WHAT IS TAKING PLACE IN SCIENCE CLASSROOMS?: A CASE STUDY ANALYSIS OF TEACHING AND LEARNING IN SEVENTH-GRADE SCIENCE OF ONE ALABAMA SCHOOL AND ITS IMPACT ON AFRICAN AMERICAN STUDENT LEARNING

by

LASHAUNDA RENEA NORMAN

B.S., Alabama State University, 1999
M.ED., Alabama State University, 2001
M.ED., Alabama State University, 2006

AN ABSTRACT OF A DISSERTATION

submitted in partial fulfillment of the requirements for the degree

DOCTOR OF PHILOSOPHY

Department of Curriculum and Instruction
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Abstract

This qualitative case study investigated the teaching strategies that improve science learning of African American students. This research study further sought the extent the identified teaching strategies that are used to improve African American science learning reflect culturally responsive teaching. Best teaching strategies and culturally responsive teaching have been researched, but there has been minimal research on the impact that both have on science learning, with an emphasis on the African American population. Consequently, the Black-White achievement gap in science persists.

The findings revealed the following teaching strategies have a positive impact on African American science learning: (a) lecture-discussion, (b) notetaking, (c) reading strategies, (d) graphic organizers, (e) hands-on activities, (f) laboratory experiences, and (g) cooperative learning. Culturally responsive teaching strategies were evident in the seventh-grade science classrooms observed. Seven themes emerged from this research data: (1) The participating teachers based their research-based teaching strategies used in the classroom on all of the students' learning styles, abilities, attitudes towards science, and motivational levels about learning science, with no emphasis on the African American student population; (2) The participating teachers taught the state content standards simultaneously using the same instructional model daily, incorporating other content areas when possible; (3) The participating African American students believed their seventh-grade science teachers used a variety of teaching strategies to ensure science learning took place, that science learning was fun, and that science learning was engaging; (4) The participating African American students genuinely liked their teacher; (5) The participating African American students revealed high self-efficacy; (6) The African American student participants' parents value education and moved to Success Middle School district for better educational opportunities; and (7) Teachers were not familiar with the term "culturally responsive teaching," but there was evidence that several aspects of it were present in the seventh-grade science classroom environment.

Critical Race Theory (CRT) was the framework for analysis and interpretation of this research study. The findings support the following tenets of CRT: (a) racism is normal, (b) interest-convergence or colorblindness, (c) contextual-historical analysis, (d) storytelling or counterstorytelling, and (e) social transformation. These findings indicate that racial inequalities remain an issue in the underachievement of African Americans and may be the solution to

improving science learning of African Americans. The outcome of this study contributes to the limited research on utilizing culturally responsive teaching along with best teaching strategies to improve academic achievement of African American students, and CRT exposes the issues that contribute to the Black-White achievement gap in science widening.

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Major Professor
Dr. Kay Ann Taylor

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Dedication

This completed milestone is dedicated to my husband, Eric, and two children, Sidney DeJuan and Erica LaShaun. I pray that the memories from this experience and accomplishment of completion will inspire you to always walk by faith and believe Philippians 4:13, *You can do all things through Christ who strengthens you.* All of the sacrifices you three endured were so that I could pave the way for you and provide a better life for us. I love you with all my heart.

Prologue

I am a 37 year-old Southern-born and raised African American female. I am a Democrat that was raised under the African Methodist Episcopal Zion religion as a child and adolescent and became a believer of the Non-Denominational faith in my adult life. I was raised by a mother who has an Associate's degree and taught three-year-olds in the Head Start Program for 42 years until she retired December 2012. My father, who was a graphic design technician for the State of Alabama, died when I was seven years old. I am the youngest of five children and have three brothers and a sister, all of whom were raised by our mom but lived with our grandmother until they reached adulthood. My grandmother was the mother of twelve children and she died at the age of 97. I have 14 maternal nieces and nephews, one of whom died three days after giving birth to a baby boy and turning 17. I have never met two of my paternal nieces and nephews because they are my step-sister's, whom I have not seen since my father's funeral. I also have a step-brother whom I have not seen or talked with since the funeral. My mother and siblings were raised in a small north-side community on the outskirts of the city of Montgomery, Alabama (Madison Park), but I was raised on the east side of town in a suburban community (Montgomery East). I had Blue Cross Blue Shield insurance and the home that I was raised in was brand-new when we moved there in 1975, one year before I was born.

I learned at an early age to be independent and to get my education. I have worked and basically provided for myself without the emotional or financial support of my family since I was 18. Ever since I graduated from high school, I have attended college, with the exception of a two year break in that time frame. It always was instilled in me to go to school and obtain grades no lower than a "B" average in order to make it in today's society. I currently possess a Bachelor's and Master's in Biology Education with a certification in Administration and Supervision.

I believe strongly I missed the most valuable lesson: it is not only what you know as an African American, it is who you know. My mother always taught me to respect my elders regardless if I thought they were wrong. I graduated within the top 10% of my high school class of more than 500 students from a majority school with less than 20% African American student population. The highest I scored on the ACT college entrance exam was 19, although I received several academic scholarships for my academic achievement, community service, and financial need. Although I scored the minimum on my Graduate Record Examination (GRE), I possessed a graduate school grade point average (GPA) of 4.0 from a traditional setting accredited university upon applying for the doctoral program at Kansas State University. I passed the PRAXIS series of exams for teachers and administrators; however, my scores were marginal. These standardized exams clearly are not indicative of my aptitude. I taught public school science for ten years and taught college-level biology and education courses part-time before pursuing my doctoral degree full-time. While pursuing my doctoral studies full-time, I held a graduate research position (GRA) and worked as a part-time college faculty member teaching biology and education courses at the local college and online. As of August 2012, I returned to the public school setting as a middle-school life science teacher in an inner-city school of a large school district and am currently the Science Academic Coach at the same middle school while teaching biology part-time as a college faculty member online. Half of my professional teaching experiences have been in a majority setting where African Americans represented less than 20% of the population and the other half in inner-city school settings with 99% African Americans.

Chapter 1—Introduction

America is an unjust society. Inequalities exist in funding per pupil, class size, teacher qualifications, resources, educational facilities, and the safety of schools (Rothstein, 2004). Moreover, an achievement gap exists between African Americans and Whites. Poliakoff (2006) describes the academic achievement gap as the acknowledgement that something has gone wrong with education without identifying what has actually taken place. Lindsey, Graham, Westphal, and Jew (2008) explain the academic achievement gap as a substantial difference in the scores of two or more populations on an assessment that measures academic achievement. No formal definition of the academic achievement gap exists. The achievement gap is measured by the difference in test scores of racial and ethnic groups (Lee, 2002).

The Black-White achievement gap was recognized initially when the United States Army used wide-ranging mental testing to diagnose recruits. Although the test did not note the tests were racially biased, the results showed that African Americans were outscored by Whites in significant numbers (Paige & Witty, 2010). Since the 1970s, the National Assessment of Educational Progress (NAEP) and other research presents data that illustrate the academic achievement gap between African Americans and Whites is narrowing in a number of disciplines, particularly science. However, African Americans still show a 75% rate of underachievement on standardized exams in comparison to Whites (National Center for Educational Statistics, 2011). African American students are experiencing a steady decline in their academic performance at the classroom level and on standardized tests (McREL, 2000). Paige and Witty (2010) state that in their analyses of the Nation's Report Card, individual schools in certain states were able to close the Black-White achievement gap, but it is yet to be done on the district level, especially in large school districts. Because of this, there has been an increase in African American dropout rates, discipline problems, lack of interest, suspensions, expulsions, flooded prisons, and a decrease in skills necessary to compete in this global economic society (Kunjufu, 2006).

On a national level, the academic achievement gap in science is measured by NAEP using achievement levels—basic, proficient, and advanced—to recognize at what grade level students are performing compared to the grade level in which they should be performing (see Figure 1.1). According to the NAEP, an average of 28% of fourth graders performed at or above

Proficiency from 1996-2005 and 34% performed at or above Proficiency in 2009. There was a 38 point gap in scores between White and African American fourth graders in 1996, 37 points in 2000, 33 points in 2005, and 36 points in 2009. An average of 29% of eighth graders performed at or above Proficiency from 1996-2005 and 30% performed at or above Proficiency in 2009. The gap in scores between White and African American eighth graders was 38 points in 1996, 39 points in 2000, 37 points in 2005, and 36 points in 2009. In 1996, 21% of twelfth graders performed at or above Proficiency whereas only 18% of twelfth graders performed at this level in 2005 and 21% performed at or above Proficiency in 2009. There was a 36 point gap in scores between White and African American twelfth graders in 1996, 30 point gap in scores in 2000, 36 point gap in scores in 2005, and 34 point gap in scores in 2009. On a national level in science, there was no major difference in Proficiency levels for fourth graders from 1996 to 2005; however, there were significant improvements in 2009. There was no major difference in Proficiency levels from 1996 to 2009 for eighth graders. The proficiency level for twelfth graders dropped from 21% in 1996 to 18% in 2005 and rose to the 1996 achievement level of 21% Proficiency in 2009.
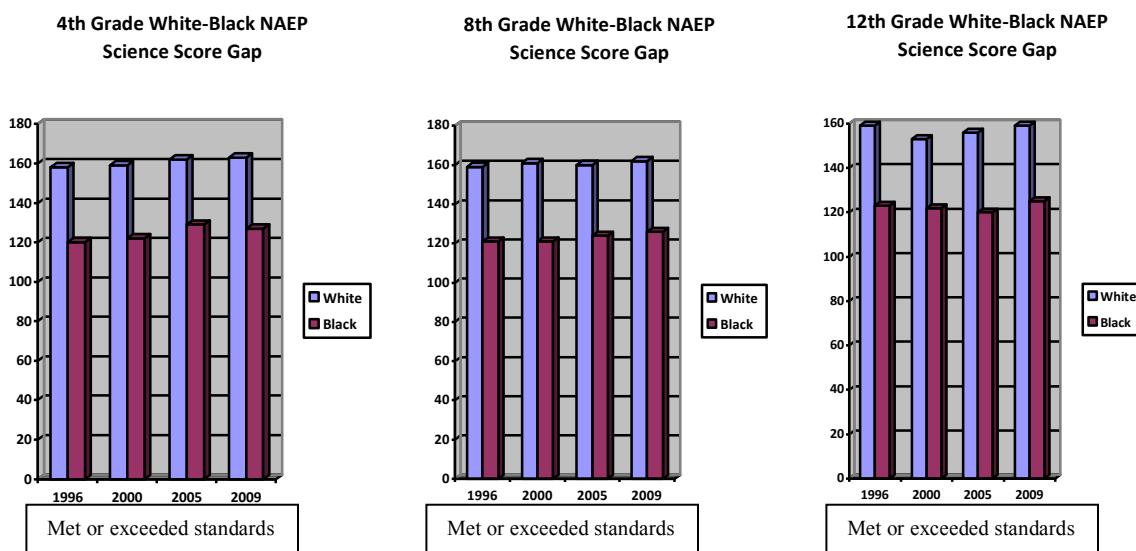
Figure 1.1. Proficiency levels of fourth, eighth, & twelfth graders on NAEP science assessment in 1996, 2000, 2005, & 2009 (NCES, 2006, 2011). The percentage of students at or above proficiency.

