	Caucasian	Third	Small city Public	6	Yes
Mrs. De Vries	Hispanic	Third	Urban Public	4	No
Mrs. Knox	African American	Third	Urban Public	11	Yes
Mr. Franklin	Caucasian	Third	Mid-size city Public	5	No
Mrs. Fewell	African American	Fifth	Urban Public	9	No
Mrs. Lewis	Caucasian	Fifth	Small city Public	4	Yes
Ms. Hale	Caucasian	Fourth	Small city Public	4	Yes

Knowledge of Equity Issues

Mrs. Knox and Mrs. Jones believe their race do not influence how they teach African American students. Mrs. Lewis hopes her African American students do not look at her differently because she is white. She believes being white may effect how she teaches, but she does not understand how it would. Unlike Mrs. Knox, Mrs. Jones, and Mrs. Lewis, Mrs. Fewell believes her race is a factor in how she teaches and relates to her African American students. She clarifies:

Being an African American myself, I am able to understand their circumstances and get on an individual basis with them. Build a relationship with them in order for them to be more engaged and willing to learn...I'm more in tuned to what they like then another race or

background. If we hear a certain song, and we all heard that song before, but somebody else a different race, would look like what's that? We're learning together, not just me teaching them. (Final Interview, 2010)

A statement like this suggests that white teachers cannot relate to black students because they do not share the same cultural heritage, whereas black teachers have a better understanding because they have similar interests. Although Mrs. De Vries is Hispanic, her students perceive her as black. This influences how her African American students relate to her as a teacher. She explains:

They relate to me because I'm not white. I mean kids relate to me and nobody can play the race card with me because the African American kids they thought I was light skinned. I was one of them. 'Everybody in the classroom is black, even Ms. [De Vries] she's just light skinned' (laughter). I was just light skinned which I thought was so funny. And it took me all year to figure it out. And maybe that was why they related to me so well because they didn't think I was any different than they were. And I hate to say it that way but maybe with third graders maybe that's all it was. Oh, she's just like us. She's not white or whatever. (Initial Interview, 2010)

Although a person's race is part of their cultural identity, Mr. Franklin disregards it. He describes:

I try not to influence any of my teaching performance to race. I try to tie it into how good am I as a teacher? Or how can I best teach these students? Instead of how can I best teach these students as a white teacher? My race usually does not play into any part of what I teach, especially in math. (Mr. Franklin, Initial Interview, 2010)

He believes everybody needs to be treated as equals, and in his class he treats everybody the same. "We need to tolerate one another, no matter what is going on" (Final Interview, 2010). Mr. Franklin further states that he does not focus on "how can we get this specific, teeny, tiny group [African American students mathematical achievement] up? Where we need to get not just them, we need to get everybody up" (Final Interview, 2010). A statement like this suggests race should not be an issue. But, if we deny a person's race,

we essentially ignore part of that person's identity. They become "invisible."

Unfortunately, society and teachers living in society have constructed negative biases and stereotypes against African Americans. Mrs. De Vries teaches in a neighborhood that was involved in a quadruple shooting two blocks from the school, and the year before she began teaching at her school, a teacher was held at gunpoint during open house. This was not similar to the type of community where she grew up. When she first started teaching she admits, "I was scared out of my mind because of the part of town I was in" (Initial Interview, 2010). She was influenced by what society told her—you should be scared of a neighborhood like that, and scared of the kids because you do not know what they are going to do. But, she realized she had to be open-minded and not judge. She understood that kids are kids and they need to learn no matter where they lived. Unfortunately, her colleagues did not relinquish their biases. When Mrs. De Vries discusses students' behavioral issues and poor achievement with them, they immediately respond, "They're like, well you know, it's just an African American thing, or it's just that part of town, or whatever" (Initial Interview, 2010). Mrs. De Vries refused to give in to the stereotype and argues:

They [African American students] will connect with you better if you don't stereotype it for what it is. You should go into the classroom thinking okay these are a brand new group of kids. They need to learn. You don't need to be like, oh well that kid lives in this kind of household. They're going to be dumber or smarter, or you know more violent or less violent or quieter or whatever. You don't know. You need to make sure that you get to know the kids, and take with a grain of salt what you hear about them when you get there because I heard all sorts of stories about my kids and where they grew up and how they behaved. I mean, it's sad that way because people don't want to go to those parts of town and don't want to teach. Well, those kids need to learn just like the other kids in good old suburbia need to learn. I'm sorry. They didn't choose where they live, but they still need to be able to be taught just as well as the kids out in you know, according to the kids, the white neighborhoods. So I mean

it's you learn a lot. The kids need to learn and you end up learning a lot from the kids no matter what part of town they're in. (Initial Interview, 2010)

Many times teachers fail to acknowledge they have stereotypes and biases. But, in order to teach effectively, teachers have to recognize that they exist and then set them aside so they can relate to students. Ms. Jenkins admits:

I have these stereotypes in my head you know things that were maybe told to me you know or I heard on TV or you know. I don't think I can say I don't have stereotypes, I think I do. They're out there, and I know about them. But for me to be conscious and say the stereotype is exactly that. It is a stereotype. It doesn't, it doesn't mean anything, you know? It may mean something for someone else at one time. But, you know when kids walk into my room and adults too because they are part of a family, I try not to have the stereotype. I try to get to know them. Even if that stereotype comes into my head, it's like I have to be conscious and say I don't have any idea, you know. I don't know this person really on the first day of school. And I'm just getting to know them by now. (Final Interview, 2009)

Teachers cannot judge students based on their own biases and prejudices or what they hear from their fellow teachers. Mrs. De Vries recalls having a little girl in her class who was a "hellish nightmare with all of the other teachers" (Initial Interview, 2010), but when she was in Mrs. De Vries' class she behaved. Mrs. De Vries let her know that she can "act a fool everywhere else, but with me you're going to act this way" (Initial Interview, 2010). Mrs. De Vries told her it was unnecessary to throw tantrums because she was better than that. By the end of the school year, the little girl made a complete transformation because she realized Mrs. De Vries cared about her and Mrs. De Vries did not accept the negative stereotypes about her from other teachers. Mrs. De Vries asserts:

She was so smart, and all she had the rep for was being an absolute hellion. And she was by the end of the year, people were like, 'oh, wow. She really does do this.' I'm like yeah she's a highly intelligent child, but she's not getting the opportunity to be that highly intelligent child because all she ever gets her rep before her was she's crazy. She acts a fool. She

terrorizes, whatever. If you give them a chance they will surprise you because this little girl was the smartest little thing in math. (Initial Interview, 2010)

Teachers have to be open-minded, and not fall prey to the negative influences of others. A child will only act the way he or she is given the opportunity to act. Teachers cannot be afraid of their African American students. Mrs. Jones recalls an incident that occurred at her son's school. A little African American boy offered a piece of gum to his teacher, and when his teacher went to take it, the package of gum gave her a shock. The teacher informed the little boy to put his "toy" in his bag because he should not have his "toy" at school. The little boy did not put his toy in his backpack. Instead, he shocked 12 other people. After speaking with some of the teachers at the school, Mrs. Jones discovered the teacher was afraid to take the toy away because the child was black.

Mrs. Stevens had an African American boy in third grade that was rather explosive. She could control him, but none of his support teachers could handle him. He moved to the district from New Orleans after Hurricane Katrina. One day, after physical education class, he was extremely hostile and ended up pushing Mrs. Stevens. Mrs. Stevens pulled the boy aside and asked what was going on. She discovered that the boy went to the white gym teacher and told him,

so and so called him a nigger. And the teacher said, 'that's what we used to call you guys, so get back in line.' So he was very agitated by this teacher who obviously was not meant to be in urban core. I mean you can't fake stupid. I mean you know what I'm saying? That's not appropriate. And so when he told me this, and he had just pushed me I realized what was going on. And so I went immediately to the principal and come to find out within a week and a half, 2 weeks time this man was let go. Because they started interviewing students and finding out that there was many racial slurs that he was using towards the children. (Initial Interview, 2009)

This quote illustrates racism is still prevalent in public schools, and some teachers are not sensitive to and do not care about the needs of their African American students.

The participants acknowledge there are factors hindering the success of African American students in mathematics. Mrs. Fewell explains one factor is lack of training for mathematics teachers in her district. Without this training, Mrs. Stevens contends teachers will not take risks because they do not feel competent or confident teaching mathematics. She clarifies:

You know, it's like asking a PE teacher to come in and teach reading. What happens is, what we lose from that is PE teachers are not going to push those kids like a reading teacher would like a classroom teacher would because she's not as prepared, and she doesn't know the questions to ask. So, I find that a lot in mathematics. A lot of teachers don't know the mathematics themselves. They don't know the underpinnings of you know the mathematical concept, so they don't push the kids because they don't know where to push the kids because they're not confident or competent enough in their own skills. (Final Interview, 2009)

Another factor is giving African American students *A*'s in mathematics when they do not have the mathematical knowledge. According to Mrs. Stevens, "Nice, quiet kids gets the A, and it's not because they are earning an A. It's because they're not causing trouble" (Initial Interview, 2009). These students are being "rewarded" because of their behavior, not because they are performing and understanding the mathematical concepts. Mrs. De Vries acknowledges a lot of teachers in her former district pass students when they know the students do not understand how to do the mathematics. Mrs. De Vries explains:

They just get pushed on. So the low scores may mean one of those things where teachers don't take the time to give the kids the extra support and the help that they need. And it's a shame that that's the way it ends up being. But I think that there's no excuse other than the teacher needs to help facilitate as much as she can in the classroom. (Initial Interview, 2010)

Yet, another factor is the lack of stability within the school district. Mrs. Stevens recalls that when Michalla, an African American girl who basically lived with her, was in fourth grade her teacher was fired in October. Michalla had long-term substitute teachers for the remainder of the school year. In fifth grade Michalla's teacher left after teaching the first day, and she had sixteen different teachers during that school year. The substitute teacher would teach anywhere from two weeks to six weeks, then a new substitute teacher would come. Two years in a row, the school district failed Michalla. She had no teacher.

Beliefs

All nine participants believe it is essential to involve parents in the educational process because "it would make a big difference on kids' behavior and kids' academics" (Ms. Hale, Final Interview, 2009). Moreover, they all emphasize the importance of communicating positive messages to parents. At least once a quarter, Mr. Franklin calls parents to discuss student progress. For example, he may explain how a child had difficulty with subtraction at the beginning of a unit, but now he is successful with subtraction and proudly shares his thinking. Mr. Franklin appreciates and values parental support, and realizes it is important to provide positive feedback to parents. Every quarter, he sends home positive notes on areas the student improved. But, according to Ms. Jenkins, sending notes home to parents is not the same as having a face-to-face conversation. During parent teacher conferences, which occur in the fall and spring, she speaks to every parent for a minimum of 15 minutes discussing students' strengths and areas of improvement. Ms. Jenkins believes it is important to communicate with parents and not settle for the misnomer that they do not care. She contends it is important to speak to all parents. She explains:

Building that trust again between teacher and parent, and knowing and then to really feel like this teacher really cares about my child. This teacher wants my child here at school, thinks that they can learn, wants them to learn. I think that's so important. But you got to make an effort if they are not coming in to make that contact. (Initial Interview)

As she reflects on her successful students, she realizes many of them have parents who are interested and take an active role in their child's education. Unfortunately, some African American parents feel intimidated when talking to teachers. Mrs. Knox believes it is critical to make the parents feel comfortable and welcome. She makes a concerted effort to speak to parents in her "regular person voice" (Initial Interview, 2009) and tries not to sound like a teacher. She lets parents know that she is a parent too, and she shares in some of their struggles. Mrs. Knox explains, "I think sometimes that helps them be able to relate to me as a person and as a teacher" (Initial Interview, 2009). She believes open communication is imperative for students' success. She describes:

It's not really strange if you [the student] haven't been turning your assignments in and the phone is off and whatever the case might be, for me to be knocking on the door. I walk around the corner and to see what's going on, and mom whomever takes care of you for some particular reason, I've been known to go over and sit in the living room for a little while and talk. (Initial Interview, 2009)

Similarly, Mrs. Stevens has a strong, positive relationship with parents. They call her at six o'clock in the morning to inform her about the kind of night the child had, and they are sending the child to school with diarrhea. Although Mrs. Stevens admits she is not always awake and parents are supposed to call the school with this type of information, she wants her parents to know she is approachable. They can speak with her about anything. Moreover, Mrs. Fewell recognizes some parents do not understand the mathematical concepts she is teaching; therefore, they are unable to help their child at home on their homework. She has an open door policy during mathematics lessons. Not

only does she teach students mathematics, Mrs. Fewell takes time to teach the mathematical ideas to parents so they are able to help their child. Sometimes, parents come during the mathematics lesson to learn. Mrs. Fewell believes parents want their children to be exemplary in mathematics, and she is willing to help them help their child learn.

Of course participants recognize the challenge and frustration in establishing relationships with some parents. For example, Mrs. De Vries recalls a time a parent came into her classroom and threatened her. She describes:

I had a parent come in my first year and made it past the office and threatened to come kick my fill in the blank because her daughter was getting picked on. And she said well you're letting the kids beat up on her. I'm like, okay, she's not even my kid. She's in my room because she's out of control and she instigates fights. And the kids knew who fought with whom, and the fact a parent came in and was ready to harm me because of what she thought I was doing, letting be done to her child who wasn't in my room was something that I had to deal with. (Initial Interview, 2010)

Some participants believe that some parents do not care and do not want to be involved in their child's education. Ms. Hale recalls out of seven students whose parents did not show to parent teacher conferences, five of them were African American families. She believes this sends the wrong message to her students. She explains:

I mean if their parents don't want to show an interest in their academic or their learning or what their teacher has to say, I think it gives them a message they don't have to care either, which then in turn makes them struggle. You know, if their parent doesn't want to come to [parent teacher] conference, they're probably not going to take time to work with them at home. (Final Interview, 2009)

Mrs. Fewell described frustration when she receives calls from parents inquiring about why their children were excluded from a class party, yet these same parents did not contact her when their children received low grades in mathematics. Although Mr.

Franklin informs parents about his availability and willingness to help, he does not hear from them after parent teacher conferences. Mr. Franklin contends many parents “focus a lot more of their attention on themselves than what they need to be on their kids” (Initial Interview, 2010). He further questions the parenting skills of some parents. He argues:

Why are these students coming to school not fed? Why are these students coming to school underclothed, or missing coats, or dirty haven't been bathed in a week? So I think parents don't care anymore. They're like, you know what, I can go and get my check. I can go and get my food stamps, go and get taken care of that way. I'll just have more kids and do this and that. You know what, you guys take care of yourself, you're little adults now. (Initial Interview, 2010)

As a result, Mr. Franklin makes a decision to focus his efforts on his students, rather than their “God awful parents.” He believes his role is to protect and defend the students, to keep them safe, to lift and build them up, and to teach them.

In summary, the participants believe it is critical to reach out to parents to build relationships with them and to talk with parents about their children's strengths and progress. Yet, they also believe that they will not be able to establish productive relationships with every parent and in these cases it is especially important to mentor these students.

Ms. Hale, a Caucasian woman, grew up in a small community where students looked like her. When she discovered she was going to teach at a school with a diverse population, she was terrified. She had heard stories about how bad the students were. She wondered if she would be successful teaching these types of students. After teaching in the same school for the past four years, she truly enjoys it and realizes it was not as terrifying as she thought. She believes she gives her fourth grade students the extra love and support they do not receive from home.