On a state level, Alabama's standardized assessments in science illustrate that race is a significant predictor of science scores. When performing an analysis of Alabama's state scores obtained from the Alabama State Department of Education (ALASDE) (2011) for White and

African American students, one can clearly see the differentiation in scores of African Americans in comparison to Whites (See Table 1.1). This table displays the percentages of students that met or exceeded science content standards in fifth and seventh grades and met or exceeded biology content standards on the Alabama Graduation High School Exam in their eleventh grade year.

There were no data available for fifth or seventh grade White students in science from 2006-2007. On the fifth grade level, White students showed three percentage points difference from 2007-2008 to 2008-2009, and an increase of four percentage points from 2008-2009 to 2010-2011. On the seventh-grade level, there was an increase of eight percentage points from 2007-2008 to 2008-20009 for White students, but no major difference from 2008-2009 to 2010-2011. On the eleventh grade level, there was minimal difference for White students on the Alabama High School Graduation Exam in Biology from 2006-2007 to 2008-2009, but there was an increase of six percentage points from 2008-2009 to 2009-2010.

There were no data available for fifth or seventh grade African American students in science from 2006-2007. African American students on the fifth-grade level showed a steady increase of five percentage points from 2007-2008 to 2009-2010, but an increase of only two percentage points from 2009-2010 to 2010-2011 in science. On the seventh-grade level, African American students displayed an increase of thirteen percentage points from 2007-2008 to 2008-2009 with a steady decline of one to two percentage points thereafter. On the high school graduation exam for biology, eleventh graders showed a decline of five percentage points from 2006-2007 to 2007-2008, an increase of sixteen percentage points from 2007-2008 to 2008-2009, an increase of six percentage points from 2008-2009 to 2009-2010, but only a one percentage point difference thereafter.

In comparison to one another, there was a consistent 20 to 30 percentage point difference between White and African American students in fifth grade with White students scoring higher in the area of science. On the seventh grade level, there was a consistent 20 point difference among White and African American students with again, White students out-performing African Americans in science. On the high school graduation exam in biology, there was approximately a 21 percentage point difference in scores between White and African American students from 2006-2007, a 24 percentage point difference from 2007-2008, but this gap began to decline in 2008-2009 with approximately a nine percentage point difference thereafter. Yet again, the

White students out-performed the African American students in biology. The patterns show that although some gaps in science achievement were closing, a Black-White achievement gap in science still exists in the State of Alabama.

Table 1.1. Proficiency of Fifth, Seventh, & Eleventh Graders that Met or Exceeded Content Standards on Alabama Science Standardized Exams (ALASDE, 2011).

	2006-2007	2007-2008	2008-2009	2009-2010	2010-2011
Fifth-Grade Alabama Science Assessment					
White	N/A	80	83	86	87
Black	N/A	53	58	63	65
Seventh-Grade Alabama Science Assessment					
White	N/A	71	79	78	78
Black	N/A	43	56	54	53
Eleventh-Grade Alabama High School Graduation Exam – Biology					
White	92	90	91	97	97
Black	71	66	82	88	89

Several suggestions have been proposed to assist in closing the achievement gap in all subjects, but it is believed strongly that educators must deal with the issues that can be controlled—teaching strategies and the curriculum. Culturally responsive teaching coupled with teaching best practices have been proposed as the key to closing the Black-White achievement gap (Cartledge & Lo, 2006; Davis, 2006; Gay, 2000; Hale, 2001; Irvine, Armento, Causey, Jones, Frasher, & Weinburgh, 2001; Ladson-Billings, 1992a; McKinley, 2010; Thompson, 2004). Culturally responsive teaching often has been referred to by many names—culturally relevant teaching, multicultural curriculum, culturally proficient instruction, or cultural responsive pedagogy. However, all these terms encompass the same basic principles (Irvine et al., 2001; Lindsey et al., 2008; Wisniewski, Fawcett, Padak, & Rasinski, 2011). Gay (2000) defines CRT "as using the cultural knowledge, prior experiences, frames of reference, and performance styles of ethnically diverse students to make learning encounters more relevant to and effective for them" (p. 29). Culturally responsive teaching assists a child in learning for academic mastery. Culturally responsive teaching recognizes that all students learn differently and may learn differently across cultures; hence, teachers should incorporate culture into their teaching strategies (Villegas, 1991).

Culturally relevant pedagogy prepares students to effect change in society, not merely fit into it. … teachers support this attitude of change by capitalizing on their students' home and community culture. These teachers … empower students intellectually, socially, emotionally, and politically by using cultural referents to impart knowledge, skills, and attitudes. (Ladson-Billings, 1992a, pp. 382-383)

Culturally responsive teaching is considered a means to empower and educate the whole child (Gay, 2000; Ladson-Billings, 2002; Thompson, 2004). Along with best teaching strategies, CRT enhances students' academic success because it respects the students' complex culture and individual strengths that lead to academic success (Gay, 2000; Ladson-Billings, 1992a).

This study investigates what is taking place in seventh-grade science classrooms to engage and motivate African American students. The teaching strategies were examined to see the impact they had on African American student learning and to what extent those teaching strategies reflected culturally responsive teaching. Discussion in this chapter is organized in the following sections: (a) overview of the issues, (b) statement of the research problem, (c) purpose of the study, (d) research questions, (e) methodology, (f) definitions of terms, (g) limitations and delimitations, (h) significance of the study, (i) researcher's perspective, and (j) organization of the study.

Overview of the Issues

In efforts to eliminate the Black-White achievement gap and understand the need for teaching strategies and culturally responsive teaching to improve science achievement of African Americans, one must understand the history of underachievement of African Americans. A researcher or teacher cannot begin to assist in closing the Black-White achievement gap of individuals if he or she does not know the causes of the gap. The following factors were identified by the National Education Association (NEA) (2011) as contributing to the achievement gap:

- Within Schools' Control: low expectations for student achievement; lack of rigor in the curriculum; large class size; tracking groups of students into a less demanding curriculum; unsafe schools; culturally unfriendly environments; and poor or no instructional leadership.

- Teacher and Teacher-Related: uncertified and inexperienced teachers; insensitivity to different cultures; poor teacher preparation; low expectations of students; and inadequate materials, equipment, and resources, including technology-based resources.
- Student-Related: students' interest in school; students' level of effort; students' feeling that they are, in part, responsible for their learning.
- Family-Related: Non-participation in school activities; low skill level to support and reinforce learning; and excessive television (TV) watching and lack of reading at home. (pp. 1-2)

Other factors outside of school's control, such as access to health care, academic resources, and child care or extracurricular organizations, family income levels, students' nutrition at home, inequities in funding among budgets and schools, family time, and society bias, are not expounded on because they are beyond the school's control (NEA, 2011). This research focused on teaching and learning, factors that can be controlled in the classroom to improve student learning of African American students. Understanding the historical background of African Americans informs what influences have had positive and negative effects on learning and the means to overcome those effects. From understanding this background, progress may begin to address the areas of concern in improving African American science achievement.

The Historical Educational Background of African Americans

African Americans have faced numerous negative experiences that marginalized their opportunities for an equitable education. For example, slavery is where the negative practices against African Americans began in the United States. Slavery is the act of controlling another individual with little or no limitations. Race was deliberately and socially constructed because African Americans were prevented from retaining their African culture and barred from assimilation. "The cultural inheritance of African Americans today is the product of a long history of racial oppression—centuries of slavery, followed by disenfranchisement, legally mandated segregation, and subordination in the Jim Crow South and intense racial prejudice in the North" (Thernstrom & Thernstrom, 2003, p. 121). At the end of the Civil War in 1865, the 13th Amendment of the Constitution of the United States abolished slavery in America (Urban & Wagoner, 2004). Before slavery was abolished in 1865, African Americans received education

anywhere that they could (e.g., homes, fields, churches) because African Americans were slaves and forbidden to become literate by Whites (Bennett Jr., 1988). Since that time, African Americans have been oppressed and forced to adapt to the dominant White culture. More than 400 years of attack on a person's culture explains the inferiority complex and his or her failure to compare to Whites (Freire, 1970). As a result, African Americans possess high numbers that are homeless, illiterate, and a product of single-parent households (Lamm, 1989; Thernstrom & Thernstrom, 2003).

The 14th Amendment was adopted in 1868 protecting the rights of African Americans by granting them citizenship and prohibiting any state from violating their rights as citizens (Urban & Wagoner, 2004). The 14th Amendment permitted education opportunities for African Americans, but it condoned segregation at the same time, which was unconstitutional (Urban & Wagoner, 2004). For example, Spring (2001) comments on a situation with a California school where White students age five to twenty-one were allowed to register for schools but minorities, including African Americans, were not allowed to enroll in that school, which constitutes segregation. In 1896, the *Plessy v. Ferguson* case permitted "separate but equal" accommodations (LaMorte, 2005). African Americans believed they were still being treated unequally because the accommodations were not the same quality as or equal to those of Whites.

Segregation was another negative practice that marginalized African Americans' opportunities for an equitable education. African Americans possessed self-doubt because they were set apart from others, which indicated that they were never accepted fully by Whites (hooks, 2002). The curricula also were segregated because African American history and contributions to society were omitted from textbooks. This was a strategy that Whites used to persuade African Americans that they were beneath them, had always failed at what they did, thus still being enslaved (Woodson, 1933).

> If you control a man's thinking you do not have to worry about his action. When you determine what a man shall think you do not have to concern yourself about what he will do. If you make a person feel that he/she is inferior, you do not have to compel him/her to accept an inferior status; he/she will seek for it. If you make a person think he/she is a justly outcast, you do not have to order that person to the back door, that person will go without being told, and if there is no back door, the nature of that person will demand one. (Woodson, 2000, p. 84)

Segregation was the basis of the *Brown vs. Board of Education of Topeka, Kansas* case in 1954. This case sought to make schools more equitable (LaMorte, 2005). The lawsuit was centered around the right of equal protection by the Constitution (Delgado & Stefancic, 2001; Urban & Wagoner, 2004). This case led to the desegregation of schools referred to as integration. The grief that African Americans continued to experience because of the inequitable opportunities led to the Civil Rights Movement. The Civil Rights Act of 1964 was supposed to end racial segregation and unequal application requirements to vote (LaMorte, 2005).