The participants believe effective mathematics teachers of African American students encourage students to make and discuss their conjectures. For example, Mrs. Stevens gave her students three segments and asked if it would create a triangle. They discussed the measurements of the segments and made conjectures about if two short sides equal the long side, would it make a triangle. What would happen if the two short sides were longer than the long side? Would it still make a triangle? The students were able to make generalizations based on their patterns. Not only do effective teachers allow time for conjectures, they must take time to sum up the lesson. Mrs. Stevens believes if you do not take this opportunity, “You will have kids with misconceptions that you have not identified. And they’re going to go home with that. And then it’s going to sink in, and it’s going to be harder the next day to get over that” (Final Interview, 2009). Additionally, Mrs. Stevens believes effective teachers give students time to build conceptual understanding and provides opportunities for students to explain their thinking. For instance, when introducing multiplication, Ms. Jenkins requires her students to think about the meaning of four times three before memorizing the fact. Students make connections and build understanding as they create four groups of three and discuss what mathematicians call multiplication. Ms. Jenkins further elaborates:

I think a good math teacher asks guiding questions that leads students in the right direction, that doesn’t feed them, you know, necessarily just an answer or that’s wrong. Think more about this is a better question or does this make sense? What can you do to make this make sense? A good math teacher, I think, has supports in place and extensions in place for students who got it. They’re not just, okay, they got it, so now they go sit and read or they go sit and do something else because they’re done. Sit and talk. But, it is pushing those students toward more, at the same time providing that support to students who don’t get it. It’s a juggling act. It really is. (Final Interview, 2009)

Mr. Franklin also believes supports must be in place to meet the needs of all students at every level. But, he contends an effective mathematics teacher of African American students is:

One who doesn't look at race, creed, or color... To me a successful math teacher of African American students is one who can teach, to me, any normal student. And they see past all of that ethnic, and racial, and religious hoopla that's out there. And say, okay let's see, what can I teach this student? What can this student learn, and how can I best use my energy to help this student's educational process. (Final Interview, 2010)

Mr. Franklin contends this is what makes him successful. He treats everybody the same. He offers help and support to students who need it and “spends every ounce of energy teaching everyone the best possible practices and procedures” (Final Interview, 2010). He believes the number one characteristic of effective teachers is to know the students—their history, how they learn best, and where they are in their educational process. Contrary to Mr. Franklin's beliefs, Mrs. De Vries believes effective teachers notice and pay attention to the needs of African American students. She contends teachers must be aware of what African Americans are doing and be sensitive to whether they understand or misunderstand mathematical concepts. While Mrs. Lewis believes she does not teach mathematics differently to her African American students, she realizes that their situations are different, their understandings vary, and sometimes “you have to be more cautious about encouraging them and making sure they feel a sense of success” (Final Interview, 2009). She further believes effective teachers of African American students understand their situations. Unfortunately, Mrs. Jones has not taken the opportunity to think deeply about how to teach African American students. She explains:

I just kind of look at the classes as a whole and then try to break down their individual needs. I don't really focus on their race. I don't think I ever have, and I'm sure that provides different experiences since they have

come from different places, but it's just kind of situations where okay well, these three kids are about the same, so we'll put them together to learn their money. (Final Interview, 2009)

Mr. Franklin believes his socio-economic status he experienced as a child allows him to relate to his students. He explains:

I feel like I was one of these kids... I used to be you, now look at me. I was in the military, a successful soldier for 12 years. I'm a teacher now. Look what you can do. You can do the same things. So I kind of used that to influence and their background where I see, oh they have it a whole lot worse than I do, I use that to say hey that's me wanting to be a servant to them. And try to teach them no matter how bad your background is, you can improve it. And that's all, that's really what I want to instill in these kids is eh, you can improve it by learning, getting your education is extremely important. The harder I have to work and the harder I can help you hopefully the farther you'll go in school and you'll see it in a positive experience. (Mr. Franklin, Initial Interview, 2010)

Within the effective mathematics classroom, participants believe both the teachers and students have defined roles. Mr. Franklin contends students are respectful, responsible, and follow the rules. They put forth their best effort and ask for help when they do not understand. Mrs. Fewell believes her role is to facilitate and support her students. For example, as she circulates among her students she notices that one of her students almost has an answer correct. She asks the student what would happen if he does this or this. She does not provide direct answers to students. Instead, she lets them struggle under her guidance. Although Ms. Hale views herself as a facilitator, she struggles to give up control and allow students to grapple with the mathematics. She would like to take the pencil out of their hands and show them how to work the problem. But, she realizes students do not learn best with this approach. So, she tries her best to refrain from this act.

As a mathematics coordinator of 44 schools, Mrs. Stevens never liked entering quiet mathematics classrooms. She believes that does not exemplify mathematics. She feels quietness does not build mathematical understanding. Additionally, Mrs. Stevens was able to have a clear picture of the cultural climate in mathematics classrooms. She describes:

When I went to the schools that were predominately white, it was just a different culture with low class white. It was the poorer white students. It was a whole different feel. Their biggest problem was that they made AYP, but they would never come to school because mom and dad said, 'it looks like you have a little snot coming down your nose. You don't have to go to school today.' And then my schools that were Hispanic were just calm and sweet and nice. And then one of my schools spoke 27 languages. They were just confused. They didn't know exactly where they were. But the schools that were predominately black, it was very loud. It's their culture. If they go to church and sing hallelujah, praise the Lord, and they're singing and dancing in the aisles. (Initial Interview, 2009)

The participants believe teachers need to establish an environment conducive to learning, not one that is demeaning to African American students. Mrs. Jones witnessed teachers talking down to their African American students causing them to shut down, instead of taking the time to explain the mathematical process. For example, if a student could not figure the answer to seven minus four, the teachers made snide comments like, "You don't know that?!" (Final Interview, 2009) Mrs. Jones believes this is the wrong way to respond because "a lot of times we don't know where they're coming from or maybe they should know it at that point, but they just don't" (Final Interview, 2009). As Mrs. Lewis reflected over the previous year, she admits she was scared of a fourth grade African American boy at her school, and she did not want to have him in her class. She reported he would "yell, 'oh, you all are a bunch of old white women'" (Final Interview, 2009). The boy consistently refocused attention to himself, and his peers looked up to

him. He was not scared of anything. Mrs. Lewis realized she had to detach herself from his actions so she would not form any negative biases against him. It is vital teachers take the time to build relationships by being honest and sincere with their students and themselves.

Once the relationships are built, some participants believe it is important to provide students a rationale or purpose regarding why they need to learn the mathematical concepts. According to Ms. Jenkins it is important for students to understand they are not learning mathematics because it is a school mandate, but rather that they will use mathematics, and they can be interested in and successful with mathematics. Teachers need to be able to articulate how the information they present will help the students. For example,

You need geometry because when you grow up you might want to be a carpenter, or if you're doing certain things around your house you need to be able to figure out perimeter, area, and what type of things if you want to move your furniture around. (Mrs. Knox, Initial Interview, 2009)

Mrs. Fewell believes if students do not know the purpose and do not have a clear understanding of what is expected, they will not focus. Mrs. Stevens contends it is important to let students know what is expected of them. She makes the analogy that she would not want to work for a principal who never informed her of her expectations for the year. Yet, the principal turns around and fires her because she did not meet the expectations. She believes it is only fair for students to know the purpose or goal of the mathematics lesson. In order to successfully accomplish this, Mrs. Fewell contends it is crucial for teachers to plan and prepare lessons in advance. She remarks, "You can't have a lot of transitional time because they get bored really quickly. It [the lesson] has to be very well prepared" (Final Interview, 2010).

In order to create engaging mathematics lessons, teachers must understand how African American students learn. Mrs. Fewell believes African American students learn best when they are taught from an inquiry based or project based curricula because it allows them to work with partners or with small groups, and it is more hands on. Likewise, Mrs. Stevens believes African American students are not book driven. They are not pencil-paper driven. They do not learn best when the teacher lectures. Instead, they learn best when they are given opportunities to explore because they are social, visual, auditory, and kinesthetic. Similarly, Mrs. Knox believes everyone has different learning styles. However, the way people learn has nothing to do with their skin color. She contends teachers must “Key in to what makes them [students] tick and tailor your lesson there” (Initial Interview, 2009). She further believes students learn best through repetition. Mr. Franklin also believes African American students learn the same as everyone else. He does not differentiate his instruction based on race. He contends that he never has to change his method of teaching mathematics. He makes sure they are part of a group where they experience and are engaged in mathematics. Mr. Franklin teaches the mathematical process and they follow along and do it. Mrs. Stevens believes that just because students are African American, it does not mean they will respond a specific way. Yet, she understands they need lots of boundaries and repetition.

Some participants believe African American students are highly engaged in their mathematics classroom. Whenever Mrs. Stevens informs her students it is time for mathematics, they are really excited. And when mathematics is over, they do not want to stop. Even when students misbehave, they do not want to miss the mathematics lesson. Mrs. Stevens elaborates:

‘Well, well, well can I please do math?’ So, I mean they’ll pretty much do what ever it takes to make sure that they can come back to do what the kids are doing. To them, they don’t want to miss it. (Initial Interview, 2009)

Mrs. Jones contends her African American students participate more than they did at the beginning of the year because they realize there are multiple ways to solve problems, and they feel comfortable sharing strategies that do not work. Students are willing to help their peers and provide respectful explanations about why certain strategies do not work or other ways to think about the problem. Whenever Mrs. Jones gives her students free time, they want to solve mathematics problems. She comments:

It’s amazing like probably 70% of the students with those 3 minutes would say ‘give me an addition problem, or give me a multiplication problem. I bet I can get it.’ And they’re starting to do math, and I’m like wow that’s weird. It’s funny how they eventually start wanting to do it because it’s fun. You know it’s something out of the ordinary. (Final Interview, 2009)

Mr. Franklin believes his students should be actively engaged in the learning process. He contends they are responsible for their learning, and the teacher does not “preach the whole day” (Final Interview, 2010). Yet, Ms. Hale believes her African American students are not as engaged as she would like them to be. They do not take the initiative to raise their hands to explain how they solved a problem. Instead, they sit back, listen, and allow others to share their thinking. Ms. Hale contends they do not volunteer because they probably feel intimidated by the white students in the class who are quite intelligent. She feels they believe the white students have the correct answers and they do not. But, Ms. Hale still calls on her African American students even when they do not raise their hands because she believes they have great thoughts. And, she wants them to share. Mrs. Fewell has about 25% of her African American students who do not participate in whole class discussions. She believes that after much encouragement and praise, they will

eventually decide to verbally answer questions. Ms. Jenkins believes her African American students have average to low average participation. She sees more participation when they know they have the correct answer. Like Ms. Hale, Ms. Jenkins' African American students do not raise their hands if they have to explain their thinking. But, Ms. Jenkins recognizes that they do participate more in small groups. Ms. Jenkins believes it is important for her African American students to share their thinking, so she probes them. She explains:

It's real easy to see well I know the answer here is seven, so seven, I'm done, move on. So what I try to do for example if the answer is seven I call on that student and then probe a little bit. How did you, that's a great, you know how did you figure that out, and to push because I think that's maybe how it's eventually going to come that the hand goes up for more explaining type of questions with that confidence. (Final Interview, 2009)

Mrs. Jones believes it is challenging to get African American students to care when it appears they do not. They want to give up because they are overwhelmed by the amount of numbers in a problem. But, Mrs. Jones tries to keep them motivated and interested as they solve the problems.

Ms. Hale believes African American students enter her fourth grade class with the same skills as the other fourth graders. But, she recognizes they do not have similar experiences, which often interferes with their understanding. She explains:

Sometimes some of my African American students don't necessarily have that prior experience or that prior knowledge to kind of understand what they're doing. And they say, 'what are they talking about?' And then we have to stop for a second. One day we were talking about something, I don't even remember what it was. But, one of my African American students [said] 'well I don't even know what those things are.' And so that was kind of getting in the way of his whole math. (Final Interview, 2009)

Ms. Jenkins enjoys witnessing when her students experience the "aha" moments and change their thinking as they deepen their understanding of the mathematical concepts.

She believes her students enjoy mathematics and it makes sense to them. On the other hand, Mrs. Lewis believes the best part of teaching occurs when her students struggle with a concept for a long time, and then they finally understand it and have success with it. She is proud of them and she recognizes the pride they have in themselves.

Mrs. Lewis believes in order for her African American students to be successful in mathematics, she must assess their thinking. If they do not understand, she must guide them by using mathematical language they understand. She believes if she builds students' confidence and helps them realize they can do mathematics, they will be successful. She believes it is important for students to understand mathematical concepts before a teacher moves onto the next topic. She agrees with Mrs. De Vries who believes mathematical concepts are not separate entities that have no connection to other mathematical ideas. She argues, "If you let them go through not understanding it and failing miserably, it doesn't affect just the unit you're in, but it goes to the next unit [as well]" (Final Interview, 2009). In other words, according to Mrs. De Vries:

If you can't get one concept, you can't build on it and expect the kids to understand, without them understanding the first block first. You can't add the second block and be like you should be getting it by now, even if you didn't understand the first step. (Final Interview, 2010)

Mrs. De Vries believes she is more sympathetic with her students because she knows how challenging it was for her to learn mathematics. She realizes some teachers become frustrated if they have to repeat things when students are not grasping the mathematical concepts. They feel pressured to stick to the agenda of what they have to teach. However, Mrs. De Vries does not allow that pressure to get to her. She believes it is important to take her time teaching the concepts so her students understand and do not fall through the cracks. She explains:

I knew that they, at least, I felt that they knew that I cared enough to continue to help them, not just okay we'll figure it out later, or we'll try it later, or it's okay you'll understand later. I think they knew that I wanted to help them learn. I think they knew that I cared enough about them to re-go over things, and I didn't make them feel dumb. And I made sure that they understood. (Initial Interview, 2010)

Mrs. Lewis contends many students come to her in fifth grade with gaps in their learning, and it is vital she fills the gaps so students are successful.

Ms. Hale believes African American students need positive affirmation when they correctly solve mathematical problems. This reassurance builds confidence and self-esteem. Ms. Hale recalls her African American students raising their hands requesting help or confirmation that their work was correct. Ms. Hale believes it is important that she conveys to her African American students that she is paying attention to them. She explains:

I try to make sure that I get to them like put my hand on them or say it looks good or I try to point out like it looks like you did this one right, but maybe check this one. Just so they know that I'm paying attention to them and I'm making sure they're doing okay, and they don't think that I'm trying to look past them or look by them. (Initial Interview, 2009)

Mrs. Fewell believes pre-service teachers need to enroll in undergraduate courses focused on African American culture. Not the traditional multicultural course where students learn about African culture and Swahili, but a course that focuses on what is occurring in the African American community—topics such as hip-hop, graffiti, gangs, and how to deal with poverty and drugs. Mrs. Fewell believes these topics are essential for individuals who have never been around this type of cultural environment.

Additionally, Mrs. Stevens believes a course called “Beyond Classroom Management in the Mathematics Classroom” is essential for all pre-service teachers so they are effective teaching African American students. Mrs. Stevens believes a lot of her colleagues do not

use manipulatives when they are teaching mathematics to their African American students because they are afraid the kids would steal, throw, or misuse them. Thus, Mrs. Stevens believes you have to have good classroom management when using manipulatives. She believes this course will provide direction to teachers as to how to establish the classroom environment. Mrs. Stevens contends, “You have to be in control. It’s not about yelling. It’s about how you set it up so you don’t have to do those kinds of things” (Final Interview, 2009). Mrs. Jones agrees pre-service teachers need a course in classroom management, but she would emphasize how to manage students’ behaviors. She admits that she has more behavior problems from her African American students. She believes every new teacher needs a course on how to refocus African American students’ behavior without yelling or giving them negative attention. When Ms. Jenkins was asked about advice she would give pre-service teachers about teaching African American students she emphasized taking time to understand:

One thing that I wish I would have more of, or would have helped me is to actually talk to more African Americans who have had positive experiences, who have had mediocre experiences, and who had negative experiences. You know? Adult or college students, or not necessarily education students, but just people who have gone through it because how can I really understand until I talk to someone who could give me a little different perspective? I am not African American. I can think about it and reflect on it, and I should. But to actually talk to somebody and go what helps you? What did teachers do that you appreciated or didn’t appreciate? Talking to someone first hand, I think is invaluable. You just get so much information. And have more experiences work[ing] with African American students, whether that be after school tutoring or in classes. The other thing is to get chances to observe teachers who are doing great things with African American students, so you can see, you know, and then reflect, getting experience from the experts, I think would be really great. (Final Interview, 2009)

Knowledge of Equity Pedagogy

All nine participants establish a classroom community conducive to learning. During the first week of school, Mr. Franklin spends two days where he does not focus on academics. Instead, he and the students learn about each other—their likes and dislikes. They spend time learning how to play together and how to respectfully speak to each other. Similarly, at the beginning of the year Mrs. Fewell builds classroom community by allowing the class to get to know her and each other. She discusses her life and what she was like as a student growing up. She believes sharing her experiences helps students become comfortable to talk about their personal life and the things that they are going through. She begins class every morning with Harambee, which means pulling together in Swahili. She and the students sing songs and say uplifting phrases to establish a positive atmosphere. Furthermore, she sends home a letter to inform parents about her background. She also sends a questionnaire so parents can answer questions about their children's strengths and weaknesses, what they want their children to work on in class, what they want from Mrs. Fewell, and how Mrs. Fewell can help them. This information not only helps Mrs. Fewell understand her students, it also aids her in preparing her lessons. Mrs. Fewell emphasizes, "It takes everyone. [It takes] the principal, teachers, parents, and the community all working together for the greater good of the students to help these kids be successful and to stay in school" (Final Interview, 2010). Mrs. DeVries explicitly stresses that since she and the students are part of a community they look out for each other. She explains:

It's just not all about them. They need each other to succeed. It's not one of us is going to get all the right answers and succeed in the classroom and leave everybody behind. We're going to try to get through together helping each other. So, they would have this certain responsibility, not

only to themselves, but to the class to help each other work through whatever they need to math wise. (Final Interview, 2010)

Mr. Franklin agrees, and emphasizes his students are a family who help each other succeed. Ms. Jenkins has weekly class meetings where students sit in a circle and share information. She describes:

I don't necessarily know what somebody's family's life is like. Or what their culture asks of them, or what interests they have, or how they do things are very different from me. Maybe depending on their race, and so I think it's important to have share time in the morning where they're allowed to share you know what did you do this weekend? It seems like a small thing and sometimes for me, sometimes I think okay this is minor. We have academics to do, but if I really stop and ask myself, what am I learning from this? I think I get a lot out of it because I know what background to build on. (Initial Interview, 2009)

During the meetings students also discuss their problems or concerns. Each student, then, has the opportunity to offer suggestions for a solution. Ms. Jenkins found that this approach works "well because the student takes some ownership. [It is] the class working together to solve this problem" (Initial Interview, 2009). Sometimes "family members" do not have everything they need when they come to school. This is not a problem for Mrs. Knox and the type of climate she and the school established for their students. She explains:

Even if you came to the school with nothing, once you get there everybody has what they need. You see what I'm saying? Even if we got a kid like the teachers get supplies for the kids. We go that extra mile. If you don't have clothes, we have clothes at the school. If your clothes aren't clean, there's a washer and dryer at school. If you need a little bit more to eat, we have food at school. So if there's something going on at home, we have a team of people, guidance counselor, a social worker, school resource officer, principal, teacher, we have a whole care team so that you have what you need to learn at school. Not to say that the things that you have going at home aren't going to influence you as a person, but if you establish a certain climate once you walk through the door you are going to be okay. (Initial Interview, 2009)

Of course, all nine participants recognize creating a community of learners is based on their ability to establish relationships with their students. Mrs. Jones recalls having an African American boy whom she had a special relationship. She reports, “Everybody in the building did not like this kid” (Final Interview, 2009). He was so negative. Whenever he was mad at the world, Mrs. Jones would just look at him, and he would start laughing. Her student teacher tried to treat him the same way, but it did not work. Her student teacher did not understand why this approach was not working. Mrs. Jones recalls her saying, “I don’t understand what’s going on? How come he does that to you, but he treats me like crap?” (Final Interview, 2009) Mrs. Jones explained that you have to honestly build relationships with students. She further elaborated, “It’s hard to build a good relationship if you’re saying things that are making them shut down” (Final Interview, 2009). Ms. Jenkins feels she has really gotten to know her African American students. She communicates and shows them that she is caring, interested, and supportive. She elaborates:

I think that might be part of it because even now when I see African American students that I’ve had in the past they want to come talk to me. It’s not like they’re shying away in the hallway, and I really am truly interested in how they are doing now. It’s like, ‘Hey, how’s fourth grade going? What are you working on?’ I really do want to know. I’m not just saying those things because you’re supposed to. I think they really do want to share with me, and they can see that I care. (Final Interview, 2009)

Many of the participants have extended the relationships with their students beyond the classroom, and they acknowledge it makes a difference. For example, Mrs. Jones remembers an African American student she had who would not speak for about two years to anyone about anything real. He noticed one of his peers handing Mrs. Jones a schedule of her ice-skating performances. As a result, he asked Mrs. Jones to attend one

of his football games. Mrs. Jones went, and from that point the boy opened up and started communicating. Likewise, one of Mrs. Knox's students invited her to attend his "mom and mom dad" marriage ceremony. It meant the world to the student that Mrs. Knox came. Mrs. Knox comments, "If they have something going on and they invite me, then I try to go and oblige that. All those things do make a difference" (Initial Interview, 2009). Not only does connecting with students outside of school hours make a difference in the lives of the students, it impacts the teacher as well. Mrs. Stevens recalls an African American girl, Michalla, whom she had four years ago. When things did not work out at home, Mrs. Stevens brought Michalla to her house to stay. Mrs. Stevens lived in a small three-bedroom house with her husband and two kids, but they made room for Michalla in the computer room, which contained her own bed and drawers for her clothes. This went on for three and a half years—until she was adopted. But even then, they continued to stay in contact through facebook, text messages, and e-mail. Mrs. Stevens remarks, "It was a spiritual growth thing for me really" (Initial Interview, 2009). Similarly, Mrs. De Vries stays in contact with her former students via e-mail and her Myspace page. She articulates:

They're there and they still know Ms. [De Vries], and they type Ms. [De Vries] e-mails and shoot me messages all the time. They still remember you, and I feel like I made some kind of impact if they still want to look for me. I could have been the teacher they hated from the start. They seem to like me because they still want to talk to me. But, I mean make sure that you keep open minded, and kids love you no matter what. They don't look at the color of your skin. They look at the way they're treated. (Initial Interview, 2010)

Once teachers establish these relationships, students are more willing to listen, participate, and learn the mathematical concepts. "I want to please the teacher because I know she wants me to learn" (Mrs. Devries, Initial Interview, 2010). However, if African

American students feel you do not care, they immediately shut down. Mrs. Jones explains:

I have certain students that shut down the minute they even think I'm saying something negative to them. It doesn't even have to be something I say. It could be my body language. Or, if they start to talk to me and I say hold on I'm working with someone else, they shut down, and they don't care anymore. I think a lot of it is your personal relationship with the students. (Final Interview, 2009)

Mrs. Jones understands that you have to build a positive, personal relationship with students. They have to be able to relate to you as their teacher, and the teacher has to be able to relate to them. To help Ms. Jenkins relate and understand her African American students she experienced what it was like to be a minority. She explains:

For me, as a Caucasian, I had to go into some situations where I was the minority. And it was so interesting for me because I have never felt that. You know you walk into a room, and I guess I didn't realize that you know because that's the way it always was for me growing up. In my elementary classes we had one or two African American students. That's how it always was for me, but to flip it and put it on the other side was an awesome experience. I think I like more of that because you know I felt like I didn't want to say anything. I just wanted to sit back. I was looking for someone else who looks like me. Instead of just getting to know someone. You know when I was put in a large group with me being the only Caucasian it's hard. I mean that's why I think I try, I try to think about, you know, how did I feel in that situation? Is that child feeling like that everyday, even though I got some [African Americans] that are successful and on level, what can I do to help them feel like they fit in and you know just as much a part of this as everybody else who might look the same. (Initial Interview, 2009)

Ms. Jenkins understands the difficulty African Americans may have adjusting when there are not many people who look like them. In her classroom, she is cognizant of this fact. So, she helps her African American students feel comfortable by initially assigning them partners to work on mathematical tasks. She believes this builds confidence. She reflected on her experience and remembers that she longed to connect with someone. Ms. Jenkins

realizes to build a community she must take it one step at a time. After her African Americans feel comfortable with a partner, she has them work in groups. She elaborates:

Okay, now I feel comfortable as an individual, a partner, a group member, then finally as a class member. Then build on that. Now I feel comfortable, okay I feel I trust everybody in here. I can be a leader in this group. (Initial Interview, 2009)

Unfortunately, Ms. Jenkins did not establish relationships with her African American students during summer school. As she reflected over her experience, she acknowledged this was the first time she taught a class consisting of mostly African American students. It was the most challenging teaching experience she ever had. Kids were on top of their desks. Kids were constantly fighting. She elaborates:

I think about why was that so hard for me? I mean I had kids. I had more disruptions, outward disruptions than I ever had in my teaching career. And it made me feel like a bad teacher sometimes. I really struggled with that. What am I doing wrong? I mean it was something that I usually don't see. (Final Interview, 2009)

Ms. Jenkins believes she had a difficult time during the summer because she did not take time to build a community and establish a routine and expectations. She allowed the students to sit wherever they wanted and gave students freedom to make their own decisions. She realized this was a mistake because the students generally congregated with kids they knew. Some of them just decided they were not going to learn. Ms. Jenkins believes if she had the opportunity to repeat this experience, she would provide boundaries and let the kids know they are there to learn. She reports she learned a lot from the experience on the importance of establishing relationships and building a community of learners.

Mrs. Lewis recalls she was pretty "hard core" her first couple of years of teaching. She expected students to do everything her way because she knew she was right. But, as

she gained more experience teaching she realized there are other ways to approach people that are not so abrasive. She explains:

[When] I first started teaching I don't think I really got it. I don't think that I was always, I was trying to be kind, but I don't think I was always as empathetic as I could have been. My compassion has changed because my heart always broke for those kids that weren't able to do it. My understanding of them and where they're coming from I think has changed to realize that my main goal is for them to feel good about themselves at school, for them to feel successful, for them to want to come to school, and continue staying in school and so however I can meet that is my goal. (Initial Interview, 2009)

She understands if teachers do not take the time to develop genuine relationships with students, learning will not occur. She explains:

Developing a relationship with them to know that you trust them and they trust you, and they would want to work for you, because if they don't like you, not necessarily like you. If they think you're mean, hateful, and don't care about them, then they aren't going to work for you. I think. (Final Interview, 2009)

Mrs. Stevens agrees and further elaborates:

It's not just a one-way street. It's not just me delivering. It's not going to happen. So, if I'm just thinking I'm going to stand up there and you're going to receive it and I'm going to walk, go home and leave, then no I will have to bring in a relationship. I will have to bring in a piece of me to the table. I can bring trust. I have to let them know I care, and all of that has to happen before any mathematics can really even happen. (Final Interview, 2009)

Ms. Jenkins believes it is important to get to know students, "even if they are driving you crazy... That's the first step, I think, in all instruction" (Final Interview, 2009).

All nine participants use a variety of instructional strategies to teach mathematics to their African American students. Mrs. Stevens encourages her students to think critically by having them determine what the mathematics question is asking them to do and what information they already know. Moreover, Mrs. Jones sometimes intentionally solves

mathematics problems incorrectly. She then has students determine if she solved it correctly and explain why or why not. Mrs. Jones also uses this approach to help her students understand it is okay to make a mistake. They are in it together to help each other. Ms. Hale lets her students know she still values when they share incorrect responses. She wants to know what they think and she appreciates their willingness to explain their thinking. She does not embarrass them in front of the class for their wrong answers, but she takes the time to inform them that they missed this little part in the problem. She wants them all to be successful.

One way of ensuring the success of African American students in mathematics is making the mathematics lessons relevant. If students are solving word problems, and the problem said Wanda had this and Jose added this many more, Mrs. Jones simply changed the names to the names of the students she had in class. She realized that Wanda and Jose meant nothing to her students. “Who cares if Wanda and Jose have 85 marbles?” (Final Interview, 2009) But, as soon as she inserted the names of her students, they were interested in solving the problem. Mrs. Jones asserts you have to make it real for the students, and change some of the items in the textbook. For example, a problem in the book revolved around jacks. Her students we’re like, “What are jacks? What are those? A ball and some little silver things? I mean some of them don’t even know what that is. And those are the kind of things they put in the book” (Final Interview, 2009). Mrs. De Vries concurs that sometimes you have to change the wording in a problem so it would relate to African American students. She acknowledges this may pose a problem for some of the white students in the class. She suggests the following solution:

Get questions that both students are going to understand. And even if it’s, okay here’s your question that you know that the white kids are going to

understand, and then ask a question that your African American students are going to understand. Same material, posed the question differently, then that's how you're going to get their interaction. It's not just okay [to say] my African American students aren't paying attention. They just don't care. They don't get it. Maybe they do, they would understand it, if you posed it in a way they understand. (Final Interview, 2010)

Both Mrs. Jones and Mrs. De Vries understand the importance of being culturally relevant. Mrs. Fewell agrees. She invests time listening and watching current trends in the media, trying to understand her students' interests. She explains:

Like for me, I listen to music on the radio and watch certain cartoons so that I know some of the things that they're watching on TV. Some of the things they're listening to on the radio. It may not be my favorite kind of music, I try to listen to things that they're interested, things that I think they're listening to so that I can incorporate that into my lesson. There was a time like Pokémon came out, and being able to draw a Pokémon and them seeing me draw the Pokémon on the board, we're talking about angles, and lines and symmetry. And it happens to get them engaged. It's simple things that you just notice when watching them. (Final Interview, 2010)

Mrs. Fewell recognizes she must understand her students and adapt if necessary to make them successful. She invites business leaders and other professional community members to come and share the importance of mathematics. For example, she realizes the boys in her class all want to become football players. So, she invited a football player to come and speak with them. The football player explained that the students have to be able to read, write, add, and subtract. He emphasized consequences if they did not know how to add or subtract. For example, they would not be able to determine if they were getting paid the correct amount of money during contract negotiations. He further explained that they needed to be able to add and subtract in order to collect their plays and calculate their points.

All nine participants adjust their instruction to meet the needs of their students. Many of them do not implement the “traditional” instructional strategies because they believe they are not effective with African American students. As an African American, Mrs. Fewell identifies with her African American students. She explains:

Even me now, an adult going to classes, it’s more beneficial if it’s hands on. We’re up and moving, not just sitting. I’m not a sitter. I can’t sit. You can lecture me all day long. I’m not going to get it. I’m going to zone out. So, getting them up and moving, keeping them engaged is going to be more beneficial. (Initial Interview, 2010)

She incorporates activities that involve movement in her classroom. Mrs. Fewell also uses her instruction time to allow students to create songs over mathematical concepts and share it with the class. Mrs. Fewell organizes her mathematics instruction into mini-lessons. She teaches the mathematical concept during the mini-lesson. She then individualizes the activities—for her low group, medium group, and high group by going around helping each group, if necessary. She describes:

Teaching at a certain point and the lower ones don’t get it, you’re going to lose them. Teach at a higher point the low ones don’t get it, you lose them. Teach at a lower point the high ones are going to get bored. So that’s where the problems tend to break out. So I do a quick mini-lesson and let them know what skill they’re working on for that day, and then have an activity for them to do in groups. And then moving from group to group I think is more beneficial. (Final Interview, 2010)

Additionally, the nine participants give students the support they need, and seek out additional support for students so they are successful in mathematics. For example, Mrs. Fewell sits next to students who are having difficulties with a mathematical concept. She encourages them by letting them know they have the ability to master the mathematical concept. “Okay, what should you do next here? Well, that’s a good start right there, what could you do next?” (Final Interview, 2010) Mrs. Lewis comes in before school, spends

her lunchtime, and stays after school with students to help them develop their mathematical knowledge. Ms. Jenkins recalls using manipulatives and a hundreds chart to help support her African American students who were struggling adding two-digit numbers. They were able to understand and think more about the problem without getting hung up on the computation. Sometimes Ms. Jenkins reteaches a lesson and provides additional instructional time to support her students' learning. She continually reflects and asks herself, "What other things can I pull? What resources do I have?" (Final Interview, 2009) She wants her students to succeed, and she is willing to do whatever is necessary to make it happen.

When the mathematics lessons do not go as anticipated, many of the participants go home and reflect over the lesson. They contemplate, "Well they probably didn't get it because I said it this way, so maybe I should try explaining it a different way" (Ms. Hale, Initial Interview, 2009). The participants never "blame" the students. And when they are tempted to do so, they always refocus it back on themselves. Ms. Jenkins elaborates:

I think we all find ourselves, and sometime I find myself saying, 'Well my class is just'. Those are just blanket statements that don't mean anything. So, instead what I try to do is ask 'What can I do to make this go better for my class and me?' (Initial Interview, 2009)

Some participants emphasize the importance of acknowledging African American students in the mathematics classroom, particularly when they are in the minority. Not only do they recognize them, they purposefully plan opportunities for them to contribute and become leaders during mathematical discussions. Ms. Jenkins describes:

I do try to give them opportunities especially in a classroom like I have where there are for sure in the minority. I think that child deserves a chance to kind of shine. To say well I get a chance to be a leader in this classroom. They may come to the board, they may be the person that is sharing their strategy, and even if it's not the most efficient we're talking

about it. What did this student understand? Does anybody else have something to add to this? So, pulling out that leadership role I think is just so important. Again going back to feeling that sense of accomplishment. (Initial Interview, 2009)

Mr. Franklin initially poses questions to students he knows they can answer. He first builds their emotional confidence and then their mathematical confidence. He asserts the emotion is connected to learning the mathematics. Mr. Franklin does not only pose questions that he knows his students can answer, but also poses higher-level questions to push student thinking.

All nine participants positively handle off task and disruptive behavior. For example, Mr. Franklin uses one of his teaching ques—close proximity to encourage students to pay attention. He finds this generally works. Mrs. De Vries is cognizant of students' feelings, and does not embarrass them when she has to redirect their attention. If she recognizes that a student is not paying attention, she poses a question that she knows the student can answer. She does not “target them to make them look dumb or like they weren't paying attention” (Final Interview, 2010). Instead, she asks them a question to get them involved or to help them realize that she knows they were not paying attention. Mrs. Jones understands sometimes students need to get up and move around. Then, they can focus and pay attention. She describes:

Honestly if I notice even one or two students is off task I always say put your pencils down, and we stand up. We do silly things like hands on your head, hands on your hips, you know, hands on your toes, hands on your lips. Okay, do five jumping jacks. Sit down and they usually get back on task. It's usually something where they're just bored or they've been sitting too long or something like that. I do silly stuff like that probably 12 times a day. So, other than that honestly that usually does it. (Final Interview, 2009)

She is aware when her students “check out.” As a result, she does activities to help them “check back in” and get back on task. When African American students are disruptive during the mathematics lessons, the participants agree they should not show their frustration because students feed off of it and make matters worse. Ms. Jenkins goes home and tries to put the incident aside. She asserts, “That’s one thing you don’t want to find yourself doing—battling the student because the student is going to win. I am going to tell you (laughter)” (Initial Interview, 2009). Mrs. Stevens recalls a time a student was disruptive in her class. She assigned him the role of “resident expert.” Before she began the mathematics lesson she gave him the definitions of two new vocabulary words they were going to discuss. Mrs. Stevens typically has 15-minute lessons. As the “resident expert” waited on his opportunity to share, he paid attention and did not disrupt the lesson. When Mrs. Stevens was ready for the definition, she asked the “resident expert.” The “resident expert” proudly shared the definition with his peers. He was part of a group and he experienced success through his contributions to the lesson. Whenever Ms. Jenkins believes some of her African American students are disengaged in the lesson, she understands they are disengaged for a reason—perhaps they do not understand or they are not interested. Instead of reprimanding them for their lack of engagement, Ms. Jenkins focuses on what she is doing. She asks, “What can I do to fix it? What can I do to support them or maybe change the environment or something to reengage them?” (Final Interview, 2009) Mrs. Lewis believes that “maintaining their interest is hard, but you got to keep busy. Keep on them (Final Interview, 2009).

All nine participants use a variety of assessment strategies to guide their instruction, including chapter tests, quizzes, homework, and district benchmark assessments. The

most prominent strategy is pre-assessment. At the beginning of every unit, Mrs. Fewell gives a pre-test. If she is starting a unit on area and perimeter, and she discovered from the pre-test that 95% of her students already know perimeter, she understands she does not have to waste valuable class time discussing perimeter. Instead, she focuses her lessons on other mathematical concepts. Not only does Mrs. Fewell use the pre-tests to guide her instruction, but she asks her students to use the results to set goals. For example, a student scored a 42% on the pre-test and he was expected to score at least 80% to be proficient on the post-test. Mrs. Fewell requires that he set some specific goals and then write how he will achieve his goals. Mrs. Fewell believes this process helps students become accountable for their learning. Similar to Mrs. Fewell, Mrs. Stevens pre-assesses her students before she begins a unit, but she does it at least a week before she teaches it. Mrs. Stevens uses pre-assessments to inform her of her students' misconceptions. She believes:

Pre-assessing them is so important so you can understand where to start, how to modify the teaching. But, pre-assessing everyday, reassessing everyday, and then assessing at the end of the unit, I pretty much already know at the end of the unit where my kids are. And it's just validation.
(Final Interview, 2009)

Mrs. Stevens emphasizes that when she gives her post-assessments, she expects 90% proficient and advanced from her students because she made modifications and adjustments in her instruction to get them to that level. She does not understand why teachers say, "Oh, they are going to bomb this test" (Initial Interview, 2009). She responds:

Then why are you giving it to them (laughter)? You already know they are going to bomb it. I mean you should be saying I know they're going to nail this because we've been working on this so hard. And the ones that weren't getting it, I pulled them in a small group and we've worked in a

small group, and I buddied them up with someone who could. (Initial Interview, 2009)

Ms. Jenkins uses a lot of informal observation as an assessment for learning. She recalls that after she taught a mathematics lesson on multiplication she did not feel like she had a sense of who did and who did not understand it. She asked her students to solve a multiplication problem on a half sheet a paper. She collected the papers and quickly sorted them into groups of how they solved it—pictures, an array, skip count, and repeated addition. She immediately realized that she had two students who did not understand. She pulled those kids during another time of the day and discussed strategies they could use to solve the problem. This approach provided Ms. Jenkins a quick snapshot of who was having difficulties solving multiplication problems.

All nine participants expect all of their students to succeed and grow in their mathematical understanding. For example, at the beginning of the year, Mr. Franklin gives his students a test and throughout the year they chart their growth. He conferences with the students at the end of the year and praises them on how much they learned. Mr. Franklin elaborates:

I celebrate more individual achievement than I do look at our school, look at our class, look at what we did. Yeah, we see that, but I want to get to that individual student, look you already improved. I'm so proud of you! Great! Or look you were able to learn your multiplication facts, your twos. Fantastic! You didn't know those before, did you? (Mr. Franklin, Initial Interview, 2010)

He realizes they may not be where they need to be for fourth grade, but they have improved. He is excited to see the smile on the student's face when he informs them that they started at a first grade level, but now they have excelled to the middle of second grade. Mrs. Knox recognizes that the district's valedictorian and salutatorian for the past

seven to eight years have filtered through her class. She believes she has played a role in preparing them for their academic success. Likewise, Mrs. Fewell prepares her students for success in society and celebrates when she sees them later as productive citizens. Mrs. Stevens recalls students coming back for visits owning a t-shirt design company, and others performing in Zimbabwe and Cameroon. Mrs. Stevens felt she prepared her students to lead productive and successful lives. Furthermore, Mrs. Fewell teaches at a low-income school where some of the kids are homeless. She continually emphasizes, “You can do this and this and this to get to a better place” (Initial Interview, 2010) as she works with them and gives them an outlet to succeed.

All nine participants have high expectations for their African American students in mathematics. Although Mrs. Lewis has high expectations, she does not have the same expectations for all of her students. She believes her expectations are focused on individual students. She recalls a student who has difficulty mastering mathematics problems. He would do whatever comes to his mind, regardless if it made sense. Mrs. Lewis admits her expectations for him are different “because he’s not capable of doing the same things a normal 5th grader would be doing” (Final Interview, 2009). Yet, she still gives him the tools he needs and takes pride in his success.

In summary, all nine participants realize the importance of incorporating pedagogical practices that enhance the quality of life of African American students in mathematics.

Discussion

In this study, I examined elementary teachers’ knowledge of equity as it relates to teaching mathematics to African American students. I specifically selected research participants who had been successful teaching African American students (as determined

by student achievement results and district administrator recommendations). In this section, I discuss the findings using the components of the Knowledge of Equity in Teaching Framework (i.e., participants’ knowledge of equity issues, beliefs, and knowledge of equity pedagogy).

Knowledge of Equity Issues

In the following subsections, I discuss teachers’ knowledge of equity issues related to: (1) structural inequities that persist in larger societal contexts where schools are situated, and (2) influence of race, ethnicity, language, and class on teaching, learning, and schooling. I summarize the themes for knowledge of equity issues in Table 7.

Table 7

Knowledge of Equity Issues: Themes

Components of Knowledge of Equity Issues	Themes
Structural inequities that persist in larger societal contexts where schools are situated	School districts do not have the necessary resources to support the mathematical learning of African American students
Influence of race, ethnicity, language, and class on teaching, learning, and schooling	Race influences how teachers teach and relate to African American students.

Structural inequities that persist in larger societal contexts where schools are situated. After analyzing the data for structural inequities the following theme emerged across the participants:

Theme 1: School districts do not have the necessary resources to support the mathematical learning of African American students.

Participants acknowledge that some teachers who teach mathematics do not have sufficient knowledge for teaching mathematics. Too often, mathematics teachers in

predominately black schools are unqualified and inexperienced (Darling-Hammond, 1998; Lee, 2004). As we saw in the analysis of the nine participants, Mrs. Stevens reports that mathematics teachers, who do not have the mathematical training and background, are teaching mathematics to African American students. She equates this with assigning a physical education teacher to teach reading. Without the proper background and preparation, the physical education teacher is unaware of what is necessary to facilitate and enhance students' reading skills. The same is true for teachers who lack mathematical content knowledge. These teachers are not confident in their mathematics skills and are unwilling to take risks during instruction. They do not understand the mathematical concepts, so they are unable to challenge students in their mathematical thinking at a deeper level. Consequently, they rely on low-level instruction that does not challenge African American students (Lubienski, 2002), hindering their success in mathematics. Similar to the results in Thompson's (2003) study, Mrs. De Vries recognizes that some teachers pass students to the next grade level when they do not understand the mathematics. They do not take the time to give students the support they need to be successful. In essence, they have low expectations for their African American students. Moreover, high teacher mobility does not provide consistency that African American students need to build productive relationships with their teachers. For example, Mrs. Stevens reports that in one academic year, Michalla, an African American girl who basically lived with Mrs. Stevens, had 16 different teachers. In summary, the participants had knowledge of structural inequities that hinder the success of African American students in the mathematics classroom.

Influence of race, ethnicity, language, and class on teaching, learning, and schooling. After analyzing the data for knowledge about influence of race on teaching, learning, and schooling of African American students the following theme emerged across the participants:

Theme 2: Race influences how teachers teach and relate to African American students.

Many participants, particularly African Americans, personally identify with their African American students. They are tuned in to their interests and understand how to handle African American students. As we have seen in the cases of Mrs. Mitchell and Mrs. Thomas, teachers, white or black, who do not have experience teaching African American students may misinterpret their actions, and punish them for shouting out responses during class. But, the African American participants say they can relate to the students because they know how they were as children. Whereas, some white teachers have difficulty with black students and use negative approaches and reprimands to deal with their behavior. White and black teachers typically interpret African American actions through a Eurocentric cultural lens.

One of the white participants, Mrs. Savage, recognizes her race is a factor as she teaches her African American students. She feels like sometimes she does not get through to her students, and some of them do not do well with her because she is white. Some of her students have told her that their “momma said I don’t have to listen to no white teacher” (Initial Interview, 2009). Nevertheless, Mrs. Savage keeps an open mind when relating with her African American students. She does not let the prejudices of her students nor their parents determine how she teaches. Instead, she uses this as a stepping-

stone to learn more about her African American students' race and culture, so she can better instruct them.

Participants realize that everyone has biases, but you cannot let those assumptions contaminate or influence instruction. Research has shown that teacher expectations generally act as a self-fulfilling prophecy (Rosenthal & Jacobson, 1968). That is, teacher beliefs influence how they interact with their students. Furthermore, students typically act in ways their teachers expect them to act. The participants know it is critical to assess their students based on the interactions that take place in their classrooms, rather than by negative comments from other teachers in the hallways. For example, Mrs. DeVries had an African American student whom the other teachers regarded as a hellish nightmare. But, Mrs. DeVries did not accept her peers' negative prejudices, and discovered the child was very intelligent. Mathematics teachers cannot let negative biases influence how they interact with students. They must reach out to students and give them opportunities to be successful. More importantly, teachers must acknowledge their biases toward specific students and take the time to build relationships with their students. Mrs. Wilkins admitted that she did not like one of her classes of African American students. She thought that they were the worst group in the entire school. It was not until she was honest with her students in a "Come to Jesus Meeting" was she able build positive relationships with her students. Each year, teachers must enter their classrooms with the mindset that this is a new group of students and it is their job to help them learn mathematics. Consequently, they must invest time to understand African American students.

Participants realize that teachers are more comfortable teaching students who look like them. When students do not look like them, they need to take the initiative to learn more about their culture and history. Milner (2006) found that many white teachers are not comfortable talking about racial issues. However, contrary to Milner's findings, Mrs. Savage (a white teacher) reads literature about African American history and culture and seeks advice from her African American colleagues to better understand her African American students. Similar to Delpit (1995), Mrs. Savage tries to understand by asking questions and talking about racial issues because these interactions help her eliminate fear, become a better teacher, and facilitate communication among her students.

Thompson (2010) reports that researchers have found that, frequently, a student's race determines how his or her teacher will treat the student. Unfortunately, in many public schools in the United States race, specifically that of African Americans, has negatively influenced teaching and learning (Lewis, 2003; Lipman, 1998). Traditionally, the influence of race on mathematics instruction has been identified in the literature under a deficit paradigm (Lubienski, 2002; Waxman & Padron, 1995). But, the findings in this study do not view the race of African American students as a deficit. Instead, it is viewed as part of African American students' identities, which participants positively use to influence their teaching and students' learning.

Teacher's Beliefs

Teachers' beliefs significantly influence their instructional practices (Thompson, 1992). In other words, teachers' beliefs act as a filter and shape how a teacher thinks about children and teaching as well as structures her classroom environment. Although researchers have described beliefs as a "messy construct" with multiple meanings and

interpretations (Aguirre & Speer 2000; Pajares, 1992; Phillip, 2007), Barlow and Cates (2006) argue beliefs affect how teachers view their students. In the following subsections, I discuss teachers' beliefs related to: (1) African American students, (2) how African American students learn, (3) instruction of African American students, and (4) themselves, as teachers, in relation to teaching African American students. I summarize the themes for teachers' beliefs in Table 8.

Table 8

Teachers Beliefs: Themes

Teachers' Beliefs	Successful Teachers of African American students believe that:
African American students	African American students can learn mathematics.
	African American students have fears, concerns, defense mechanisms, and strengths that influence their participation and success with mathematics.
	African American students need positive affirmation, encouragement, and praise specifically related to learning mathematics.
How African American students learn	African American students learn mathematics when teachers view them as individuals and when they are actively engaged.
Instruction of African American students	Mathematics lessons must be relevant to students.
	Teachers must establish and maintain productive learning environments that facilitate the participation of every African American student.
	Parents of African American children can support their learning in mathematics.
Themselves, as teachers, in relation to teaching African American students	Teachers have multiple roles in the lives of African American students.
	Teachers must consistently reflect on and improve upon their practice.

African American students. After analyzing the data for teachers' beliefs of African American students, the following themes emerged across the participants:

Theme 3: African American students can learn mathematics.

Participants realize that African American students are not the same. They come in with different prior knowledge and different understandings. In other words, as illustrated in the case of Mrs. Thomas' beliefs, just because a student is African American, does not mean that he or she will behave like other African American students. They are individuals with similar skills as other students, but different experiences. These differences interfere with their understanding of mathematical problems because they do not have the prior knowledge to make sense of the problem. Some participants acknowledge that African American students coming from families with low socio-economic status have limited experiences compared to African American families with high socio-economic status. Yet, they are all still capable of learning mathematics. These results agree with the findings in Malloy's (2009) study, in particular that teachers need to respect students' prior knowledge and preconceptions and believe all students can learn mathematics.

However, the results in this study are contrary to typical beliefs held by most educators of African American students. The majority of teachers, according to Thompson (2009), do not believe that African American students are as intelligent as other races. Additionally, society believes that African American students do not have the ability to do outstanding work (Thompson, 2007). Nevertheless, the participants in this study recognize that their African American students are highly engaged, motivated, and excited about mathematics. They believe all their students are successful and eager to learn mathematics. They are willing to explain to their peers what strategies do and do

not work and offer other ways to think about problems. They enjoy mathematics because it makes sense to them.

Theme 4: African American students have fears, concerns, defense mechanisms, and strengths that influence their participation and success with mathematics.

Teachers of African American students must know something about the students' fears and defense mechanisms that are displayed in the mathematics classroom.

Participants realize some African American students have concerns about how their peers perceive them. Not surprisingly, they do not want to be embarrassed, ridiculed, or laughed at by their peers or teachers. As illustrated by Mrs. Wilkins' beliefs, students would rather receive a failing grade, than be ostracized by their peers. If they anticipate or encounter embarrassment, they will not engage in learning. African American students need to feel safe. They need to feel that their teachers care, trust, and respect them. If they feel disrespected, or believe their teachers do not care about them, or think their teachers are mean, they will shut down during instruction. They must believe that their teachers genuinely care about them.

If African American students feel teachers do not care about them, they will utilize defense mechanisms to protect themselves. African American students may sometimes become hostile and "blow" the teacher off by not listening. Similar findings were noted in Howard's (2003) and Lee's (1999) studies. Both Howard and Lee found that students felt their teachers did not care about them, and some prejudged them. Participants realize that African American students want to feel safe and they will use strategies to protect themselves from embarrassment or ridicule.

Participants believe that some of their African American students “act out” because they do not understand the mathematical concepts. To protect themselves in front of their peers, they “act out” in order to redirect the teacher’s attention away from the focus of the lesson, or they use avoidance tactics to get out of completing mathematical work that may demonstrate they lack understanding.

Some participants, for example Ms. Hale and Ms. Jenkins, recognize that their African American students have low to average participation during mathematics instruction. These students only participate in whole group discussions if they are certain they have the correct answers. The participants believe that in some cases African American students do not raise their hands to explain how they solved a problem because they feel their answers may be incorrect or they feel intimidated by the white students in the class whom they perceive as having the correct answers. So, they sit back, listen, and allow others to share.

Teachers must not only have an understanding of African American students fears and concerns, they must recognize their strengths of being expressive. Participants believe culturally there is a difference among African Americans and other ethnic groups. Some African American students speak in an aggressive way, but they are simply jokingly expressing themselves. According to Mrs. Wilkins,

Black children on the whole, I know this is a generalization, but it’s true (laughter) they are loud. They are LOUD. Not all of them because you have different personalities. Like there are some people who are quiet and introverted people, but I would say if you had to make a general characteristic of a school, our students are loud (Initial Interview, 2010).

Some participants believe some of their African American students cannot focus or work in a quiet classroom. In order for them to concentrate, they need to have some type of noise (e.g., music) in the classroom. It is their culture.

Theme 5: African American students need positive affirmation, encouragement, and praise specifically related to learning mathematics.

The participants all emphasized the importance of conveying positive messages to their African American students. They noticed African American students respond positively to immediate and positive feedback. As we see in the analysis of the remaining nine participants with Ms. Hale, as her African American students solve mathematical problems, they consistently wanted her to verify that they are on the right track. The students' confidence grows when they receive immediate feedback. They also feel successful. As a result, they take more risks and persist through challenging problems. Students do not give up when their teachers praise their efforts and their mathematical thinking. These types of positive comments encourage them to try harder as they work to solve more challenging problems.

How African American students learn. After analyzing the findings for teachers' beliefs on how African American students learn, the following theme emerged across the participants:

Theme 6: African American students learn mathematics when teachers view them as individuals, and when they are actively engaged.