Serano v. Priest, a case that went to the California State Supreme Court and received a ruling in 1976, dealt with inequitable state funding among the school districts (Day, 1989). The court ruled that the school district had to provide more equitable distribution of resources regardless of the wealth of the community. In 1988, *Rodriguez et al. v. Los Angeles Unified School District*, another court case that dealt with inequity of minorities, claimed that the school district allocated inadequate resources to urban schools that most of the minorities attended (Day, 1989). Many other landmark court cases provide evidence of minorities' unequal access to education, but only a few are mentioned to support this research.

The negative attitudes and beliefs of White teachers toward African Americans also have marginalized their opportunities for an equitable education. Negative beliefs and teacher attitudes result in setting low expectations and the creation of non-challenging curricula, which contributes to underachievement (Gay, 2000; Kunjufu, 1990; Thompson, 2004). These behaviors foster learned helplessness among African American students (Gay, 2000). Delpit (1995) explained that people say one thing but do not believe what they are saying. For instance, educators recite in their philosophies of education that "all children can learn" but do they actually believe that? Thompson (2004) believes that many teachers focus on what African American students cannot do and what they do not possess (i.e., deficit thinking) but many of their perceptions are differences in cultural norms. In many cases, African American students have heard only negative messages about themselves through textbooks, media, parents, educators, and other ethnic groups. Thus, they begin to perceive it themselves, which becomes a self-fulfilling prophecy (Thompson, 2004).

Teachers' negative attitudes can trigger responses from students that are not indicative of who they are and their capabilities. For example, some teachers deny African American students extra assistance on assignments because they believe the students should be able to keep up with

the others or adapt to the flow of the class (Thompson, 2004). As a response to the teacher's refusal to provide extra assistance, African American students will choose not to do the assignment. Ladson-Billings (2007) describes the denial of the teacher to perform extra services to assist the student and the student's refusal to complete an assignment because he or she did not receive extra help as a "permission to fail" syndrome (p. 319).

The overview of the issues discussed how African Americans have faced obstacles that have marginalized their opportunities to attain an equal and equitable educational experience. All of the aforementioned events played a role in the attitudes that developed and hindered African Americans from academic success. Due to the inequitable and inadequate educational experiences, an achievement gap developed that yet remains. Culturally responsive teaching engages students in the learning process, which addresses the issues of concern by making the content meaningful and relevant, thus promoting cognitive development (Ladson-Billings, 2000; Zeichner, 1996).

The Impact of the Attempts to Resolve African American Access to Education

In spite of the attempts to resolve African American access to an equal education, inequality still exists. The 13th Amendment ended slavery; however, African Americans are still enslaved by practices that were enacted in the past causing them to retain a slave mentality (Gay, 2000; Ladson-Billings; 2007; Thompson, 2004). Slavery leads to oppression and this power is maintained by imprisoning many African Americans in inferior schools resulting in underdeveloped abilities. Since schools are provided for African Americans, based on the dominant White idea of freedom and opportunity, African Americans are blamed for not being academically successful and their underachieved position in life.

The 14th Amendment served its purpose in the 1800s and was the basis for the 1954 *Brown v. Board of Education of Topeka, Kansas* case. This case was won overturning "separate but equal" as a violation of the Equal Protection Clause. The Civil Rights Act of 1964 influenced the education of African Americans and the poor population by withholding federal funds in school districts that did not allow African Americans to attend. The Coleman Report was a response to mandates by the Civil Rights Act of 1964 to discover information about the lack of opportunities for poor people (Urban & Wagoner, 2004). Coleman concluded: (a) "differences

in school resources were only mildly related to differences in educational achievement"; and (b) "achievement differences were strongly related to the educational backgrounds and aspirations of a student's peer group" (Urban & Wagoner, 2004, p. 315). The Coleman Report did not answer the many questions officials had about the lack of educational opportunities for African Americans and the poor, but it did explain the relationship among socioeconomic status, race, and academic achievement (Urban & Wagoner, 2004).

Although *Brown v. Board of Education of Topeka, Kansas* attempted to integrate schools, racism, ethnicity, diversity, and multiculturalism issues still exist (Thompson, 2004). There was little cooperation from Whites when this education integration case was won (Urban & Wagoner, 2004). Schools are supposedly integrated all over the United States; however, many researchers acknowledge that schools are more segregated now than before *Brown*. Hale (2001) presumes that schools are still separate and unequal because parents cannot afford better educational institutions (private or public) or neighborhoods with better schools; therefore, African American students outside of these situations still receive an inferior education.

> Whites have been creating smaller and smaller political enclaves so that they can restrict and delineate economically homogeneous school districts. State legislatures have been maneuvering to create subtle structures for maintaining private school excellence within predominately white suburban public school districts. (Hale, 2001, p. 176)

Kozol (1991, 2005) speaks about privatizing public schools with public money and the inequities of expenditures on education. Magnet schools were created as a solution to integrate schools in poor neighborhoods. It is believed that magnet schools are enhancing the knowledge, skills, and abilities of Whites while remediating African American children (Hale, 2001). For example, high-tech facilities and programs are implemented in buildings where only White students and a few African Americans are able to utilize the resources. However, the other students that attend the school, but not the program, are unable to access the same resources. Magnet and theme schools reflect forms of segregation because the schools possess specialized interests that involve a selection process rather than persuasion of students to attend (Urban & Wagoner, 2004). Hale (2001) also points out that African Americans are bussed to White schools where no high-tech facilities and programs are in place, with simply remedial classes available. Kozol (2005) proposes that vouchers and tax credits were allowed as a means for private schools to receive public money and maintain inequality of African Americans' educational experience.

This effort has not succeeded to improve academic achievement of low-income African American students; however, it has opened doors for middle-class African Americans to move to areas where quality integrated public and private schools are located (Hale, 2001).

> African Americans were forced to become more "obsessed with race" and to experience more "racial assaults … Even the well-meaning and kind white teachers often believed racist stereotypes. We were never away from the surveillance of white supremacy … And it was this constant reality that began to undermine the foundation of self-esteem in the lives of Black folks. (hooks, 2002, p. 12)

One view is that gifted and talented programs were created as a result of desegregation because Whites had to find a method of teaching that would create an opportunity for Whites to be taught in one area of an integrated school while the African American children are taught in another— the concept of top to bottom or superior to inferior (Hale, 2001). These reflect examples of defacto segregated schools. As Kozol (2005) pinpoints, a majority black school can be within five miles of a white school and there will still be a difference in the education opportunities despite the property tax within the area. Racism will continue to be a social issue exhibited in the schools as long as it persists across the United States (Urban & Wagoner, 2004)

Brown v. Board of Education has been used as an example of a tenet of Critical Race Theory—interest convergence (Delgado & Stefancic, 2001). Delgado and Stefancic (2001) reason that the "great triumph of civil rights litigation may have resulted more from the self-interest of elite Whites than a desire to help Blacks" (p. 7). They expose further that the United States was trying to save face because World War II had just ended and the United States was still attached to the Cold War so it had to find a way for the international community to recognize its efforts and reward the African American servicemen who fought in the wars. It is proposed that African Americans were a product of "Social Darwinism"—survival of the fittest—predicting that African Americans who adapt to White culture or "play the game" will survive (Hale, 2001). Delgado and Stefancic (2001) state that race is central because studies have shown that African Americans: (a) are more apt to be denied loans and jobs than Whites although they may possess the same qualifications and experience; (b) African Americans are charged more for products and services than Whites; and (c) the medical care that African Americans receive is substandard in comparison to Whites. Hale (1994) states that "African Americans have engaged in a game of hide-and-seek with White Americans for quality

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education: White Americans have been hiding quality education, and African Americans have been seeking it" (p. 18).

In the 1980s, the nation recognized the achievement gap and failing economy; and, therefore, began to view the disparities in education in the United States. Education reform efforts were on the rise. Former President Ronald Reagan issued a report in 1983, *A Nation at Risk: The Imperative for Educational Reform* (National Commission of Excellence in Education, 1983), which attempted to persuade Americans that there were major issues with America's educational system; therefore, education should become the main focus (Urban & Wagoner, 2004). This set the tone for national debates to address these issues because the people saw this as an attempt to place private school over public school education but it only granted recommendations without the funding for implementation (Marsh & Willis, 2007).

In 1991, former President George Herbert Walker Bush, proposed *America 2000* in response to the education crisis (Urban & Wagoner, 2004). This proposal was a safe and strategic move to remain popular with voters versus truly addressing the issues of education. It was noted that *America 2000* basically repeated the issues identified in *A Nation at Risk:* "the schools were in need of a revolution, school people would have to be held accountable for their results, the schools were destined to become learning communities, and the students within them should prepare for lifelong learning" (Urban & Wagoner, 2004, p. 362). *America 2000* had six national education goals that were to be reached by the year 2000:

1. All children in America will start school ready to learn.
2. The high school graduation rate will increase to at least 90 percent.
3. American students will leave grades 4, 8, and 12 having demonstrated competency in challenging subject matter including English, mathematics, science, history, and geography; and every school in America will ensure that all students learn to use their minds well, so that they may be prepared for responsible citizenship, further learning, and productive employment in our modern economy.
4. U.S. students will be first in the world in science and mathematics achievement.
5. Each adult American will be literate and will possess the knowledge and skills necessary to compete in a global economy and to exercise the rights and responsibilities of citizenship.

6. Each school in America will be free of drugs and violence and will offer a disciplined environment conducive to learning. (Urban & Wagoner, 2004, p. 362)

In 1994, former President Bill Clinton built on *America 2000* and established *Goals 2000: Education America Act,* which was a standards-based education reform movement that focused on institutional changes to improve the quality of teaching and learning, emphasizing high expectations of students (United States Department of Education, 2000; United States Metric Association, 2003). *Goals 2000* reflected improvements in academic achievement on the state level; however, an achievement gap continued in the United States (Marsh & Willis, 2007). There were eight national education goals covered in this Act and the rest of the Act dealt with the plan to reach those goals by 2000. The eight goals addressed:

1. School readiness;
2. School completion;
3. Student achievement and citizenship;
4. Teacher education and professional development;
5. Mathematics and science;
6. Adult literacy and lifelong learning;
7. Safe, disciplined, and alcohol-and-drug free school; and
8. Parental participation. (United States Metric Association, 2003, para. 1)

Goals 2000 was an ongoing challenge for standards-based reform and student achievement among different ethnic groups on the classroom level. In the midst of the United States proceeding from one educational reform to another, the students are still suffering.