Participants realize their students have different knowledge and experiences. As a result, they understand that they cannot instruct their students using one strategy. They must implement a variety of instructional strategies so all students understand. We have

learned from the beliefs of Mrs. Thomas, Mrs. Mitchell, and other participants that teachers cannot instruct African American students using the Eurocentric paradigm of teaching. They must organize and adjust their instruction according to the needs of their African American students. Thus, the participants believe that African American students learn mathematics when they are actively engaged in the lesson, have opportunities for mobility within the classroom, and opportunities to use multiple modes (i.e., see, hear, do, and touch). These results agree with Willis' (1992) summary of the learning preferences of African American students. Boykin (1978) also supports these findings suggesting African American students learn faster when incorporating movement in lessons, known as behavioral verve.

Instruction of African American students. After analyzing the data for teachers' beliefs on the instruction of African American students, the following themes emerged across the participants:

Theme 7: Mathematics lessons must be relevant to African American students.

Participants believe mathematics instruction should not be book or pencil-paper driven. Instead, instruction needs to be relevant to students' lives and specific activities need to be tied to their interests. When the lessons relate to something they enjoy, they deepen their mathematical understanding and experience success. Participants believe African American students must have a purpose for learning mathematics.

Theme 8: Teachers must establish and maintain productive learning environments that facilitate the participation of every African American student.

Participants believe teachers should not yell at African American students. If students feel you do not care or if you are mean and hateful, they will not work. They believe you have to refocus behavior so students can learn. Additionally, they believe you have to create a climate where students feel comfortable participating and know that their ideas and thoughts are valued. Jacqueline Jordan Irvine (2009) concludes that since African American students tend to be more teacher-dependent than other races, they do poorly when they do not have a positive relationship with the teacher.

Theme 9: Parents of African American children can support their learning of mathematics.

Participants believe parental relationships and open communication are vital to the success of African American students. Walker (1996) reports on the importance of teachers knowing how to speak with parents in their community to ensure the success of all students. Mrs. Knox speaks to all her parents in her “regular person voice” (Initial Interview, 2009), and lets parents know she is a parent, too. The participants realize that teachers and parents need to form a team that works together for a common goal (i.e., the student/child’s success). Thus, participants call, send positive notes, and have face-to-face conversations with parents. They take time to meet and speak with parents in the evenings, on Sundays, or at local restaurants. They inform parents that they should feel comfortable contacting them anytime. Some parents have called Mrs. Stevens at 6:00 in the morning. But, she does not mind because she wants parents to know she is available. Mrs. Knox goes to the homes of her students to discuss concerns with parents. The participants believe parental involvement makes a difference in a child’s academic success.

Some participants believe that some parents do not take an active role in their children's education. They will not adjust their busy schedules to attend parent teacher conferences. But, Ms. Jenkins and other participants believe they still have to make an effort to contact parents even if they do not visit the school or contact teachers.

Participants believe schools need to educate parents, so they in turn can help their children. They realize that sometimes parents do not have the mathematical knowledge to help their children. As a result, some participants take the time to teach the parents the mathematical concepts, while others, Mrs. Fewell for example, allow them to sit in their classes during mathematics instruction so that they can learn. African American parents do care about their child's education (Stinson, 2009; Thompson, 2003) and want them to excel in mathematics. Thus, the participants are willing to do whatever is necessary to make it possible.

Themselves, as teachers, and their relationship with African American students.

After analyzing the data for teachers' beliefs about themselves as teachers, the following themes emerged across the participants:

Theme 10: Teachers have multiple roles in the lives of African American students.

Participants believe they are not only teachers of African American students, but they are also the facilitator, parent, counselor, grandparent, protector, defender, supporter, and encourager. They see the African American students as *their* children. Similar to parents and grandparents, the participants are proud of their students' achievements and they want the best for them. They want them to be successful. They have a vested interest

in what their African American students accomplish because they are a reflection of them.

Theme 11: Teachers must consistently reflect on and improve upon their practice.

Similar to Malloy (2009), the findings reveal participants are reflective in practice and make adjustments to mathematics lessons because they want their students to understand. They continually make changes trying to determine what does and does not work. Some participants changed their instructional approach from the giver of information (i.e., lecturer) to one who guides students in their understanding. They believe it is crucial for students to develop and deepen their mathematical knowledge. They are persistent, and do not give up on their African American students because they want them to be successful.

Teachers' Knowledge of Equity Pedagogy

Good teaching, then, required them to see each child as an individual and to count the successful engagement of each child in learning as part of the larger ongoing task of contributing to their race and to the human race. Good teachers could launch a child into a life that would otherwise not have been possible (Walker, 1996, p. 150).

In the following subsections, I discuss teachers' knowledge of equity pedagogy related to: (1) culturally relevant pedagogy, (2) cultural competence, and (3) critical consciousness. I summarize the themes for teachers' knowledge of equity pedagogy in Table 9.

Table 9

Teachers' Knowledge of Equity Pedagogy: Themes

Teachers' Knowledge of Equity Pedagogy	Themes
Culturally relevant pedagogy	Mathematics lessons must relate to African American students' lives and experiences.
	Teachers use a variety of instructional strategies
	Teachers establish a positive classroom community.
	Teachers establish relationships that extend beyond the classroom.
Cultural competence	Teachers adapt mathematics instruction to meet the cultural needs of African American students.
	Teachers identify with African American students.
Critical consciousness	Not only do teachers invest in African American students and have high expectations of them in the classroom, they have high expectations that extend beyond the classroom.
	Teachers understand the success of African American students influences their quality of life.

Culturally relevant pedagogy. After analyzing the data for culturally relevant pedagogy, the themes that emerged across participants are similar to the themes in Ladson-Billings (1994) study. I discuss the themes below:

Theme 12: Mathematics lessons must relate to African American students' lives and experiences.

Teachers must have knowledge of students' culture, lives, and experiences to make mathematical learning relevant (Malloy, 1997). Participants understand that relationships must precede instruction. If they do not take the time to establish positive relationships with their students, learning will not occur (Kunjufu, 2002). This was evident in Mrs. Wilkins classroom. As long as Mrs. Wilkins did not like the students and the students did

not like her, learning was not going to happen. When establishing relationships, you cannot merely go through the motions because students know if you are genuine and really care about them. African American students must relate to the teacher and the teacher must relate to them. This is accomplished by getting to know one another. The participants spend time at the beginning of the year learning about each other's likes and dislikes. The participants share information about themselves, and in return students share their stories during weekly class meetings. The participants realize they must have a relationship before they can make mathematics lessons relevant to the students. Participants take the opportunity to know their students and discover their motivations and interests. They tailor their instruction with this knowledge. For example, Mrs. Mitchell realized one of her African American boys was interested in aviation. She customized her mathematics instruction around his interests. He deepened his mathematical understanding and excitedly shared his thinking with his peers.

Some participants insert students' names in mathematics problems so they can relate with the problem's context. The participants are aware that students do not care about what Wanda and Jose are doing in the problem, but as soon as the participants involve them in the problem, they are motivated and excited to solve it. It became relevant to them because it was about them. Some participants not only inserted students' names, they changed the whole context of the problem. They realized that their students did not know anything about ball and jacks, so they changed the context of the problem to one that their students could relate. One of the participants, Mrs. Fewell, invests time watching television and listening to music to determine what her students are interested in. She incorporates this knowledge into her mathematics lessons. For example, when

Pokémon was popular, she drew a Pokémon on the board to discuss angles and lines of symmetry. As a result, the students were fully engaged.

Theme 13: Teachers use a variety of instructional strategies

Participants consistently have African American students actively participate in mathematics lessons by having them work in pairs or in small groups. They rarely have them work in isolation. Participants want the students to talk more than the teacher as students develop and build conceptual understanding of the mathematical concepts. Thus, the teachers use a magic spinner, popsicle sticks, and other techniques to randomly select students to share their thinking. As the students explain their thinking, the participants ask clarifying questions and probe for further details. As we learned from Mrs. Mitchell, Mrs. Thomas, and other participants, students sometimes understand the mathematical ideas better when their peers explain it. As a result, participants have students work with a partner where one student is the teacher and the other is the student. They teach each other. Additionally, teachers make sure African American students enunciate and use the correct mathematical language when they explain. Mrs. Thomas' students clap the syllables in the mathematical word to ensure correct pronunciation, while Mrs. Mitchell encourages her students to use a "100 dollar word" when they are explaining their mathematical thinking.

Participants intentionally design lessons that involve movement. For example, in Mrs. Thomas' introductory lesson on multiplication, she had her students rotate from group to group, writing information about what comes in groups of twos, threes, etc. Moreover, students play mathematical games, investigate hands-on activities, participate in math workshops, and solve mathematical problems in at least two different ways.

Participants intentionally solve problems incorrectly and have students critically examine them and determine what was and was not correct.

All participants used assessment for learning (Black, Harrison, Lee, Marshall, & Wiliam, 2004) as an instructional strategy to guide their mathematics instruction. Many participants pre-assess their students at the beginning of a unit to determine their misconceptions and what they do and do not know. If the pre-assessment reveals students already have understanding of a mathematical concept that will be covered in the unit, they do not spend time teaching it. Instead, they address students' misconceptions. Mrs. Stevens constantly makes modifications in her instruction based on students' understanding. Other participants use one-on-one conferences, observations, and listening to group discussions to determine what students understand. Mrs. Savage has her students solve problems on slates. The students hold up their slates to share their answers. When Mrs. Savage notices that several students solve the problem incorrectly she stops and addresses students' errors and misconceptions. The participants reteach mathematical concepts to students who experience difficulties.

Theme 14: Teachers establish a positive classroom community.

The participants see themselves and their students as a team working together. Mrs. Mitchell sums up the responsibilities for her and the members (i.e., the students). She is the coach and the students are the players. She determines the plays, and the students implement them. But, as we learned from Mrs. Wilkins the "plays" cannot be successfully implemented when teachers yell and scream at their African American students. If students "fumble the ball," the participants speak to them quietly and in

private. Participants are careful not to embarrass students or make them look dumb in front of their peers. Yet, they are stern, and, at the same time, caring.

Moreover, as we learned from all the participants, students need the teacher and each other to succeed. They are responsible for their peers' success. If they understand a mathematical concept and their peers do not, they teach their peers the concept so they understand. African American students have a responsibility to themselves and the class. They are there to help one another.

Theme 15: Teachers establish relationships that extend beyond the classroom.

Similar to Stinson's (2009) results, teachers establish relationships with their African American students outside the classroom. Participants invest in their African American students by taking time to attend their football games, parents' marriage ceremonies, and other events. The participants realize it makes a difference in the lives of their students, both emotionally and academically. As a result, when they are invited to one of their students' events, they make every effort to attend.

Cultural competence. After analyzing the data for cultural competence the following themes emerged across the participants:

Theme 16: Teachers adapt mathematics instruction to meet the cultural needs of African American students.

African American students must be visible in the mathematics classroom (Malloy, 2009). The participants pay attention to how African American students learn. Participants understand that some African American students are generally loud and like to talk. Thus, during mathematics instruction the participants capitalize on African Americans strengths by assigning them leadership roles. After determining the African

American students' assets, the participants capitalize on them in the classroom. Additionally, participants incorporate clapping, rhythm, and movement in their mathematics lessons because they understand African American students' culture. Mrs. Savage uses rhythm to help her students learn their multiplication facts. Mrs. Thomas allows her students to freely move around during instruction. These instructional approaches are similar to the ones reported by Peterek and Adams (2009) of a successful fifth grade mathematics teacher of African American students. The participants understand you cannot be so rigid in instruction and impose the Eurocentric style of teaching (i.e., stay in your seats, do not talk unless you raise your hand) on African American students. Instead of the participants imposing Eurocentric cultural values on African American students, they allow African American students to impose their cultural norms on them. African American students stand, wiggle, move, create songs, shout out answers, and participate in call and response during mathematics lessons.

Theme 17: Teachers identify with African American students.

Many of the African American participants identify with their African American students. They adjust instruction for students because they personally relate to students' cultural learning styles. Mrs. Fewell needs movement and hands on activities, and does not like to sit when she is a learner. Since she knows what type of instruction she needs as an African American, she provides the same type of instruction to her African American students. Not only do the African American participants identify with their African American students, Ms. Jenkins, a Caucasian participant, experienced what it is like to be a minority. She was able to incorporate this knowledge in her instruction by

making sure she is cognizant of how African American students feel in her “mixed” classroom.

Critical consciousness. Critical consciousness focuses on having students think critically and take action against oppressive elements in society (Freire, 1986). Although none of the participants explicitly alluded to how they instruct their African American students to empower them to make a difference, many of them have knowledge of necessary components of critical consciousness. I discuss the themes that emerged below:

Theme 18: Not only do teachers invest in African American students and have high expectations of them in the classroom, they have high expectations that extend beyond classroom.

Participants argue teachers should not lower expectations for African American students because of their circumstances and/or environment. As we learned from Mrs. Wilkins and Mrs. De Vries, teachers expect less from their African American students because of where they live. However, they and the remaining participants expect students to reach their highest potential and be successful. Mrs. Mitchell articulates that African American students cannot give A work on Monday and C work on Tuesday. All the participants expect excellence every day. Although Mrs. Lewis does not have the same expectations for all of her students, she maintains high expectations for each student according to his/her ability.

Many participants understand they are not just preparing their African American students for success at the next grade level. Teachers’ responsibility to their students is a long-term commitment (Ladson-Billings, 2006). Mrs. Mitchell takes the time during her instruction for her students to write letters to colleges and universities inquiring what

their requirements are for enrollment. The ultimate goal is to see students in 10 or 20 years as business owners, doctors, or PhD students. The participants want their African American students to function in the real world and become productive citizens of society.

Theme 19: Teachers understand the success of African American students influences their quality of life.

The participants, particularly Mrs. Thomas, want to give African American students all the skills they need so that in ten years they are successful. She thinks about where her students will be in 20 years and how they will compete in today's economy. Participants are excited to hear that their former students eventually became high school valedictorians and salutatorians, business owners, and performers around the world. Their former students are leading successful and productive lives. Mrs. Fewell teaches homeless students and helps them understand that the mathematical knowledge they gain will give them an outlet to succeed and provide future opportunities.

Conclusion

Unfortunately, many educators refuse to acknowledge racial inequities faced by African Americans in mathematics. Instead, they live in a "colorblind" society. This is evident in Mr. Franklin's discussion on how he does not want to look at "one teeny tiny group," but he must look and consider how he can raise all of his students' scores. Teachers upholding this colorblind ideology argue that good teachers are good for every student and equitable outcomes will automatically occur (Gay, 2000; Martin, 2007). However, this ideology contributes to ignorance on the impact of racism and racial issues in the mathematics classroom. Although one teacher (participation based on

recommendations by administrators), appears to have explicitly adopted a colorblind ideology and two others (participation based on African American students' achievement scores) made reference to a colorblind ideology, I did not have the opportunity to observe their teaching practices to determine how they enact their knowledge of equity in their mathematics classroom. Portions of their interview data suggest that they are not “aware” of race and/or they treat everybody the same. Yet, these same teachers may enact culturally relevant pedagogy, cultural competence, and/or critical consciousness in their mathematics classroom without realizing it.

Researchers (Ladson-Billings, 1994; Malloy 2002; 2009; Matthews, 2005) argue that teachers who practice equity pedagogy build relationships with African American students, have high expectations for them, and help African American students maintain their identities. Data collected during this study also indicate the importance of these critical ideas, but I argue that teachers must have knowledge of equity issues and equity pedagogy filtered by productive beliefs to foster high mathematical achievement of African American students. The findings from my study reveal that the components in the Knowledge of Equity in Teaching Framework (see Figure 24) influence each other. Although one might argue the findings in this study could apply to any content area besides mathematics, I reiterate that the focus of this study is about teachers' knowledge of equity in teaching mathematics to African American students. Therefore, this research was focused on teachers' knowledge, and this knowledge was examined in the context of the elementary mathematics classroom.