The *No Child Left Behind Act* of 2001 (NCLB) was signed into law on January 8, 2002 by former President George Bush, Jr. "reauthorizing the Elementary and Secondary Education Act (ESEA) [of 1965] built on four principles: accountability for results, more choices for parents, greater local control and flexibility, and an emphasis on doing what works based on scientific research" (United States Department of Education Office of the Deputy Secretary, 2004, p. 1). *No Child Left Behind* has yet to be considered fair in reference to ensuring all students learn the same content within the same capacity, while possessing adequate and equal educational experiences (Ladson-Billings, 2007; McNeil, 2000; Meier & Wood, 2004; Thompson, 2004). Porter-Magee (2004) states that the NCLB Act is supposed to afford the opportunity for students to transfer to another school of choice if the zoned school is labeled

"persistently dangerous" (p. 28); however, the state has made a way to prohibit minorities and poor students from participating in this opportunity because of how the state defines "dangerous" so broadly.

Schools are changing from using traditional curriculum (e.g., textbooks) to test preparation materials or prescriptive curricula. The displacement of curriculum to raise test scores may indicate an improvement of test scores, such as in reading, but few of those students are truly readers because they are not using reading to help with assignments in other classes, not reading books outside of class, or not sharing books with friends (McNeil, 2000). A newfound type of discrimination is prescriptive teaching because it substitutes the traditional curriculum, which is considered substantive, in poor schools or schools that are highly represented with minorities (McNeil, 2000). McNeil states that

> standardization produces sameness—and therefore equity—is based on the notion that standardization 'brings up the bottom'…students have to 'get the basics' before they can get to the 'creative' or 'interesting' part of the curriculum. It is here where the effects on low-performing students, particularly minority students, begin to skew the possibilities for their access to a richer education. (p. 731)

As long as inadequate state and federal funding is maintained and the focus of NCLB on standardized tests remains, failure is inevitable (Thompson, 2004). Tests alone cannot measure a student's knowledge, skills, and abilities because many African American students suffer from poor test-taking skills and test anxiety (Thompson, 2004). Therefore, other formal assessments must be administered (e.g., projects, writing assignments, portfolios, individual and group presentations). No Child Left Behind sends the message that standardized tests are the best method of assessment for students; however, it is destroying student learning (Thompson, 2004). Poor schools and schools with underrepresented students are hegemonized to believe that NCLB will ensure that all students will learn to the same high expectations and standards as others and achieve these set goals by 2014.

No Child Left Behind's idea of standards-based education is becoming a burden to teachers because it forces them to adopt practices that de-emphasize their skills and abilities (Marsh & Willis, 2007). Teachers are using commercially produced, scripted teaching materials that require them to teach less content (McNeil, 2000). This practice does not encourage students to be critical thinkers or to make connections with other content that is not being tested.

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Teachers' images have been tarnished because NCLB has favored subject matter over pedagogy (Cochran-Smith & Lytle, 2006). These researchers pinpoint that educators are forced to teach a limited curriculum disregarding all of the wisdom that the teachers and students can add. Teachers are exhausted, confused, and demoralized (Thompson, 2004).

No Child Left Behind sends the message that accountability is the best method of assessment for teachers; however, this measure is destroying teaching efficacy (Thompson, 2004). It is understandable that what is monitored is done and the need for teachers to have a means to measure student performance in the classroom. However, teachers are at a disadvantage, especially on the secondary level because they cannot control the prior knowledge the students possess when they enter the class. For example, if this accountability system is put in place, then a group of students who begin kindergarten a set year should be monitored until they reach the eleventh grade. No Child Left Behind describes clearly the need for "highly qualified" teachers and a process to eliminate teachers if the students are under-performing; therefore, the law plays a major role in the notion that teachers are the problem and the solution (Cochran-Smith & Lytle, 2006). No Child Left Behind contradicts its views concerning accountability in the sense that it promotes a system of alternate routes for teacher certification that rushes the candidate into the environment (usually urban and rural) with little on-the-job or practicum experience, or careful supervision and feedback instead of recommending and funding teacher education preparation programs that afford the opportunity to receive the type of preparation needed to work with diverse populations and become highly qualified (Cochran-Smith & Lytle, 2006). Attention is given to how NCLB impacts teachers because they play a key role in African Americans' access to an equal education and student-teacher relationships.

No Child Left Behind is a comprehensive plan that promises to educate all children and hold teachers accountable, but it fails to address the cultural mismatch between the majority White teaching force and African Americans and the devastating impact that it has on the Black-White achievement gap (Thompson, 2004). The Civil Rights Movement brought about the need for multicultural education. Attempts are made to make curricula culturally diverse; however, African Americans continue to be mis-educated because they are not positively referenced or are being left out altogether. This contributes to African American students becoming disengaged and feeling like they have nothing of which to be proud. Multicultural education and culturally responsive teaching are terms that many White educators describe as confusing and debatable

because of their unwillingness to accept the need for culture to be incorporated into curricula (Thompson, 2004). Educators do not see the need or value of culturally diverse curricula and many are uncomfortable addressing sensitive issues. Thompson (2004) expresses a multicultural education promotes tolerance and exposes students to the diversity among culturally different groups. A curriculum that supports multiculturalism or diversity empowers the students on personal and societal levels. In order for NCLB to close the African American—White achievement gap, the classroom must be a safe, orderly place that is highly conducive to learning (Thompson, 2004). "Too often, school policies and practices, cultural misunderstandings, teachers' teaching strategies, and weak classroom management skills create a climate that is not conducive to learning" (Thompson, 2004, p. 105).

According to Paige and Witty (2010), the Black-White achievement gap closed on a national level from the 1970s through 1980s but stopped in the 1990s. This indicates that this was an "important period in the nation's trek toward racial harmony . . . a period when many major national efforts to reduce poverty, equalize opportunity, and achieve social justice, which had begun just prior to this period, began to bear fruit" (Paige & Witty, 2010, p. 33). These national efforts included:

> school desegregation driven by the 1954 decision of *Brown v. Board* of Education, 1964 Civil Rights Act, 1965 Voting Rights Act of 1965, federally funded Head Start programs, 1965 enactment of Elementary and Secondary Education Act [now called the NCLB Act], state and federally funded compensatory programs for elementary school with high enrollments of low-income children, affirmative action policies for admission to colleges, universities, and professional schools. (Paige & Witty, 2010, pp. 33-34)

African Americans benefited from all these efforts and the Black-White achievement gap was narrowed. Economic factors, social factors, as well as the attitudes that the communities possess about education had an influence on these improvements by African Americans. Paige & Witty (2010) concur with the voices of other African Americans based on their experiences during those time periods with African Americans; not actual research conducted on the issue. For example, African Americans had high hopes and expectations after the major decisions from the acts that were passed. They felt free from bondage, better funding for schools was supported, schools were desegregated, and more opportunities for African Americans were presented because they could now vote or run for elected office (Paige & Witty, 2010).

This section has highlighted some of the major actions that were put in place to provide African Americans an equal and adequate educational opportunity. These efforts represent the measures that were necessary to try to overcome the intractable obstacles that African Americans faced. Although these measures were put in place to help African Americans' progress, inequalities and the academic achievement gap between Blacks and Whites persists.

Statement of the Research Problem

"Forty years after the Civil Rights Act … affirmative actions …, (African) Americans still perform lower than any major racial or ethnic group in the United States, at all ages, in all subjects, regardless of class" (McWhorter, 1997, p. 2). This represents the Black-White achievement gap of African Americans in all subjects. According to the National Governors Association Center for Best Practices (n.d.), the academic achievement gap is classified by race and class where there exists a lack of academic achievement among minorities in comparison to Whites. The United States Department of Education describes the academic achievement gap as academic differences between racial groups (Southwest Educational Development Laboratory, 2008). No formal definition of academic achievement gap exists; therefore, I agree with all of the definitions of the aforementioned sources because the definitions are data-driven. The definitions are data-driven based on the patterns of performance on tests and racial-ethnic demographic disparities over time among Whites and Asians and their Black counterparts and not the knowledge that the individuals possess (Lindsey et al., 2008).

A great need exists for White teachers to learn how to teach African Americans, especially African American males. White teachers must understand the behavior that they exhibit is not always because of the need for medication or as a result of a psychological or emotional disorder (Thompson, 2004). Hale (2001) argues that White teachers know how to teach; however, they need to put forth the same effort, love, and support for African Americans that they do for White children in white environments. There is a plethora of research on strategies to improve academic achievement and culturally responsive teaching. Little has been studied about the effectiveness of culturally responsive teaching to improve the academic achievement of African Americans in science; therefore, more information is needed on this topic.

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Purpose of the Study

There are many incidents that marginalize African Americans' opportunities for an equitable education, and laws, acts, and events have attempted to resolve these issues and afford African Americans access to an equal education. A number of theories have attempted to explain the causes of the Black-White achievement gap. Over the years, research has been conducted and reform efforts have been incorporated. None of the attempts thus far have closed the Black-White achievement gap, but evidence indicates how teaching strategies can be implemented along with culturally responsive teaching to support these efforts. Little is known about the implications that culture can have on science achievement. Hillard (1995) attests that a relationship between the influence of culture and learning exists. This suggests additional research is needed on the impact that culture could have inside science classrooms and on science achievement (Thompson, 2004). Teachers need to explore other techniques and strategies to improve science achievement because the Black-White gap still exists with current practices. This proposed research sought to identify the barriers that educators have about the notion that all children can learn and using culturally responsive teaching to achieve this goal. Therefore, this research provides a context to address the theories proposed to explain the underachievement of African Americans and expand the strategies used to improve African American achievement in science.

Research Questions

This case study investigated what is taking place in seventh-grade science classrooms in an attempt to understand the impact that teaching and learning have on African American science learning. This study was guided by three research questions. In examining the teaching strategies and the extent of those practices reflecting culturally responsive teaching, the overall research question was: What teaching strategies are being used in seventh-grade regular and advanced science classrooms that impact African American student learning? The following sub-questions also were addressed in this study:

1. What do teachers think about the teaching strategies they employ to teach African American students?
2. What do African American students think about the teaching strategies that are used by their science teachers to impact their science learning?

3. To what extent do seventh-grade teachers' teaching strategies reflect culturally responsive teaching?

Methodology

Chapter Three explains thoroughly the details of the methodology that was utilized in this research. This study was a case study analysis examining two regular and one advanced seventh-grade science classroom of one Alabama school for six weeks. All three classrooms contained at least a 20% African American population. Observations of the teaching strategies used in seventh-grade science were conducted daily. Two semi-structured individual interviews took place with the teachers and African American students over the six-week period (first individual interview after week one of observations and the second individual interview during week six of observation period). All student individual interviews took place outside of the times scheduled to observe the seventh-grade regular and advanced science classes.

Concerns about this research study were considered and special care was taken to ensure participants were comfortable and did not feel pressured due to the nature of the subject—underachievement of African Americans in science. This study assumed: (a) All teaching participants would conduct the instructional process in their normal teaching style; (b) All participants would answer the individual interview questions honestly; and (c) All responses provided by participants would reflect their own beliefs and be based on their own experiences. Critical Race Theory was the framework used to interpret and analyze collected data.

This qualitative case study was conducted to investigate teaching and learning in seventh-grade science classrooms and its impact on African American student learning. The extent to which the teaching strategies used reflect culturally responsive teaching also was examined in the observations. Throughout the study, I was an active observer and listener of teaching strategies and student-teacher interaction to determine: (a) what teaching strategies improved science achievement of African Americans, and (b) if culturally responsive teaching strategies were used in the learning process. One school was selected for this study and its selection was based on the school's performance on the Alabama Science Assessment (ASA) for the past five years. An average school was selected, so I could observe students from all socioeconomic backgrounds. The assistant principal selected the advanced teacher to participate in this study because there was only one advanced teacher at the participating school and she also was the

science department chairperson. The advanced teacher/science department chairperson selected the regular teacher participant based on her years of experience and students' passing rate on the ASA. Both teacher participants recommended all of their African American students from each class observed to participate in the research. A total of ten African American seventh-grade science students were interviewed individually (three out of four advanced students and seven out of eleven regular students).

Definition of Terms

The following terms have been defined for the purpose of clarity in the presentation of this dissertation study:

Achievement gap: "A significant difference between two or more groups as measured by an academic achievement test" (Lindsey, Graham, Westphal, & Jew, 2008, p. 196).

Adequate: "Lawfully and reasonably sufficient" (http://www.merriam-webster.com/dictionary/adequate).

African American: Being a member of a group or race that is American and of African descent. It is used synonymously with the term Black (http://www.merriamwebster.com/diction ary/african%20american).

Assessment: "The formal or informal process of collecting evidence about student progress, analyzing and evaluating progress, communicating about progress, and adjusting teaching practice based on reflection on a teacher's practice" (California State University-Fullerton, 2010). In this study, assessment refers to standardized tests, tests given by the teacher, student assignments, and feedback from participants (California State University-Fullerton, 2010).

Average-performing school: A school identified as producing an average number of students that perform at or above Proficiency on the National Assessments of Educational Progress, Alabama Science Assessment, and Alabama High School Graduation Exam.

Best teaching strategies: The "general principles, guidelines, and suggestions for good and effective teaching based upon the systematic study of instruction and learning" (http://www.mondofacto.com/facts/dictionary?instructional+ best +practices). It is used synonymously with the term best practices. In this research study, this term includes academic and behavioral practices that affect teaching and learning.

Black-White achievement gap: A significant difference in academic achievement of Black students in comparison to the academic achievement of White students (Lindsey, Graham, Westphal, & Jew, 2008).

Content standards: Standards identified and adopted by the state that informs the knowledge and skills needed in order to master a skill at a certain grade level (California State University, Fullerton, 2010). This term is used synonymously with academic content standards.

Critical Race Theory: A theory that "allows scholars to interrogate social, educational, and political issues by prioritizing the voices of participants and respecting the multiple roles held by scholars of color when conducting research" (Chapman, 2007, p. 157).

Culturally responsive teaching: "Using the culture knowledge, prior experiences, frame of reference and performance styles of ethnically diverse students to make learning encounters more relevant and effective for them" (Gay, 2000, p. 29). This term is used interchangeably with culturally relevant pedagogy, culturally relevant teaching, culturally responsive pedagogy, and multicultural curriculum.

Equality: In terms of social order, an impression of being fair in how essential supplies and assistance are dispersed (Edmonds, 1979).

Equity: "Freedom from bias or favoritism" (http://www.merriam-webster.com/dictionary/equity?show=0&t=1301960354).

Group work: A teaching method where students work together in heterogeneous groups to learn or master a skill that is taught.

High performing school: A school that has been identified as producing a large number of students that perform at or above Proficiency on the National Assessments of Educational Progress, Alabama Science Assessment, and Alabama High School Graduation Exam.

Independent work: A teaching method where students work alone on a task to learn or master a skill that is taught.

Low performing school: A school that has been identified as producing a small number of students that perform at or above Proficiency on the National Assessments of Educational Progress, Alabama Science Assessment, and Alabama High School Graduation Exam.

National Assessment of Educational Progress (NAEP): "The largest nationally representative and continuing assessment of what America's students know and can do in various subject areas. Assessments are conducted periodically in mathematics, reading, science, writing,

the arts, civics, economics, geography, and U.S. history. Since NAEP assessments are administered uniformly using the same sets of test booklets across the nation, NAEP results serve as a common metric for all states and selected urban districts. The assessment stays essentially the same from year to year, with only carefully documented changes" (NCES, 2010).

Practices: Patterns of professional activity or professional performance to include the design and enactment of professional activity, the situational and cultural context of the activity, and the outcomes from the students (Murrell, 2002).

Race: "Phenotypic make-up of individuals and has been used as a political category" (Hilliard, 1995, p. 99). This term also is used interchangeably with ethnicity throughout the dissertation. This word is socially constructed—not a biological or scientific reality.

Racism: "A system of advantage based on race" (Tatum, 1997, p. 7).

Science State Assessments: Yearly standardized assessments that are developed on a state-level using state standards in science for grades three through eight and at least once on the high-school level (National Center for Educational Statistics, 2006, 2010).

Standardized exam: A criterion-referenced exam that is used as an attempt to measure a student's overall cognitive ability (LeTendre & Lipka, 2000).

Teaching strategies: "A combination of instructional methods, learning activities, and materials that actively engage students and appropriately reflect both learning goals and students' developmental needs" (California State University-Fullerton, 2010). This term is used synonymously with the term teaching strategies.

Unit of Study: "A group of related lessons supported by a common goal or theme" (California State University, 2010).

White: Being a member of a group or race characterized by light pigmentation of the skin; of, relating to the characteristics of people or their culture with European descent (http://www.merriam-webster.com/dictionary/white).

Limitations and Delimitations of the Study

Limitations of a research study are circumstances that may have effects on the results of the study or restrict the magnitude of the study. Three limitations are identified in this study. The first limitation was that the researcher is African American and individual interviews were conducted with White teachers and that may cause them to feel uncomfortable and not answer

the questions or provide comments honestly. A related limitation was researcher bias because I am African American and am informed about how I believe science should be taught to African Americans to improve their academic achievement. A third limitation was that the advanced seventh-grade science teacher was available for approximately four and one-half weeks of my data collection period instead of six weeks due to an eight-week maternity leave of absence.

Delimitations are restrictions that the researcher inflicted on the study before it began to narrow the magnitude of the study. Two delimitations were identified in this study. The first delimitation deals with sampling because I used only one school district and one school, which meant the data gathered and my findings may not be generalizable to other school districts in the State of Alabama or other states. A second delimitation is that this study was qualitative, which meant that the significance of the teaching strategies and culturally responsive teaching on science learning could not be determined quantitatively. A third delimitation was that this research was conducted during the second semester and third nine-week period, which also meant that I would not have the experience to see how the teacher interacted with the students to get to know them at the beginning of the school year or how she became familiar with their academic levels and preferred learning styles. A fourth delimitation of this study was that the data were collected on specific chapters within the diversity of life unit of study (plants and animals) over a six-week period instead of the entire unit or all the science units of study taught during the entire school term.

Although delimitations and limitations restrict a study, using one school district and one school afforded me, the researcher, the opportunity to make a deeper and more comprehensive investigation of the participants. I examined, on a smaller-scale, what took place in seventh-grade science classrooms to understand better the Black-White achievement gap, why the gap may persist, and ways to improve African American student learning. Many reform efforts are already in place; however, the achievement gap continues. It was my desire to find out what was actually taking place in science classrooms of average to high-performing African Americans to identify the teaching strategies implemented that are improving science learning and those that are or having no effect on science learning. The findings have the potential to reveal results on science learning of seventh-grade African Americans and possibly be applied to other science levels and other disciplines.

Significance of the Study

Teaching is not a profession that can be taught in steps that will ensure all participants the same success. It is a profession that requires personal reflection about oneself, what his or her role is, how he or she will fulfill that role, and the art of fulfilling that role. Palmer (1998) captures my attention in his chapter titled, "Divided No More," when he states:

> we have met the enemy and the enemy is us.…the moment we decide to stop being our own enemy, we free ourselves from institutional constraints and gain power to confront the institution.…many educators love education too much to let it sink to its lowest form.… they are sparking a movement for educational reform by deciding to live divided no more. (p. 170)

My research may encourage others to "Divide No More," by teaching in ways that reflect their deepest values and beliefs instead of conforming to society and violating one's inner integrity, and making a commitment to ensure all children are learning and achieving academic success. Children are our future and the greatest investment that educators can make is educating our future. The negative consequences that the people will suffer due to children who are illiterate or not educated are far worse than the choice to become a teacher who differentiates instruction and teaches in a culturally responsive way—strategies through which all students can learn effectively. Research that provides findings that cultural competence exists is limited. Findings from this proposed study will contribute to the knowledge base on teaching strategies that improve science learning of African American students, including culturally responsive teaching. This study contributes to the body of knowledge on culturally responsive teaching by presenting culturally responsive teaching strategies that have indicated practices to improve science achievement of African Americans and possibly be beneficial to all students.

Researcher's Perspective

I began this dissertation with a personal/professional prologue because researching for this literature review brought increasing frustration and constant reflection of my educational and teaching experiences. The prologue identified the subjective basis for my study and brings further credibility to the findings of this study. I had few Black teachers throughout my K-12 learning experience. I entered the education profession because I had many teachers that I considered to be poor teachers due to their lack of interest in my learning experience or the

learning experience of African Americans. I wanted to become that teacher who was the exact opposite—an effective teacher that cares and meets the needs of all students. It is noted widely that socioeconomic factors play a major role in the under-achievement of African Americans, but many people are unwilling to accept the idea that race, gender, sexual orientation, and religion also matter when it comes to curriculum development, how students learn, and how students are taught. This leads me to the unanswered question of: Why do I continue to score low on standardized tests if socioeconomic factors (i.e., parental involvement, health insurance, hygiene, family's educational level, suburban lifestyle) do not play against me?