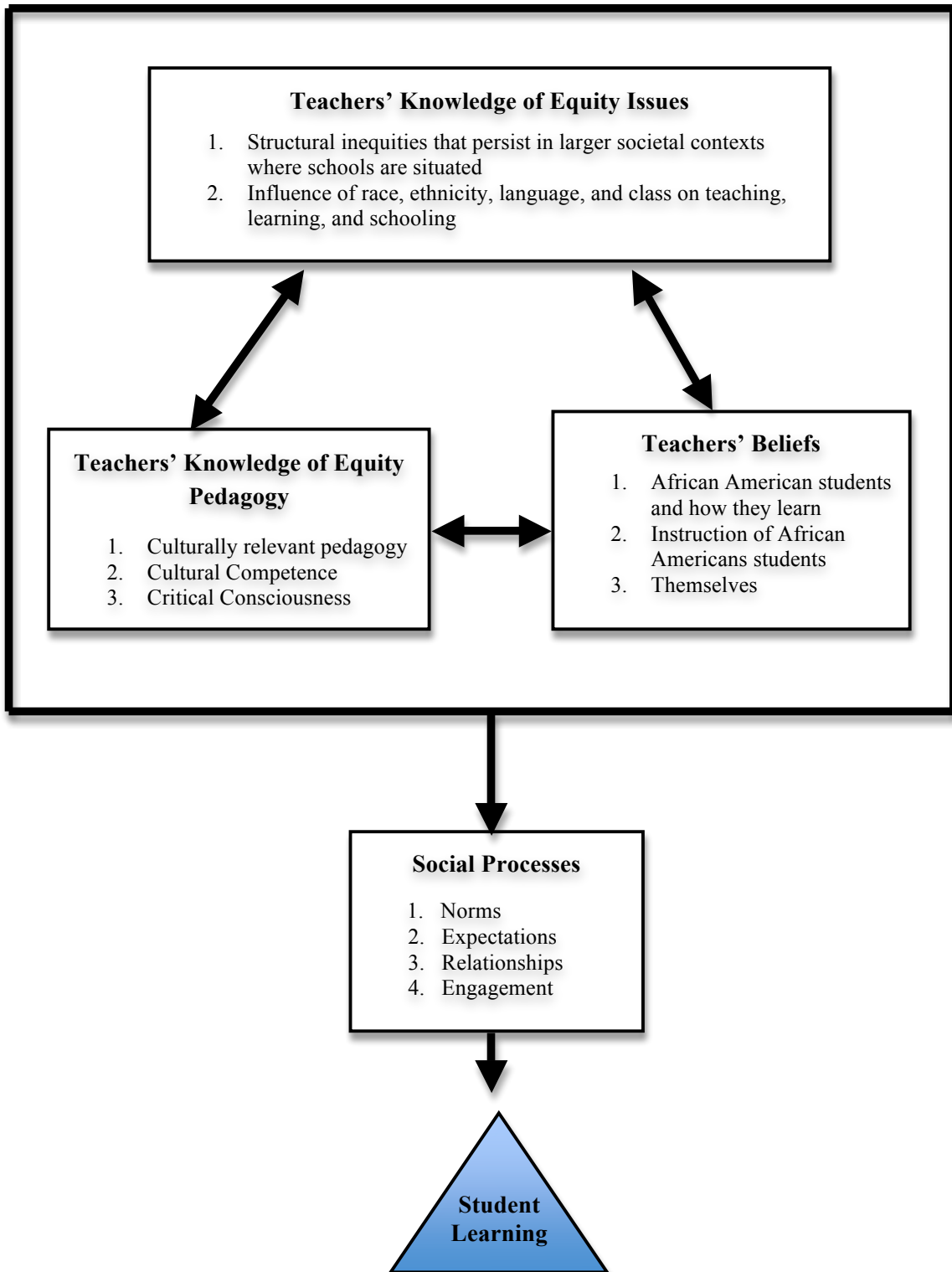


Figure 24. Knowledge of equity in teaching framework.

Through the course of this study, I examined the different components as well as the relationships between the components of the Knowledge of Equity in Teaching Framework. The data from the four specific cases illustrated how teachers' knowledge and beliefs related to equity and African American students influence their interactions and success with African American students. For example, the participants' productive beliefs about African American students helped them understand that structural inequities exist for African Americans in the mathematics classroom. But, this was not recognized until the participants acknowledged the presence of African American students in their mathematics classroom. They made the invisible, visible. They did not manifest the idea of colorblindness in their class. Their knowledge of equity issues helped them to be cognizant of their race and the race of the students in their mathematics class. With this realization, the participants used the culture and interests of African American students in their instructional decisions. Basically, all the beliefs held by the participants were evident and enacted in their pedagogical practice. They truly believe all students can learn and be successful. These beliefs were valued and apparent in their knowledge of equity pedagogy. Most importantly, the participants in this study demonstrated a specific knowledge related to equity in teaching African American students. This suggests that as the field continues to conceptualize and theorize teacher knowledge, these critical knowledge bases must be considered. I will elaborate on this important idea in chapter 5, when I discuss the limitations, implications, and significance of the study.

CHAPTER 5: LIMITATIONS, IMPLICATIONS, and SIGNIFICANCE

The underlying theme of the Equity Principle in the *Principles and Standards for School Mathematics* (NCTM, 2000) is all students can learn mathematics. Unfortunately, many African American students are consistently demonstrating low mathematical achievement. Mathematics educators constantly discuss equity in the classroom, but do we know what equity in mathematics really looks like? Researchers in mathematics education have explored and studied a variety of methods to raise the mathematics achievement of African American students using what they term as equitable practices. In this study, I chose not to advocate yet another approach for teachers to use in the classroom. Instead, I qualitatively investigated elementary mathematics teachers' knowledge of equity in teaching mathematics to African American students. I find that teachers who have been successful in teaching mathematics to African American students have productive beliefs about African American students, which influences and are influenced by their knowledge of equity issues and their knowledge of equity pedagogy. An equity-centered paradigm in mathematics education requires teachers who “value the cultural and lived experiences of all children...[and] the belief that all children possess strong intellectual capacity and so bring a wealth of informal, out-of-school knowledge to the teaching and learning process” (Lemons-Smith, 2008). Moreover, an equity-centered paradigm requires teachers who have specific knowledge about equity and teaching African American students specifically. In this chapter, I discuss the limitations, implications, and significance of the study.

Limitations

While focusing on a smaller sample size using a case study method within naturalistic settings gives me a detailed and meaningful representation of personalized experiences, I realize the sample size, time, and resources limit the study. I interviewed a small sample of teachers, and observed one teacher over a relatively short period of time. Thus, I was not able to directly link teachers' teaching practices with African American student achievement for all the teachers in my study. Some teachers in the study who appear to negate having specific knowledge of equity in teaching (e.g., Mr. Franklin) may have this knowledge and enact it in their classroom. As a result, more teachers need to be observed in the classroom to determine their knowledge of equity in teaching mathematics to African American students. Nevertheless, triangulation of multiple data sources has given me an initial and substantial look into teachers' knowledge of equity in teaching mathematics to African American students.

Another limitation of the study is the amount of time needed to establish a relationship with my participants. I did not know the participants prior to the initial interviews. Since the nature of this study centered on topics most teachers do not freely discuss, I had to build and maintain an open, trusting relationship. I communicated my passion for improving mathematics education for African American students and the need to understand the knowledge and the expertise that the participants have. I believe the participants felt comfortable to freely discuss the nature of the phenomenon that allowed me to fully conceptualize their knowledge related to equity.

A final limitation to the study is the participants were all from the same geographical area in the United States—the Midwest, due to financial constraints. Larger-scale studies that investigate enacted knowledge are needed to test and refine the model.

Implications

Implications for Future Research

Research in mathematics education needs to continue to develop an infrastructure to help researchers and teachers focus on how to achieve equity in mathematics (Hart, 2003; Weissglass, 2000), specifically with African American students. As indicated by Gutierrez (2002):

The majority of studies that explore effective and ineffective teaching emphasize teaching absent from a local context or absent from the decisions that factor into a teacher's mind before she commits to a particular action...Most of what has been written about what teachers do in the classroom has focused on teacher ability (knowledge, beliefs, skills) and has not been situated in an individualistic or cognitive framework. Yet, we know that the kind of teaching practice we witness in mathematics classrooms is more that just what individual teachers knows or does. Such practice is intricately connected to the students in a classroom, the nature of the mathematical activity or task, and what the teacher knows and aims to do. (p. 169-170)

Earlier attempts to conceptualize teacher knowledge bases (Carpenter, Fennema, Peterson, & Carey, 1988; Grossman, 1990; Hill, Ball, & Schilling, 2008; Hill, Rowan, & Ball, 2005; Ma, 1999; Magnusson, Krajcik, & Borko, 1999; Shulman, 1986) have not included knowledge related to equity in general or African Americans specifically. In this study, I used the Knowledge of Equity in Teaching Framework to unpack elementary mathematics teachers' knowledge of equity in teaching mathematics to African American students. Currently, equity in mathematics education has not been fully theorized (Gutierrez, 2002; Secada, 1989). The findings from this study suggest this framework is a

constructive approach to theorizing teachers' knowledge of equity in teaching mathematics to African American students. However, further research is necessary to test and refine this framework with a larger sample of teachers from different contexts (e.g., grade levels, numbers of years teaching, and geographical locations). Additionally, these research studies must include the investigation of teachers' knowledge enacted during mathematics lessons. We need to know more about teachers who are successful teaching mathematics to African American students. What are their specific teaching practices and how do they make decisions during instruction? Furthermore, the framework should be tested longitudinally across the professional continuum including novice teachers, experienced teachers, and teacher leaders.

Teachers need to be provided opportunities to develop this specialized knowledge of equity in teaching mathematics and given adequate support to enact this knowledge in the mathematics classroom. Consequently, further research is needed to study how to facilitate the development of this knowledge. Researchers must consider appropriate methodologies to capture this knowledge and how it is enacted in the mathematics classroom.

Further research needs to address the following questions: What supports do beginning teachers need to develop this knowledge? How is this knowledge developed over the course of a teacher's career? What constrains and/or facilitates the development of this specialized knowledge? In what ways does the knowledge of equity in teaching mathematics to African American students differ for other ethnicities? What are the sources of teachers' knowledge of equity in teaching mathematics?

Implications for Teacher Education

As teacher educators, we cannot shy away from unpleasant and uncertain conversations because the failure and unwillingness to look, listen, and learn about diversity, oppression, and the experiences of the cultural other significantly interfere with the ability to critique and problematize schooling or “teach against the grain” (Cochran-Smith, 2004, p. xii).

The majority of elementary mathematics teachers and pre-service elementary teachers are not prepared to effectively teach mathematics to African American students. They have insufficient knowledge about the needs and supports necessary to teach African American students. How can mathematics teacher educators prepare and support prospective and practicing teachers to develop this specialized knowledge? How can mathematics teacher educators challenge unproductive beliefs related to teaching African American students and facilitate the development of productive beliefs? What professional resources are needed to support these efforts?

First, we need to consider improving mathematics teacher education programs and professional development opportunities to address the knowledge base needed for teaching mathematics to African American students. Currently, pre-service teachers are required to enroll in a multicultural course in some preparation programs. However, these efforts have been insufficient as they do not address how to develop knowledge of equity in teaching mathematics or other content areas. Mathematics teacher education programs should address the needs of African American students specifically. This effort will require new materials such as video and written cases to facilitate this knowledge development.

Second, teacher preparation must include content that develops knowledge and competencies in teaching mathematics (Chval & Pinnow, in press) to African American

students. Considerable research has been devoted to the knowledge bases teachers need to teach (Grossman, 1990; Hill, Ball, & Schilling, 2008; Magnusson, Krajcik, & Borko, 1999; Shulman, 1986). Unfortunately, little discussion in the field of mathematics education has addressed ways to develop teacher knowledge of equity in teaching African American students.

Finally, teacher education programs must include opportunities for pre-service and practicing teachers to learn how to establish a productive, safe learning environment for African American students. Teachers need to view video images of effective learning environments that show:

- How African American students participate in peer interactions as members of a community of learners;
- How teachers support African American students in their learning;
- How African American students are successful when they are mathematically challenged (Chval & Pinnow, in press).

We need to know how to effectively prepare and support mathematics teachers so they can establish an equitable classroom community. This study informs the design of teacher preparation and professional development programs, which in turn influences the development of teacher knowledge related to equity in teaching.

Significance

W. E. B. Du Bois, one of the founders of The National Association for the Advancement of Colored People (NAACP), envisioned that the education of African Americans would equip leaders to protect the political and social rights of the Black community. Furthermore, he wanted to make the “black people aware of the necessity of

a constant struggle...[and] develop an Afro-American culture that would blend the African background of former slaves with American culture” (Spring, 2005, p. 226). Realizing Du Bois’ vision requires more effective teacher education as well as support structures for teachers. Unfortunately, the majority of teachers are not fully equipped to educate a diverse population of students. Currently, in the best of circumstances we have mathematics teachers who have strong mathematical content knowledge and high levels of pedagogical content knowledge, yet African American students are still underperforming in mathematics (Martin, 2009). For example, according to the National Center for Education Statistics, 91% of eighth grade African American students perform below proficient in mathematics (Adams, 2008). Public opinion suggests that African American students have less ability in mathematics than White and Asian students (Martin, 2007). Moreover, many believe that African American and other minority students learn mathematics best from direct instruction. Thus, some instructional strategies implemented with African American students are based on direct instruction. For example, after the school board adopted the *Discovering Mathematics* curriculum in Seattle, WA, community members brought a lawsuit against the school district claiming that students of color do not learn mathematics best with inquiry-based curricula (Seattle Court Case, <http://www.keypress.com/x24956.xml>). Instead, they can only learn and excel with a direct approach to instruction. They believed inquiry-based curriculum privileges a select few (i.e., the mathematically gifted). The judge ruled that there is insufficient evidence for a board member to approve the *Discovering Mathematics* curriculum. However, direct instruction deters African American students from high-level thinking and becoming effective problem solvers because everything is explicitly

explained for them. Society will continue to encourage African American students to be followers, rather than leaders. Consequently, disempowering African American students. Haberman (1991) denotes this as “pedagogy of poverty.” This pedagogy includes: “giving information, asking questions, giving directions, making assignments, monitoring seatwork, reviewing assignments, giving tests, reviewing tests, assigning homework, reviewing homework, settling disputes, punishing noncompliance, marking papers, and giving grades” (p. 291). This pedagogy of poverty is typical in schools with large populations of African American students. Typically, in “mixed populated schools” students are educated under a Eurocentric paradigm, in which teachers privilege white students and reprimand African American students, negatively affecting the educational experiences and resulting achievement of African American students (Parsons, 2005; White, 2010). Apple (1992/1999) argues:

Education does not exist in isolation from the larger society. Its means and ends and the daily events of curriculum, teaching, and evaluation in schools are all connected to patterns of differential economic, political, and cultural power... That is, one must see both inside and outside the school at the same time. And one must have an adequate picture of the ways in which these patterns of differential power operations operate. In a society driven by social tensions and by increasingly larger inequalities, schools will not be immune from—and in fact may participate in recreating—these inequalities. If this is true of education in general, it is equally true of attempts to reform it. Efforts to reform teaching and curricula—especially in such areas as mathematics that have always been sources of social stratification, as well as possible paths of mobility—are also situated within these larger relations. (p. 86)

Moreover, some have argued that culturally relevant pedagogy seems like just “good teaching,” but situations arise in classrooms in which privileged students interact with African American students, (Esmonde, 2009), which affects teachers’ pedagogical practices. For example, Malloy (2009) observed her student teacher teach a geometry

honors class, which had 13 Caucasian, two Asian, one African American, and one student who was mixed race. The student teacher instructed the students to work in groups of two or three to complete the assigned activity. Everyone in the class had groups to work with, except the African American student. Malloy inquired who his group members were, and the African American student pointed to two boys sitting in front of him. Neither the boys nor the teachers (i.e., student teacher and cooperating teacher) interacted with the African American student, so Malloy asked the student leading questions to help him complete the activity. After the lesson, Malloy asked the teachers about the African American student. They informed her that he was not on the same level as the other students in the honors class. Malloy immediately pointed out that the other students were working together, but the African American student had no one to help and support his learning, and they did not approach him to offer their support. The teachers were both shocked and embarrassed that they allowed this to happen. If we want African American students to succeed in mathematics, we need to better understand the necessary knowledge base related to equity in teaching African American students. Teachers must have productive beliefs about African American students and knowledge about equity issues and equity pedagogy specifically related to African American students. If we are serious about achieving “Mathematics for all” and we truly want African American students to be successful in mathematics, the findings presented in this study are critical. We learned from Mrs. Mitchell that teachers must interpret the actions of African American students through an “Afro-centric paradigm”—not through Eurocentric culture. Although some of her African American students are loud and like to talk, she believes they all can learn and be successful in mathematics. With this knowledge, Mrs. Mitchell does not

reprimand her students for doing something that is considered “normal.” Instead, she capitalizes on their strengths and gives them leadership roles during the mathematics lessons. As a result, the students are successful. She establishes an equitable, positive classroom environment that is conducive for learning. The data presented in chapter 4 shows how knowledge of equity issues influence beliefs, which influences knowledge of equity pedagogy. This ultimately effects the engagement and learning of African American students in mathematics. Therefore, teachers must enact the knowledge and beliefs presented in this study in the mathematics classroom. Otherwise, African American students will continue to underperform in mathematics.

Virtually no research in mathematics education exists that investigates the specialized knowledge mathematics teachers need to teach African American students. Thus, this research examines and explores mathematics teachers’ knowledge of equity to begin to understand the phenomenon of how teachers facilitate high mathematics achievement among African American students. As a result, teachers will feel free to discuss their knowledge and teaching practices in relation to teaching students of color and use their knowledge to truly teach “Mathematics for All.”

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APPENDIX A: E-MAIL RECRUITMENT SCRIPT & TEACHER CONSENT

I am conducting a dissertation research study entitled, “**A Study of Elementary Mathematics Teachers’ Knowledge of Equity.**” My dissertation committee members at the University of Missouri have approved the proposal for this study and _____ gave me your name as a potential research participant.

In order for me to investigate the elementary mathematics teachers’ knowledge of equity and how it is enacted in mathematics instruction, I will interview participants.

I invite you to take part in this research study. I believe that the research findings will help other teachers who teach mathematics to African American students. I also believe that you will benefit from participation in the study as you reflect on the teaching and learning of mathematics. Ultimately, this reflection will provide you with new insights into how to engage and motivate all your students to learn. By learning more about your knowledge of equity in the mathematics classroom, I can share the findings with teacher educators and professional development designers in order to improve support for elementary teachers as they teach students from diverse backgrounds.