Teaching science in Alabama, Florida, Georgia, Kansas, and Texas, I noted a pattern of under-achievement in science of African Americans except in my classes, which caused me to question what was actually taking place in other science classrooms. Do teachers care about African American students? Do they teach them in a manner in which they can learn? Do they actually think some African American students cannot learn? What are their perceptions about African American achievement? What are teachers' perceptions of the No Child Life Behind Act (NCLB) and the Black-White achievement gap? Are teachers aware of how their attitudes, beliefs, and teaching styles affect African Americans' ability to learn? Are teachers willing to change their attitudes, beliefs, and teaching styles to ensure African Americans learn?

This personal and professional background inspired me to research improving academic achievement of African Americans in science. I am a firm believer that nobody will care more about you than yourself. After teaching science for the past twelve years, I observed that my students, including African Americans, pass standardized examinations and are academically successful, but failing with teachers of other ethnic groups that teach the same subject. This drove my interest in researching what is needed to improve African Americans' academic achievement and the professional development of teachers to teach diverse populations. I concur with the title of the book, *We Can't Teach What We Don't Know: White Teachers, Multiracial Schools,* by Gary Howard (2006) because people are not born prejudiced or racist; therefore, I believe strongly that all teachers would teach in a manner in which all students could learn if they were equipped with the necessary knowledge and understanding. Abraham Lincoln (n.d.) once said, "I will study and get ready, and perhaps my chance will come." That simple philosophy has been the focus of all of my educational goals. I have set goals, nurtured them, and now it is time for me to broaden my horizon. I hope and pray that I will play an integral role in

the improvements of academic achievement in science and closing the African American achievement gap.

Organization of the Study

This research investigated the impact of teaching strategies in seventh-grade science on African American student learning and to what extent those teaching strategies reflect culturally responsive teaching. This chapter included an overview of the issues, statement of the research problem, purpose of the study, research questions, methodology, definitions of terms, limitations and delimitations, significance of the study, researcher's perspective, and organization of the study.

Chapter Two reviews the relevant research literature related to teaching strategies that improve science learning, including culturally responsive teaching. The theoretical framework, Critical Race Theory, is discussed. Other theoretical views that shape the framework for this study are discussed followed by specific research studies related to the topic.

Chapter Three describes in detail the research methodology that guided this study and includes a comprehensive description of the research design, data collection, and how the data was analyzed. This chapter provides researchers with all the details that are necessary to replicate the study and comprehend the study to expand it further.

Chapter Four presents the findings from my research. This chapter reveals the teacher participants' perceptions about the teaching strategies that they believe impact African American student learning. The student participants' perceptions about the teaching strategies that they believe impact their science learning also are revealed.

Chapter Five explains the findings from this study in detail. The teaching strategies that impacted African American science learning are discussed. This chapter also discusses the aspects of culturally responsive teaching implemented by the teachers in their science classes. Lastly, implications for future research and recommendations for science educators, administrators, classroom teachers of other disciplines, and policymakers are addressed.

Chapter 2 —Literature Review

This chapter presents a review of the literature on teaching strategies that impact student learning. The theoretical framework for analysis and interpretation in this study is discussed in detail. Because this study is focused on African American student learning, the teaching strategies that improved their science learning are emphasized. Researchers propose best teaching strategies in concert with culturally responsive teaching to improve African American student learning (Gay, 2000; Hale, 2001; Ladson-Billings, 1999); however, a Black-White achievement gap still persists (Haycock, 1998; Lindsey et al., 2008; Thernstrom & Thernstrom, 2003). Because the Black-White achievement gap continues, this research study investigated what was taking place in seventh-grade science classrooms. The teaching strategies implemented in seventh-grade classrooms that impacted African American student learning were observed. While there is well-developed literature on culturally responsive teaching and its impact on African American student learning, more research is needed to reveal culturally responsive teaching strategies that improves African Americans' achievement in science (Cartledge & Lo, 2006; Davis, 2006; Gay, 2000; Hale, 2001; Ladson-Billings, 1999; McKinley, 2010; McREL, 2000). With this study, the teaching strategies that were implemented in the seventh-grade science classrooms were examined to see the impact they had on African American student learning and the extent those teaching strategies reflect culturally responsive teaching.

This review of the literature begins with Critical Race Theory because it is the framework used to interpret and analyze the data. It is followed by other theories that contributed to the development of culturally responsive teaching. Culturally responsive teaching is discussed in detail because that is the focus of the research. To understand better how culturally responsive teaching is conducted, culturally responsive teaching strategies are reviewed. To make a connection between the achievement gap and culturally responsive teaching, studies of culturally responsive teaching in the classroom are shared to inform readers how it can improve student achievement in science.

Theoretical Framework

Researchers differ on the causes of the African American achievement gap and the academic steps necessary to close the achievement gap. Theory and practice together achieve

results in education. Theory provides explanations for why educators do what they do, while practice is the act of applying the theory. There are a number of theories that shape the understanding of the Black-White achievement gap. In this study, Critical Race Theory was used as the lens for the analysis and interpretation of the data. Other theories that inform this study are Vygotsky's (1978) theory of effective teaching and learning, John Dewey's (1916, 1934, 1938) theory of experience, deficit-deprivation theory, cultural-deficit theory, cultural mis-match theory, and parents-at-fault theory.

Critical Race Theory

Critical Race Theory (CRT) expanded from critical theory because of power issues, white feminists, black feminists, and Critical Legal Studies (CLS), a legal movement. Critical Legal Studies arose during the Vietnam War and Civil Rights Movement era from a group of white law professors that isolated themselves from liberal advancements, which were dominant in law and legal education, arguing that there needed to be a change from one group dominating another group of individuals. Critical Legal Studies is a style of law specific to populations in social and cultural contexts, which challenges the traditional legal doctrines and policy analysis (Gordon, 1990; Ladson-Billings, 1999). Critical Legal Studies scholars criticized principles of the mediocre depiction of the United States, but this particular group did not address racism, whereas Critical Race theorists do (Delgado & Stefancic, 2001; Edwards & Schmidt, 2006; Lynn & Parker, 2006; Milner, 2007; Solorzano & Yosso, 2001a; & Vann Lynch, 2006).

Critical Race Theory originates from the dissatisfaction of underrepresented legal scholars. Due to concern for racial reform in the United States, Critical Race Theory began in the mid-1970s by legal scholars, Derrick Bell, Alan Freeman, Richard Delgado, and Kimberlé Crenshaw (Delgado & Stefancic, 2001). They argue that the old ways of causing change, such as conducting marches or protests, do not produce progressive gains. The 1960s Civil Rights Movement addressed racial injustices of minorities but Critical Race Scholars believed that their efforts were too slow in yielding results; therefore, they analyzed race, racism, and how minorities were treated (Matsuda, 1991). Critical Race theorists do not believe the Constitution and legal system have the ability to cause change. Thereafter, other scholars joined the efforts.

There is no "canonical set of doctrines or methodologies to which all [Critical Race Theory scholars] subscribe" (Crenshaw, Gotanda, Peller, & Thomas, 1996, p. xiii). The purpose and goal of Critical Race Theory is

> the work of progressive legal scholars of color who are attempting to develop jurisprudence that accounts for the role of racism in American law and that work towards the elimination of racism as part of a larger goal of eliminating all forms of subordination. (Matsuda, 1991, p. 1331)

Critical Race Theory critiques liberalism's idea that there are no procedures for change, such as eradicating racism, but that dominant preferences support legal efforts that result in slow progression to gain minorities' citizen rights (Ladson-Billings, 1998, 1999). In reference to equality, CRT calls for uncompromising change opposed to gradual change because the slow progression is agreeable and satisfactory to the White majority—the individuals in power (DeCuir & Dixson, 2004). Critical Race Theory argues that Whites benefit from legislation due to civil rights (Delgado & Stefancic, 2001). For example, affirmative action has helped more White women than minorities, which supports the argument that Whites and their households benefit (Guy-Sheftall, 1993). On a national level, Hacker (1992) claims that only 933 (3.8%) out of 24,721 doctoral degrees were granted to African Americans and the majority of the degrees conferred were in educational leadership and the doctoral students continued to practice in schools.

Though several tenets have been proposed, Matsuda, Lawrence, Delgado, and Crenshaw (1993), in concert with Delgado and Stefancic (2001), agree on six basic tenets of Critical Race Theory:

1. Critical Race Theory recognizes that racism is endemic to American life.
2. Critical Race Theory supports the theory of interest-convergence.
3. Critical Race Theory challenges ahistoricism and insists on a contextual/historical analysis.
4. Critical Race Theory insists on recognition of the experiential knowledge of people of color and our communities of origin and often takes the form of storytelling or counterstorytelling.
5. Critical Race Theory is interdisciplinary and intersectional.

6. Critical Race Theory works toward social transformation—eliminating racial oppression as part of the broader goal of ending all forms of oppression.

Tenet One: Racism is Normal

The first tenet deals with the prevalence of racism: "Racism is normal, not aberrant in American society" (Delgado, 1995, p. xiv; Delgado & Stefancic, 2001, p. 7). Vann Lynch (2006) and Solarzano and Yosso (2001b) concur that racism is normal. Milner (2007) also agrees that racism is "endemic, pervasive, widespread, and ingrained in society and thus in education" (p. 390). Because of the United States' social order, racism appears normal, natural, and as an everlasting fixture of American lifestyles (Bell, 1992). "Racism is ordinary, not aberrational— "normal science," the usual way society does business, the common, every day experience of most people of color in this country" (Delgado & Stefancic, 2001, p. 7). Minorities experience racism every day; therefore, the dominant group—Whites—are blinded that it exists unless it is obvious (Delgado & Stefancic, 2001; Harrell, 2000). "Critical Race theorists are less surprised by the actual presence of racism as by the rare instances of its absence or decreased influence" (Broido & Manning, 2002, p. 440). This tenet "seeks to explain how every day artifacts, values, interests, and ideas serve as mechanisms of racism" (Munoz, 2009, p. 57). The strategy for Critical Race Theory is to uncover and reveal racism (Ladson-Billings, 1999).

Tenet Two: Interest-Convergence

The second tenet often is referred to as interest-convergence, which implies that the dominant group will change only when it benefits them. Lopez (2003) refers to interest convergence as the "self-interests of Whites" (p. 84). Bell (1980) describes interest convergence as a means where conditions for White people and minorities intersect. Bell's argument is that minorities should begin to set the conditions of interest convergence instead of accepting or compromising based on the recommendations of Whites. For example, in order to get Whites to desegregate, special programs or incentives (e.g., magnet schools, advanced placement (AP), international baccalaureate (IB), before/afterschool care) must be implemented to ensure the best interest of the majority. Interest convergence is "an analytical construct that considers the motivating factors...to eradicate racial discrimination or provide remedies for racial injustice" (Donnor, 2005, pp. 57-58). Whites do not disagree that minorities should be protected by the United States Constitution or that policies need to be in place to protect them; however, they

oppose any changes that affect White privilege (Milner, 2007). Lopez (2003) supports this claim by stating, "Whites will tolerate and advance the interest of people of color only when they promote the self-interest of Whites" (p. 84). Ladson-Billings (1998) provides an example of the State of Arizona reversing their decision not to recognize the Martin Luther King Jr. holiday after the National Basketball Association (NBA) stated that they would not hold the All-Star Game and the National Football League (NFL) would not hold the Super Bowl there if the day was not honored. The State of Arizona easily reversed their firm decision and compromised when they thought of all the revenue that would be lost—self-interest.