The consent form below explains the details of the research study and outlines the commitment of the work if you were to agree to participate.

Please respond to this email (cdma88@mizzou.edu) or phone Christa Jackson (573-882-1495) if you have any questions about the study or if you are willing to participate in the study.

**UNIVERSITY OF MISSOURI
TEACHER INFORMED CONSENT**

**A Study of Elementary Mathematics Teachers'
Knowledge of Equity**

The purpose of this research study is to understand elementary teachers' knowledge as it relates to equity and teaching mathematics to African American students. The research study will begin in August 2009.

INFORMATION

You must be at least 18 years of age to be eligible to participate in the study. Your participation in this study is voluntary; you may choose not to participate and there will be no penalty. If you decide to participate, you may withdraw from the study at any time without penalty.

PARTICIPATION

Participate in two audio-recorded interviews (September 2009 and November 2009) in which you will be asked questions about your knowledge and the nature of teaching mathematics to African American students. I anticipate each interview will last approximately 1 hour.

BENEFITS

Your participation in this research study will provide insight into the knowledge needed for teaching mathematics to African American students. The research findings will support other elementary mathematics teachers who teach students from diverse backgrounds. The information gained in this study may be useful to designers of teacher education programs and professional development programs in mathematics education. The information gained in this study may be published and may also be useful to mathematics teacher educators at other universities and colleges.

CONFIDENTIALITY

Your identity will be kept strictly confidential. The data collected during the study will be stored in a secure area in Townsend Hall. In reporting the findings of this study, your name will be replaced with a pseudonym. You may choose to end your participation at any time during the study, and your data will be destroyed. Data will be stored for three (3) years beyond the completion of the study and at that time it will be destroyed.

RISKS

This project does not involve any risks greater than those encountered in everyday life. This project has been reviewed and approved by the University of Missouri Human Subject Review Board. The Board believes the research procedures adequately safeguard your privacy, welfare, civil liberties, and rights. For additional information regarding human subject participation in this research, please contact the University of Missouri IRB officer at (573) 882-9585.

CONSENT

Please read the consent statements below. Copy and paste the statements in an email and place an “x” next to the statement that describes your desire to participate in this study at this time with your name and the date on the email. Please send the email to Christa Jackson at cdma88@mizzou.edu.

I have read the information presented above and have had an opportunity to ask questions and receive answers pertaining to this project.

_____ I hereby agree to participate in this research study. I am aware that my participation is voluntary and that I am free to withdraw participation at any time without any penalties to myself.

_____ I do **not** agree to participate in this research study.

Name: _____ Date: _____

Thank you. If you have questions at any time, please call Christa Jackson at the University of Missouri at (573) 882-1495.

APPENDIX B: UNIVERSITY OF MISSOURI TEACHER INFORMED CONSENT

A Study of Elementary Mathematics Teachers' Knowledge of Equity

The purpose of this research study is to understand elementary teachers' knowledge as it relates to equity and teaching mathematics to African American students. The research study will begin in August 2009 and conclude in April 2010.

INFORMATION

You must be at least 18 years of age to be eligible to participate in the study. Your participation in this study is voluntary; you may choose not to participate and there will be no penalty. If you decide to participate, you may withdraw from the study at any time without penalty.

PARTICIPATION

1. Participate in an initial interview (September 2009) and closing interview (December 2009) in which you will be asked questions about your knowledge and the nature of teaching mathematics to African American students. I anticipate that each interview will last approximately 1 hour.
2. Allow the researcher to observe and videotape 8 lessons in your mathematics classes during September/December 2009.
3. Participate in 4 post interviews each following 2 lessons in which you will be asked to watch the video and respond to questions about the lesson. I estimate that each interview will last approximately 1 hour. These post lesson interviews will begin during the second week of observations.
4. Allow the researcher to display clips at professional research conferences and other professional meetings. (Your image may appear in these clips.)

BENEFITS

Your participation in this research study will provide insight into the knowledge needed for teaching mathematics to African American students. The research findings will support other elementary mathematics teachers who teach students from diverse backgrounds. The information gained in this study may be useful to designers of teacher education programs and professional development programs in mathematics education. The information gained in this study may be published and may also be useful to mathematics teacher educators at other universities and colleges.

CONFIDENTIALITY

Your identity will be kept strictly confidential. The data collected during the study will be stored in a secure area in Townsend Hall. In reporting the findings of this study, your name will be replaced with a pseudonym. You may view the videotapes on the University of Missouri campus and request that certain video segments not be used. You may choose to end your participation at any time during the study, and your data will be

destroyed. Data will be stored for three (3) years beyond the completion of the study and at that time it will be destroyed.

RISKS

This project does not involve any risks greater than those encountered in everyday life. This project has been reviewed and approved by the University of Missouri Human Subject Review Board. The Board believes the research procedures adequately safeguard your privacy, welfare, civil liberties, and rights. For additional information regarding human subject participation in this research, please contact the University of Missouri IRB officer at (573) 882-9585.

CONSENT

Please read the consent statement below and place an “x” next to the statement that describes your desire to participate in this study at this time. Sign and date the form.

I have read the information presented above and have had an opportunity to ask questions and receive answers pertaining to this project.

_____ I hereby agree to participate in this research study. I am aware that my participation is voluntary and that I am free to withdraw participation at any time without any penalties to myself. I agree to allow my classroom instruction to be videotaped as part of my participation in this study.

_____ I do **not** agree to participate in this research study.

Signed: _____ Date: _____

Printed Name: _____

Thank you. If you have questions at any time, please call Christa Jackson at the University of Missouri at (573) 882-1495.

STUDENT RELEASE FORM:

A Study of Elementary Mathematics Teachers' Knowledge of Equity

I am investigating elementary mathematics teachers' knowledge as it relates to equity in teaching mathematics. Your child's image may be captured on videotape as a result of his/her presence in a classroom in the study. I seek your permission to analyze the content of the videotapes in which your child's image is captured.

Information: Your participation/release is voluntary; you may choose that your child not participate and there will be no penalty or consequence. You may view the videotapes on the University of Missouri campus and request that certain video segments not be used.

If you sign yes on this form, you give permission for the research team to:

1. Capture your child's image on videotape, and analyze the content of the videotapes for research purposes.
2. Display clips at professional research conferences and other professional meetings. (Your child's image may appear in these clips.)

Privacy: No names or identifying information will be used in reporting the research findings on written documents. However, your child's image may appear in a video clip displayed at professional research conferences and other professional meetings.

Risks: This project does not involve any risks greater than those encountered in everyday life.

This project has been reviewed and approved by the University of Missouri Human Subject Review Board. The Board believes the research procedures adequately safeguard your privacy, welfare, civil liberties, and rights. For additional information regarding human subject participation in this research, please contact the University of Missouri IRB officer at (573) 882-9585.

Consent: I have received and read a copy of this form. I understand the above information.

- ☛ Yes, I agree to participate. I understand that I can change my mind and withdraw from the project at any time. I understand that I may request that certain information not be used.
- ☛ No, I will not participate. If your child's image is captured on video while in the classroom, it will not be displayed or analyzed for research purposes.

Student Signature _____ Date _____

Child's Name _____
Please Print.

Parent Signature _____ Date _____

APPENDIX C: INITIAL INTERVIEW PROTOCOL

1. Tell me a little about your teaching career. For example, when and where did you begin teaching? Have you taught in different types of schools? How long have you taught at your current school? Describe the student population of the schools you have taught. **[This question will provide background information – Demographics]**
2. How would you characterize the kinds of relationships you've had with parents? Particularly the parents of your African American students? **[Pedagogy; Equity]**
3. Tell me a story about a time when a student had a racial conflict. How would you handle that situation? **[Equity]**
4. How do you think the schooling experience of the students you teach differ from students in other districts or schools within your district? **[Equity; Beliefs]**
5. How do you think the background of your students influence their work with you as their teacher? **[Equity; Pedagogy]**
6. Throughout your career what have you learned about teaching African American students? Where did you learn it? **[Sources]**

Say: I understand that as an elementary teacher you may teach multiple subjects. So, for the following questions I would like you to relate your responses to your mathematical teaching in your mathematics classroom.

7. What are some norms and expectations in your mathematics classroom? How do you establish them? **[Pedagogy]**
8. When you are teaching mathematics, how does your race influence your work as a teacher of students of color? **[Equity; Pedagogy]**
9. How do you think students learn mathematics best? How do you think African American students learn mathematics best? What strategies do teachers use to accommodate how African American students learn mathematics? **[Beliefs; Knowledge of Learner; Pedagogy]**
10. What do all students need in order to learn mathematics? In particular, what are the needs of African American students? **[Beliefs; Pedagogy]**
11. Throughout your career what have you learned about teaching mathematics to African American students? Where did you learn it? **[Sources]**

12. What knowledge and experiences do your African American students bring to the mathematics classroom? **[Pedagogy]**
13. I would like you to reflect on your first couple of years of teaching mathematics and reflect on your last couple of years of teaching mathematics. How has your teaching changed? In relation to teaching mathematics to African American students, how has your teaching changed? What influenced those changes? **[Equity]**
14. What advice would you give Ms. Maben in the following situation:

Eric, an African American third grader is extremely disruptive and often displays his anger during mathematics class. Ms. Maben, his teacher, is frustrated. First, what questions would you ask her, and then what advice would you offer? **[Equity, Beliefs, Pedagogy]**
15. What advice would you offer novice teachers on how to facilitate the participation of African American students in the mathematics classroom? **[Equity, Beliefs, Pedagogy]**
16. How would you explain the low mathematical achievement of African American students? **[Beliefs]**

APPENDIX D: FINAL INTERVIEW PROTOCOL

1. What do you enjoy about teaching mathematics? [**Opening Question**]
2. I was told that you are successful teaching mathematics to African American students. Why do you think you're successful with these students? [**Beliefs; Pedagogy**]
3. You are teaching a mathematics lesson, and you notice an African American child is off task and another African American student is gazing out of the window. How would you handle this situation? What would you do? [**Equity; Pedagogy**]
4. You are teaching your students how to divide whole numbers, and you notice one of your students is struggling with this concept, what strategies would you use to intervene? How would these strategies differ if notice one of your African American students who was off task and is now experiencing difficulty? [**Pedagogy; Equity**]
5. How would you describe an effective mathematics teacher of African American students? (Follow up prompts: What is the role of the teacher? What is the students' role? Explain why you believe the students will experience success/excellence in this type of mathematics class.) [**Orientations: Equity; Pedagogy; Beliefs**]
6. What do you find rewarding about teaching mathematics to African American students? [**Beliefs**]
7. What do you find challenging about teaching mathematics to African American students? [**Beliefs**]
8. You have been asked to give a presentation to your colleagues on what facilitates and hinders the success of African American students in mathematics. What presentation consist of? [Follow-up how can we use this information to design our mathematics classrooms?] [**Equity; Pedagogy; Beliefs**]
9. Describe a typical mathematics lesson. How do you engage all of your students, specifically your African American students, in the mathematics lesson? [**Pedagogy**]
10. Different students need different types of support. How do you determine what African American students need to be successful in learning mathematics? [**Knowledge of Learners; Equity**]

11. What advice would you give Mrs. Skee, a novice teacher who teaches a racially mixed class, in the following situation: Mrs. Skee is a fourth grade mathematics teacher who has prepared a dynamic lesson, or at least she thought it was a dynamic lesson on multiplying whole numbers. She organized her lesson by following the guidelines outlined in her textbook. Her white students are following along, and doing exactly what they are supposed to doing in a “traditional” classroom; however, her black students are not with her. They are busy doing their own things, and ultimately not learning. What advice would you offer her? **[Equity; Pedagogy]**
12. In what ways do you assess your students’ mathematical knowledge? Explain how these assessment strategies help build the mathematical knowledge of African American students. **[Pedagogy; Beliefs]**
13. At this point in the year, how would you describe the engagement and participation of your African American students? **[Knowledge of Learners]**
14. What do your African American students find engaging? What facilitates their participation? **[Knowledge of Learners]**
15. If you could design the way mathematics teacher education programs prepare teachers to be more effective with African American students, what would you include? What advice would you offer to pre-service teachers? **[Equity; Beliefs]**

APPENDIX E: STIMULATED-RECALL INTERVIEW

1. Describe your teaching style. [**Pedagogy, Beliefs**]
2. Describe your role as a teacher. [**Beliefs; Pedagogy**]
3. To what extent and in what ways do you have your African American students working together? [**Pedagogy**]
4. I have selected some parts of the instruction I found particularly interesting. I want to watch them with you and ask you some questions about them. [**Pedagogy, Equity**]
 - a. Tell me about that (example/analogy/activity)
 - b. What do you think the students were thinking?
 - c. Why do you think the student was having difficulty at that point?
 - d. How did you respond? Why did you respond in that way? What are other ways could you have responded in that situation?
 - e. How did this teaching strategy help you achieve your overall goals?
 - f. How could you teach this topic in a different way?
 - g. What knowledge about students did you use to make instructional decisions?

APPENDIX F: CODING DICTIONARY

<i>Parent Code</i>	<i>Description</i>	<i>Example</i>
<i>Teachers' Knowledge of Equity</i>	Knowledge about structural inequities that persist in larger societal contexts where schools are situated	I honestly think that helping people and they need to be more open minded because like I said some parts of town where I worked in was scared to go there. And they need to realize that kids are kids and they need to learn no matter where in town they end up having to live. I mean, it's sad that way because people don't want to go to those parts of town and don't want to teach. Well, those kids need to learn just like the other kids in good old suburbia need to learn. I'm sorry they didn't choose where they live, but they still need to be able to be taught just as well as the kids out in you know according to the kids, the white neighborhoods. So I mean it's you learn a lot. The kids need to learn and you end up learning a lot from the kids no matter what part of town they're in.
	Knowledge related to matters of race, ethnicity, language and class and how they influence teaching and learning	when we're teaching African American students a lot of times we punish African American students for behaviors that they've been conditioned to. and you talk about going to the church with the call and response. A student who goes to the principal's office for shouting out in class for disruptive behavior when the student was participating the student was disrespectful or because the student was shouting out and the teacher had rules. And one of the things was we had to reconsider our rules based on the needs of the students. so it's like you can't make students conform to a society when it's something that they're doing in their own home.
<i>Teachers' Beliefs</i>	Productive beliefs specifically related to African American students	now I'm thinking about it, most of my African American students are pretty outspoken this year and they basically, I'm thinking of my five groups and 3 of the 5 groups I have African American girls that just kind of become the leaders, and we do a lot of group work. And right now we're doing graphing and they kind of gather all of the data and say okay this is what we're going to do. I almost think that they take when we are looking at cooperative learning with math I think if they get a leadership role they do much better and they stay more focused.
	How African American students learn	I realized my African American students can count money better. I think they learn better through hands on opportunities.

	Effective teaching practices for African American students	don't be scared to reach out and touch. Allow the kids to be flexible. You have to be flexible. Let the kids communicate. And sometimes we are used to the rigor of a quiet classroom, but sometimes good communication takes place when the kids are talking about what you're learning in the classroom. And I think that's really effective.
	Productive beliefs related to themselves as teachers and the roles they play as they teach mathematics through an equitable lens	I think as an African American I kind of able to understand my students a little bit more. Because sometimes we get loud, sometimes we like to talk, sometimes we like to move. And one of the things that I try to do is I try to focus in on that strength okay you like to talk okay you are going to be the reporter you know. Alright, and I try to jump in from that aspect.
	Benefits of teaching African American students	I think the most joy comes in knowing that when they become adults that they will become confident people in terms of like money management and just confident in all things that relate to mathematics, but in the, in their day to day lives.
	Challenges of teaching African American students	I mean I think that's the hardest thing is when you know that there's not going to be reinforcement, or when you see that spark from the kids at school and then it's dulled when they get home. And sometimes it's not even because the parent you know are not trying to dull it, it's a ponderance of things. Just the harsh reality of life. And you're like oh man they were just getting so far they were just making home and they to me would be earth shattering the things that they go through. But then to them is just another day in the life. No, no. not again. Not one of these type of things. So I think that's the trials and tribulations of working in the urban core. Just to see that kind of stuff over and over and over again and try not to be harden by it. and try not to be overcome or consumed by it. but it's hard. It's real difficult not to be impacted by that.
<i>Teachers' Knowledge of Equity Pedagogy</i>		
Culturally Relevant Pedagogy	View themselves as part of a community	but at the same point in time you can do what you can as a teacher to make them feel safe, safe enough to take risks you know. Make sure you establish that climate, okay we are going to persevere, you know. We are going to work together. We're a team. Establishing that you know establishing that level of respect between teacher and student.