Interest convergence emerges as "the thesis pioneered by Derrick Bell that the majority group tolerates advances for racial justice only when it suits its interest to do so" (Delgado & Stefancic, 2001, p. 149). Bell (2004) stated two rules for interest-convergence:

Rule 1: The interest of blacks in achieving racial equality will be accommodated only when the interest converges with the interests of whites in policy-making positions. This convergence is far more important for gaining relief than the degree of harm suffered by blacks or the character of proof offered to prove that harm. Rule 2: Even when interest-convergence results in an effective racial remedy, that remedy will be abrogated at the point that policymakers fear the remedial policy is threatening the superior societal status of whites particularly those in the middle and upper classes. (p. 69)

Bell (2004) referenced these rules as "silent covenants that differ so much in result are two sides of the same coin. The two-sided coin, with involuntary racial sacrifice on the one side and interest-convergent remedies on the other" (p. 69). "Because racism advances the interests of both white elites (materially) and working-class people (psychically), large segments of society have little incentive to eradicate it" (Delgado & Stefancic, 2001, p. 7).

Taylor (2000) states that civil rights activists would like progress to be acknowledged while traditionalists are reluctant to recognize their selfishness.

People in power are often, in discourse, supportive of research, policies, and practices that do not oppress and discriminate against others as long as they—those in power—do not have to alter their own systems of privilege; they may not want to give up their own interests to fight against racism, confront injustice, or shed light on hegemony. (Milner, 2007, p. 391)

A landmark court case, *Brown v. Topeka Board of Education*, is a common reflection of interest convergence. Bell (1980, 1992) hypothesizes that the outcome of this case was not because the American public and judicial system were making a moral step forward but because they needed to improve America's image to the rest of the world and deflect the risk of racial discontent within the United States. During the time of this case, the United States recently had concluded a World War so America could not afford to tarnish its image and lose the loyalty of the uncommitted Third World countries by seeing media of lynchings, murders, or malicious acts on peaceful civil rights leaders, such as Martin Luther King, Jr. or Rosa L. Parks. Interest convergence also could be joining forces with people in opposing ideologies for a common interest. An example of this would be different religious faiths (e.g., Christians, Muslims) coming together to ban the legalization of gay marriages.

Tenet Three: Contextual-Historical Analysis

The third Critical Race Theory tenet is the necessity of historical analysis grounded in a historic context (Bowman, 2001). This tenet provides important information about the past and how the past impacts the future. According to Critical Race theorists, history has had an effect on present inequalities and social traditions constituting a benefit and challenge to social groups based on race (Bowman, 2001; Matsuda et al., 1993). Critical Race theorists suggest taking historical accounts and grasping the opportunity to include or celebrate marginalized groups that are revealed. For example, there are monuments in Washington, D.C. of people that impacted America (e.g., Abraham Lincoln and Franklin Roosevelt) while there was never a monument of a noted underrepresented individual until 2011 when the Martin Luther King, Jr. monument (Mountain of Despair, Inscriptions on the Wall, and the Stone of Hope) was erected. This tenet advocates taking the opportunity today to redeem society from such discoveries. Critical Race theorists "seek to illuminate untold stories about marginalization and oppression in an effort to liberate the oppressed and dismantle the racist status quo" (Munoz, 2009, p. 58).

Tenet Four: Storytelling – Counterstorytelling

The fourth tenet of Critical Race Theory informs how underrepresented individuals can use storytelling to describe their experiences with racism (Delgado & Stefancic, 2001). African Americans have a "unique voice of color—because they are able to communicate to their white counterparts matters that the whites are unlikely to know" (Delgado & Stefancic, 2001, p. 9).

Dixson and Rousseau (2006) call the act of African Americans sharing their experiences with those that cause adversity counterstorytelling and emphasize that it is psychologically beneficial. Counterstories are "means to examine elements of strength and possibilities for success in various educational settings" (Chapman, 2007, p. 160). Munoz (2009) recommends these stories be shared face-to-face because intersections of identities could become clear. These stories grant others to see inside the storyteller, who has a different view of the story, offering understanding of the individual and what he or she has endured. Counterstories serve four functions that are categorized as theoretical or methodological:

- They can build community among those at the margins of society by putting a human and familiar face on educational theory and practice;

- They can challenge the perceived wisdom of those at society's center by providing a context to understand and transform established belief systems;

- They can open new windows into the reality of those at the margins of society by showing the possibilities beyond the lives of the hearers, showing that they are not alone in their position; and

- They can teach others that by combining elements from both the story and current reality, one can construct another world that is richer than either the story or the reality alone. (Solorzano & Yosso, 2001a, p. 475)

Solorzano and Yosso (2001a) dispute that "traditional claims [referencing colorblindness] act as a camouflage for the self-interest, power, and privilege of dominant groups in United States society" (p. 472). Colorblindness follows the notion that one recognizes race but ignores its existence. Delgado and Stefancic (2001) describe the injustice behind colorblindness as:

> Critical race theorists hold that colorblindness will allow us to redress only extremely egregious racial harms, ones that everyone would notice and condemn. But if racism is embedded in our thought processes and social structures as deeply as many crits believe, then the 'ordinary business' of society—the routines, practices, and institutions that we rely on to effect the world's work—will keep minorities in subordinate positions. (p. 22)

Critical Race theorists view colorblindness as a "technique for combating racial subordination" (Gotanda, 2000, p. 35) and a way to conserve domination over minorities (Bell, 1992; Delgado & Stefancic, 2001; Gotanda, 2000). This frame of thinking—colorblindness—supports the interest of Whites and supports oppression for African Americans.

Critical Race Theory is separate from legal scholarship in that storytelling is utilized at times to "analyze the myths, presuppositions, and received wisdoms that make up the common culture about race that invariably render blacks and other minorities one-down" (Delgado, 1995, p. xiv). "Critical Race theorists…… integrate their experiential knowledge, drawn from a shared history as 'other' with their ongoing struggles to transform a world deteriorating under the albatross of racial hegemony" (Barnes, 1990, pp. 1864-1865). Through the use of storytelling, one is able to help others understand the experiences that minorities endure. Delgado and Stefancic (2001) emphasize that it is not easy to inspire White people to change their views on certain topics. Storytelling is acclaimed to be a way to cause others to change their beliefs about race (Ladson-Billings & Tate, 1995). These authors also state that "stories by people of color can catalyze the necessary cognitive conflict to jar dysconscious racism" (Ladson-Billings & Tate, 1995, p. 58). This tenet of Critical Race Theory is important because many times the White majority is unaware of racism because they never experienced it and they are not mindful of the privileges of being a majority. Storytelling in Critical Race Theory "makes use of the experiences of people negatively affected by racism as a primary means to confront the beliefs held about them by whites" (Taylor, 1998, p. 122). Solórzano and Yossi (2001b) share "Critical Race Theory challenges us [educators] to look for many strengths within students and communities of color in order to combat and eliminate negative racial stereotypes" (p. 7). Delgado (1989) believes that storytelling is the only approach in which Whites can "acquire the ability to see the world through others' eyes" (p. 2439).

Tenet Five: Interdisciplinary and Intersectionality

The fifth tenet "draws on multiple veins of discourse to form their ideologies" (Munoz, 2009, p. 59). This affords the creation of more meaningful spaces. Matsuda et al. (1993) state that Critical Race Theory's interdisciplinary nature derives from "liberalism, law and society, feminism, Marxism, poststructuralism, critical legal theory, pragmatism, and nationalism" (p. 6). Critical Race Theory uses "ethnic studies, women's studies, sociology, history, law, and other fields to guide research that better understands the effects of racism, sexism, and classism in education" (Solorzano and Yosso, 2001a, p. 473). This tenet upholds that interdisciplinary techniques should be used to delve into the historical and present perspectives of racism (Matsuda et al., 1993).

Delgado and Stefanic (2001) describe intersectionality as the "examination of race, sex, class, national origin, and sexual orientation, and how their combination plays out in various settings" (p. 51). Each of the areas that are examined in intersectionality reveals the complex layers of oppression. For example, I am African American, a female, a Democrat, raised fatherless due to my father's death when I was seven years old, and was once a single-parent; therefore, I can experience racism or discrimination because I possess these characteristics. Intersectionality seeks to address how these different variables, such as race and racism, work together and through gender, class, national origin, and sexuality to disempower people. According to Delgado and Stefancic (2001), "everyone has potentially conflicting, overlapping identities, loyalties, and allegiances" (p. 9). Counterstories expose the complexity of intersectionality that occurs with minorities.

Tenet Six: Social Transformation

The sixth tenet deals with the elimination of oppression (Munoz, 2009). Matsuda et al. (1993) state that "Critical Race Theory works toward eliminating racial oppression as part of the broader goal of ending all forms of oppression through social transformation" (p. 6). This tenet is dedicated to eradicating "all forms of racial, gender, language, generation status, and class subordination" (Solorzano, Villalpando, & Oseguera, 2005, p. 275).   Ladson Billings and Tate (1995) claim that it is impractical to acquire "justice for the oppressed while simultaneously permitting the hegemonic rule of the oppressor" (p. 62). The primary goal and purpose of Critical Race theorists is to bring all forms of oppression to an end (i.e., race, gender, and class).

Critical Race Theory in Education

Critical Race Theory was introduced in education by arguing that race persists to be an issue in today's society where the nation is built around property rights as opposed to human rights, and the connection between property and race is an influential mechanism to explain social and educational inequities (Ladson-Billings & Tate, 1995; Tate, 1997). Educators are uncomfortable with identifying and recognizing student differences, thus they need a theory of race in order to understand racial inequalities (Rolon-Dow, 2005). King (1991) describes these behaviors by educators as dysconscious racism, "an uncritical habit of mind that justifies inequity and exploitation by accepting the existing order of things as a given" (p. 135). Carter and Goodwin (1994) describe the behaviors by educators as the inferiority paradigm, which is a

belief that is "grounded in the assumption that visible racial/ethnic people are limited biologically and are genetically inferior in comparison with Whites (p. 294). Tate (1997) refers to the inferiority paradigm as an "ever-changing hegemonic discourse" (p. 199). Valdivia (2002) argues that White middle-class males are what the American standard is based upon; therefore, measurement tools are used on all ethnic groups with minor changes for different cultures. Padilla and Lindholm (1995) expound on how factors such as social class, gender, cultural orientation, and English proficiency should be acknowledged; yet, they are considered irrelevant and often unnoticed.