	<p>Help students to make connections between their racial, cultural, local, national, and global identities</p>	<p>I think you still have to you do incorporate culture, you know as a part of just like the ESL students and the ELL students you incorporate their culture in order to make it significant to them. And I think that's the thing. You have to make it of value to the students. like if you couldn't revamp the system, then you have to make the lesson culturally relevant and valuable to them. It's like how how can I make this lesson important to these students? it's like what makes it valuable to them, what makes them even want to learn it.</p>
	<p>Establish relationships with students that extend beyond the classroom environment</p>	<p>I also if my students have things that we're on outside of school that I'm able to you know try to attend I do that as well. All those things do make a difference. One of my students there mom and dad mom and mom person or friend or whatever were getting married and it was a big event in their life and they were you know kind and gracious enough to invite me, so I came. It meant the world to them. Sometime they have different things that go on we have different after school clubs and what not, if they have something going on and they invite me then I try to go and oblige that. and it does to help establish that level of I see you outside of the classroom.</p>
	<p>Establish a community of learners</p>	<p>they would know that as part of the classroom community they would know that they need to they can't, they need each other to succeed and they can always, it's not one of us is going to get all the right answers and succeed in the classroom and leave everybody behind. We're going to try to we're going to get through together helping each other. So they would have this certain responsibility not only to themselves, but to the class to help each other work through whatever they need to math wise.</p>
	<p>Believe knowledge is constantly recycled, re-created, and shared by students and themselves – it is not static</p>	<p>the kids aren't afraid to share strategies that don't work. There's a lot of times that strategies don't work and we're like oh no that didn't work. Okay well how do you think we can fix that. And another kid will stand up and say well, I can help you Sheila. I can tell you this.</p>
	<p>View teaching as students developing their knowledge</p>	<p>I think that communication is very important. The mathematical language is very important. Sometimes we'll say you have you're using 5 dollar word I need a 100 dollar word if we're talking about fractions I need for you to be saying simplify. I need for you to be saying denominator, numerator so that the person listening to you knows that you know what you're talking about.</p>

	Use a variety of instructional strategies	We do a lot of a lot of classroom discussion, a lot of small group discussion, and we always they're never with the same person, so they're always working with somebody different, unless we're doing really specific especially in math if we're doing really specific and kind of tough math processes and higher level thinking then I'll pair up those low students with those high students. so that's kind of where I work into that there. But then they see that and they see when they're learning they're succeeding especially as a small group or even individually, they they enjoy it.
<i>Cultural Competence</i>	Adaptation of skills	I do pay attention to how they're learning. I have one student right now, who he just can't sit still. So, I I let him stand up and do his work. It doesn't bother I'm not the teacher where everyone has to be sitting still. You know if he learns better then that's fine. I'm not just doing it for my African American students, but I know at the same time he's in his house and his not sitting down. He's running around, he's skateboarding he's zooming. That's what his mom said. So that's just how you know he reacts. And He's learning, if he's learning, then I don't have a problem with it.
	Awareness and acceptance of differences	I never taught in a predominately Caucasian classroom. But, I can only imagine one of the things that I would want to do is pull them all together and let them know that the same blood that runs in your body runs in mine. And life is about excepting differences and getting along with one another and sometimes what you may like and what I may like may be different and that's okay. But we have to respect one another.
	Knowledge about their own cultures and the role it has in their lives	like African American, even me now, an adult going to classes, it's more beneficial if it's hands on. We're up and moving, not just sitting. I'm not a sitter. I can't sit you can lecturer me all day long. I'm not going to get it. I'm going to zone out. So, getting them up and moving, keeping them engaged is going to be more beneficial.

	<p>Knowledge of the students' cultures</p>	<p>black children are typically louder anyway. I mean it's the pants down. When I go into my you know I have the 44 schools when I went to the schools that were predominately white, it was just a different culture with low class white, it was the poorer white students. It was a whole different feel. Their biggest problem was that they made a ayp, but they would never come to school because mom and dad said uhh it looks like you have a little snot coming down your nose. You don't have to go to school today. They used bicycles and stuff to get the kids to come to school for raffle tickets and stuff. Because they were making the ayp. And then my schools that were Hispanic were just calm and sweet and nice. And then one of my schools spoke 27 languages. They were just confused. They didn't know exactly where they were. But the schools that were predominately black, it's a very loud it's very their culture. If they go to church and sing hallelujah praise the Lord, and they're singing and dancing in the aisles.</p>
	<p>Understand the necessity to study their students</p>	<p>you know I don't maybe necessarily know what's somebody's family's life is like. Or what their culture asks of them or what interests they have or how they do things are very different from me. Maybe depending on their race, and so I think it's important to I have a share time in the morning where they're allowed to share you know what did you do this weekend? It seems like a small thing and sometimes for me sometimes I think okay this is minor. We have academics to do but but if I really stop and ask myself, what am I learning from this? I think I get a lot out of it. because I know what background to build on. I know what's going on at home. I maybe know something that for example if a student comes in on a Monday morning and they share something that's upsetting I know to pull that student aside and go ahead because that's going to influence academics. all that makes a difference on academics.</p>
	<p>Have the ability to communicate (both verbal and nonverbal), understand, and interact with people from different cultures</p>	<p>Some of them, if I know a student respond does not respond to a verbal que or they get upset, some kids get very upset when you call them out in front of everybody. So I would usually go over to them, take their chair, spin it around, and say come on, eyes up here, pay attention. So it depends on, it depends on the student you know. Some students all they need is come on look up here and that's not a problem. I have some sometimes get all angry because you call out their name. so I treat them differently. I treat them as students African American or vice versa. All students are that way. Some people don't mind you calling out their name other people get offended.</p>

<i>Critical Consciousness</i>	Have knowledge of the larger sociopolitical context (i.e., knowledge of political and social realities in which they live beyond the television and newspaper articles)	You have to accept them for <i>who</i> they are, but then you have to also guide them in the direction that they should be in. because okay, just because you think, this is not one of this class, but I teach reading too to 3 rd and 4 th graders. We have what you call SFA success for all. And I teach them reading. I have one little boy in there, who on his paper he writes Mr. pimpster, right. And I say I don't know Mr. pimpster. And I don't want you to write this name on this paper because I'm not going to accept this. So then I have to talk to him, like he tries to sag. So I have to tell him in private what sagging represents. It seems like being so much more than just a teacher. Like I don't just teach them academics, but I have to teach them life skills. And I think this may be the difference between the black teacher and the white teacher too is that I know that I have to make these students learn to respect authority.
	Invest in students and understand students are important for who they are and who they become	you know the success comes years later too when you have a student who calls you out of the blue and says ms. Brunk, you remember me? And you're like you get a graduation card from someone who is getting ready to graduate. And they tell you they're doing great, and they say thank you. Or you have a student who is now in college in art school and he's in the graphic design. And you know that they're using mathematics in graphic design. I mean you know they have to. and just to send me, and they come back and do a bulletin board for you, which happened this fall. One of my kiddos who is an art major in san Francisco who now has his own design company, t-shirt design company came and did a bulletin board for me.
	Plan and implement academic experiences that connect students to the larger social context	having people come out from the community, someone who works with numbers and show them what they do on a regular basis. Why it is relevant for you to learn how to add, why it is relevant to learn how to measure. I think that actually seeing it put to use.

	Believe the success of students has consequences for their quality of life	I think the most joy comes in knowing that when they become adults that they will become confident people in terms of like money management and just confident in all things that relate to mathematics, but in the, in their day to day lives. I: so, go ahead. I'm sorry. P: well, that's pretty much it. I just enjoy knowing that in the end there's going to be a difference in group of people, you know. Yeah, that there's going to be a difference in them that they will be able to go in the store and calculate percentages off on things. And that kind of thing, the rest of their lives would be better for them.
	<i>Colorblind worldview</i>	I treat everybody the same, I treat everybody as they're equals.
	<i>Engagement</i>	the love working on the computers. Okay we're doing a project on the computer, or playing a game on the computer. They are engaged when they are working in groups, when we get out manipulatives when we get out the slates, oh they can't wait to get out the slates. So, I would say those it's the style it's what we're doing to it. if they are just sitting there listening to me talk, they are not very engaged.
	<i>Parental Relationships</i>	They're plenty of times I mean, the kids, like I said each of our the community is it. and the parents meet in and outside of school, so friendship a lot. So it's not really strange if you haven't been turning your assignments in and the phone is off and whatever the case might be, for me to be knocking on the door. I walk around the corner and to see what's going on, and mom whomever ever takes care of you for some particular reason, I've been known to go over and sit in the living room for a little while and talk.
	<i>Relationships</i>	I don't know I probably tell my students too much about myself because I just like to talk. But, that always seem to help me in some way. Build a better relationship with those students. I always just tell them, I tell them about my family. And I tell them about when I was in school, I tell them about my parents. I actually have my parents come in every year. and my parents always meet my class, which is funny because you know my parents like answer questions and my dad always go no, she was not the perfect child (laughter). No, I remember he always tells the story about geometry and how upset I was and how school was always important to me. But, it's one of those things. I think that really helps my students see that I am just a person. I don't know how it was when you were in school, but when I was in school I was scared to death of half my teachers. And I didn't think they were normal people.

<i>Assessment</i>		You know I even like to preassess a week or two away, because if how I'm going to change the lesson that are in the book, I'm going to have to do it a couple of weeks out. And then postassess because I need to know by the time I actually postassess I should already get 90% proficient and advanced on a post-assessment. I should because if I done everything I need to do all along the way
<i>Challenges of Assessment</i>		it's hard to test, and it's hard to evaluate students as a blank slate, it's hard to just say well tell me what 3 plus 4 is when you're given a story nowadays of Jane ran down to the corner store and bought ten pieces of hubba bubba, and some of my students don't know what hubba bubba is where some students chew trident or whatever. So, there's just that such a variety of experiences and background, that when you really want to test them you have to get almost at the individual level. As a country and even as a district, it's hard to do that. How do you go down and curtail a test to individualize curtail our test to that individual student so that they understand what that test is about?
<i>African American students' mathematical difficulties</i>		she didn't know if the angle was larger or smaller than a right angle. So what I did we used the twisty ties and with the twisty tie she was able to determine where the angles are. And in order for her to figure out if it was larger, I had her make a right angle, an L. and if there was space outside of that angle, then that angle was larger. If the space if the angle was outside, was inside of the right angle then it was smaller. So I tried to let her just find the letter L. go ahead and find the vertex, make a right angle, and have her determine if it was inside or outside. And then if it was outside the right angle, then we knew that it was larger. So that's what I was trying to get her to determine.
<i>Classroom Management in class or building</i>		I'm random. It's, that's what it's called, a random strategy. Like my students don't know when I will call on them. And it's to keep the students on their toes. Students learn at an early age, even in kindergarten. If I don't raise my hand, then I don't have to do anything because the teacher won't call me. So if I use a magic stick, then it's random. They have to be ready because I can call on anyone. I don't have to use my random stick. I just feel like calling, if I want to call on you today, then I will call on you and you have to give me an answer. So this just let's the student know that they have to stay on task because I can call you whenever. And it just helps them to stay on task.

<i>Norms</i>		we're trying to incorporate math talk. and with math talk it means that not only do you have to do the math assignment, show me a strategy, but you have to discuss how you got the strategy, and what do numbers mean to you. For instance, if you have an activity and you have to add two numbers and you have to come up with four different strategies on how to add the number. You have to explain how every strategies is done. You can't just say oh I did it. so that's a norm, they have to explain what they do.
<i>Expectations</i>		I believe the child number one when I think of my goal for them well I'm teaching them 3 rd grade, but what's the real goal here in school? It's that students can succeed and pass high school. Whether that be college for them whether that be military for them, whether that be a job for them. Whether that be whatever they decide to do that they want to do. Number one I high expectations for me almost include expecting that that child can can perform and produce past high school. I think that's my more global sense of high expectations. Then my high expectations as far as the classroom involve that that child will grow and learn.
<i>Resources</i>		I tell my students if your parents are able to purchase those things that's fine you can maybe bring some things to school to have personal or whatever, but keep those things at home just in case you have a project or when you are working at home. We send a supply list home, it is a technicality, you know what I'm saying. They have everything they need. Their tools for learning they will when they walk in the door.
<i>Sources of Knowledge of Equity</i>		you know there are some books. One book is called teaching African American children because I also wanted to I have to do, whenever I do something I have to do research. so I was looking up equity in mathematics you know. And that sort of thing, but I have a book, I have different books that. There's one book called dreamkeepers
<i>Novice Teachers' unrealistic expectations</i>		One time I had to take a social studies course at UMKC and it was with I guess you call them pre-service teachers. So these teachers didn't have any experience in the classroom that maybe me and one other actual teacher. People who were teaching. And so it was interesting because the pre-service teachers ideas of what school would be like was like nothing it actually was. Oh, boy what until you find

<p style="text-align: center;"><i>Challenges</i></p>		<p>There's kids that come from all kinds of families, from all kinds of different situations, backgrounds, you know broken homes. And you see that everywhere, but I think that here at blue ridge you see it a lot more. It's very transient. Kids are coming and they might leave halfway through the year. My first year that I taught, I started off with 21 kids and at the end of the year I only had 14 of the same kids. Because the other ones had come and gone. I got new kids and so it's really transient.</p>
<p style="text-align: center;"><i>Teacher Education Programs</i></p>	<p>Elementary teachers' specialty</p>	<p>maybe elementary teachers should specialize in math and science</p>
	<p>Courses on culture</p>	<p>I would say more research on African American culture as far as today's music, not like when I was in undergrad we took, I had a multicultural course. But it was more like learning about Africa, and not learning about hip-hop and graffiti and gangs and all that stuff. We didn't learn anything like that, like the inner city type of things. It was more focused on the African culture and Swahili and more of the African descent, instead of what's going on right here in this world. Dealing with poverty and kids that come in. different things that are going on in the African American household, but not just African American, but you know parents being in jail, and their dealing, and people getting shot in the family, and how to deal with kids that are grieving, and being molested and all that stuff that comes along now. There's more and more in the African American community ADHD and the bipolar. Even growing up, I, we didn't know what ADHD was. And just learning it because it's coming around now. Because you have kids that come into the classroom now that's really angry and take it out on adults and take it out on their peers. So first trying to deal with those kind of students without just going into a classroom and there it is.</p>

	Flexibility in general and knowing students	<p>knowing that history of the student and knowing their background and knowing all they've gone through in their lives what you could get out of their lives is going to help. And you know that class probably would be a whole lot harder to put together but it might be the fact of going in talking with teachers and knowing or maybe getting that those confidentiality clauses and writing about some of these students and what their backgrounds are. You know leaving out names and socials and all kinds of other things, but really putting together a whole history a slew history of students. And you can do that in one classroom just finding out oh this student this is their history, their background. Here's another student and you know just start showing look research somebody these histories, and then maybe seeing, instead of in that practicum could be instead of sheets of anything, just go and get to know the kids. Make some relationships with them. Find out about their what they do at home. Find out about their home life is like. Journal about that for the day. What do you think about that? How is that going to make you a better teacher knowing that?</p>
	Variety of lesson planning strategies	<p>of course different strategies what it means to be different to have differentiated instruction. make sure the students are teachers would design lessons that have differentiate in them. Okay show them how to differentiate make sure that you're spending I would say you don't really spend more 10 to 15 minutes on one activity at this age level. 15 minutes tops. You're pushing it when you're asking them to do the same thing for longer than 15 minutes.</p>
	Need to improve their (teachers') learning	<p>I take all kinds of classes, and there are benefits to doing it. they give you lots of stuff. But I'm taking it because I said I don't ever want to be a disservice to anybody's child because I don't know something. So if I don't know, I'm going to find out how I can learn it.</p>

	<p>In class experience or one on one experience</p>	<p>The other is to get experiences with working with these students. you know pre-service teachers, and in Columbia I think we have some good opportunities for that. So it'll like to see more of that and have more experiences to work with African American students, whether that be after school tutoring or in classes where, you know the other thing is to get chances to observe teachers who are doing great things with African American students, so you can see you know and then reflect on even if your class and just five people going and just watch a lesson and after you go out and then talk to the teacher and say what things do you do, and getting experience from the experts, I think would be really great.</p>
	<p>Classroom management</p>	<p>I would make sure they would have a component how to manage kids in groups, how to manage different needs, how to manage attitudes of kids and things like that. Make sure I would show them, demonstrate different strategies you can use. and when the strategies when you have a troublesome child in a group, how are you going to work with that. How are you going to deal with that child, because the goal in education right now anyway is to do more group work to get them talking to get them expressing what they're thinking. If they can't manage they're own behavior, then they can't it's very difficult for them to learn. So something dealing with teaching teachers how to deal with behavior</p>

VITA

Christa DeAnn Jackson is currently an Assistant Professor in the College of Education at the University of Kentucky. She earned the following degrees: B.S. in Elementary Education from Evangel University (1995); MSED in Natural Science, Secondary Education from Missouri State University (2003); and Ph.D. in Curriculum and Instruction with an emphasis in Mathematics Education from the University of Missouri (2010).

Christa grew up in Springfield, MO where she taught elementary and middle school mathematics for eleven years. She initiated changes in the mathematics curriculum at the middle school level to focus more on student understanding of the mathematics concepts and to incorporate the use of technology in instruction. As an adjunct instructor at Evangel University, she shared innovative teaching strategies with pre-service elementary and middle school mathematics teachers as she prepared them to teach mathematics and to assume leadership roles in their future schools. Additionally, she was a mathematics consultant for the state of Missouri, which allowed her to mentor and collaborate with middle school mathematics teachers across the state. During her doctoral studies, Christa participated in research projects that allowed her to study mathematics teachers' knowledge as well as how students learn and make sense of the mathematics.