Lynn and Parker (2006) state that Critical Race Theory is pertinent for education and is based on four factors:

- The link between the work done by both Critical Legal Scholars and education scholars concerned with racism in education;
- Explaining the role of Critical Race Theory as a scholarship designed by people of color for people of color;
- Using Critical Race Theory to add to other research on race in connection with education and inequalities; and
- Continuing to conduct research to expand knowledge and relevance to those oppressed. (pp. 269-270)

Critical Race Theory is no longer a movement restricted to the profession of law. It is now used as a way to analyze and interpret literature in education, cultural studies, English, sociology, comparative literature, political science, history, and anthropology (Delgado & Stefancic, 2001). Bell (1992) refers to Critical Race Theory as a "new scholarly song—even if to some listeners, its [Critical Race Theory] style is strange" (p. 144). Critical Race Theory is not naïve in the sense that it suggests racism can be removed from society by eliminating ignorance or recommending all people to fellowship with one another.

Critical Race Theory is a theoretical framework that "allows scholars to interrogate social, educational, and political issues by prioritizing the voices of participants and respecting the multiple roles held by scholars of color when conducting research" (Chapman, 2007, p. 157). Chapman (2007) also believes that using Critical Race Theory "allows the researcher to evoke the personal, the professional, and the political to illuminate issues of race, class, and gender" (p. 157). There are three main objectives of Critical Race Theory: (a) depicting prejudiced acts from

the view of the underrepresented; (b) eliminating the suppression of race while recognizing at the same time that race is a social construction; and (c) bringing attention to all other forms of differences within individuals, such as gender and class (Parker & Lynn, 2002).

Using Critical Race Theory to analyze and interpret this qualitative case study research, student-teacher interactions of African Americans can be interrogated and provide a more in-depth examination of what is taking place in the seventh-grade African American science classrooms, both positively and negatively. The data that was collected, analyzed carefully, and interpreted is shared through the lens of race-based epistemology (Chapman, 2007; Ladson-Billings, 2000b; Solorzano & Yosso, 2001b; Tate, 1997).

Critical Race Theory emphasizes how minorities surpass structural obstacles and establish success for themselves, as well as others (Delgado & Stafancic, 2001). Examples of structural obstacles are teacher knowledge, curricular reforms, and school contexts. Critical Race Theory takes contexts, such as family, classroom, and political influence that affect students' ability to learn, students' views and reflections of themselves into account (e.g., political events, personal histories, societal norms, law, and policies) (Chapman, 2007). Critical Race Theory asks the researcher to be self-revelatory so he or she can recognize the consciousness of operation (Ladson-Billings, 2000b). For instance, the reasoning behind my choice to use Critical Race Theory as a theoretical framework for my study is to connect my personal and political understandings of African American educational experiences and my educational experiences as an African American student. As Ladson-Billings (2000b) described, being self-revelatory, I am incorporating myself in this research: an African American, a woman, a researcher, a parent, an educator, and a community member.

Critical Race theorists are committed to social justice (Chapman, 2007). My research-based goal is to inform teachers of teaching strategies that increase science achievement that are culturally responsive. This can be accomplished by using storytelling as a way to address negative perceptions of African Americans and to address failure (Chapman, 2007). Solorzano and Yosso (2001b) claim "Critical Race Theory challenges us (teachers) to look for the many strengths within students and communities of color in order to combat and eliminate negative racial stereotypes" (p. 7). These strengths can be identified in the stories of students about their lives and educational experiences. Teachers that are not aware of the students' stories tend to form false opinions or views that misrepresent the student.

Teachers do not want to be judged as a group, so we the reviewers wonder why some teachers tend to do this to students. Critical Race Theory is about learning to listen to other people's counter stories and finding ways to incorporate these stories to improve the educational experiences of students of color. (Edwards & Schmidt, 2006, p. 409)

A Native American proverb (author unknown)—Never judge a man until you have walked a mile in his moccasins—supports the idea that one cannot begin to understand what another endures until he/she experiences it. A White individual can never understand the impact of how certain words affect African Americans (e.g., "N" word, slave) or how it feels to be rejected based on the color of one's skin. Psychologists have proven that people are not born prejudiced and the act of being prejudiced is not inherited (Allport, 1958) but learned by external influences, such as family, friends, school, books, and media (Chartock, 2010). Reading a child a story about other cultures along with other literature with morals and values (e.g., character education traits), attitudes and beliefs towards minorities, specifically African Americans in this study, can be changed (Cameron, Rutland, Brown, & Douch, 2006).

Critical Race Theory highlights White privilege and any advantages that would impact the views and actions of students (Chapman, 2007; DeCuir & Dixson, 2004; Yosso, 2005). Storytelling in Critical Race Theory "makes use of the experiences of people negatively affected by racism as a primary means to confront the beliefs held about them by whites" (Taylor, 1998, p. 122). Teachers who know the stories of their students can begin to care more about them and, in turn, they are more apt to learn. Rogers and Freiberg (1994) concur by stating, "When the teacher has the ability to understand the student's reactions from the inside, has a sensitive awareness of the way the process of education and learning seems to the student, then again the likelihood of significant learning is increased" (p. 157). The use of Critical Race Theory to analyze and interpret my data means that "race and racism is foreground in all aspects of the research process; challenges the traditional research paradigms, texts, and theories used to explain the experiences of people of color; and offers transformative solutions to racial, gender, and class subordination in our societal and institutional structures" (Creswell, 2007, p. 28).

Educational research hardly focuses on the views of minorities' educational experiences or how they deal with the issues they face in their educational experiences. Critical Race Theory reveals how race and racism affect school practices, curricula, and the lives of underrepresented students who experience public education. It also provides a platform for underrepresented

students' voices to be heard. Educators and stakeholders becoming more aware of Critical Race Theory could potentially lead to better teaching strategies with African American students.

Deficit vs. Empowerment Theories

Many theories have been suggested to justify the Black-White achievement gap that continues to exist. These theories include deficit-deprivation theory, cultural deficit, cultural mismatch, and parents-at-fault theory. The theories of Vygostky (1938) and Dewey (1916, 1934) are discussed because they are renowned, respected, and their views are accepted by Whites, as well as their connection to the need to implement culturally responsive teaching into curricula of all disciplines. Culturally responsive teaching and racial identity development models for African Americans also are addressed.

Deficit-deprivation theory hypothesizes that intellect is characterized by Whites and Asians at the top and African Americans at the bottom (Thompson, 2004). This theory postulates that African American students are genetically inferior in comparison to Whites and Asians and that they cannot achieve at high levels. Many researchers of the achievement gap consider slavery as causing the inferiority that African Americans feel when compared to Whites (Banks & Banks, 1989; Ladson-Billings, 1998; Ladson-Billings & Tate, 1995; Loewen, 1995; Ogbu, 1983; Tatum, 1997; Thompson, 2004). Loewen (1995) reflects on slavery and states:

> the essence of what we have inherited from slavery is the idea that it is appropriate, even 'natural,' for Whites to be on top, blacks on the bottom. In its core, our culture….tells all of us… that Europe's domination of the world came about because Europeans were smarter. In their core, many Whites and some people of color believe this. (p. 137)

In a study on alternative programs, Kim (2006) argued how students that are labeled at-risk of failing academically in a traditional setting are not included in curriculum reform regardless of their potential. The majority of the participants of alternative schools are underrepresented populations (Dunbar, 1999; 2000) and this type of environment reinforces internalization of inferiority.

Cultural deficit theory is premised on the belief that the morals and values learned at home are deficient (McElroy & Hollins, 1999). "These deficiencies may be inherent in the culture itself or a response to prejudice and racism within the larger society" (p. 62). This theory suggests the family structure is at fault. Advocates of this theory believe that African American

academic achievement "can be improved by changing home environment or by providing adequate remediation" (McElroy & Hollins, 1999, p. 62). An example is the Head Start program because culturally deprived students can learn using traditional or mainstream strategies used with Whites so they can be prepared to use the strategies when they matriculate into public schools.

Payne (2005) offers her personal observation-based (not research-based) deficit view that students of poverty are broken and educators need to fix them to be more like the White middle-class. Payne suggests that there are "hidden" rules of social class that affect one's perspectives about people. She discusses three classes: poverty, middle, and wealthy and believes that there is a difference in how each social class views life. With education, Payne (2001) states that the poverty class sees it as valuable but abstract and not a reality; the middle class sees it as critical for becoming professionally successful and making money; and the wealthy class sees it as an essential tradition for creating and maintaining networks. With money, Payne (2001) states that the poverty class sees it to be used and spent; the middle class sees it as something that must be managed; and the wealthy class sees it as a substance that must be conserved and invested. She believes that poor students cannot be serviced until educators understand the poor, which would require them to understand Payne's devised hidden rules to poverty and teach these hidden rules to poor students so they can learn how to behave appropriately away from home instead of changing the behaviors that are familiar and necessary to survive.

Cultural mismatch is the difference between the practices utilized at home by minorities and the culture of school practices (Au, 1993; Gilmore, 1985; Hollins, 1982; McElroy & Hollins, 1999; Michaels, 1981; Thompson, 2004).

> The clash between school culture and home culture becomes evident in judgments and labels that teachers place on students with non-mainstream speech and styles of discourse, and through teachers' use of teaching strategies and classroom management strategies that are at odds with community norms. (Ladson-Billings, 2001, p. 167)

A traditional educational experience is considered to be one that encourages and is developed upon the positive principles of White culture (Gay, 2000). This experience also has exacerbated the Black-White achievement gap by not including culture in the learning experience. Ogbu (1983) supports the idea that students perform on a level related to how they are perceived by Whites due to the oppression that limits how they view themselves.

The parents-at-fault theory hypothesizes that the Black-White achievement gap and low academic performance of African Americans is due to little or no parental involvement with the child's school and learning. Thompson (2002, 2003) conducted individual interviews with parents and discovered that parents were interested highly in their children's academic performance, skills, and abilities regardless of others' misconceptions. Many parents pinpointed that schools made them feel unwelcome and told them assistance was not needed. "It is just wrong for educators to assume without proof that African American parents do not care about their children's academic welfare—missing back to school night or open house is not adequate proof" (Thompson, 2004, p. 26).

Vygotsky's (1978) theory of effective teaching and learning environments concerns the zone of proximal development and the actual developmental level of an individual. This theory contributes to culturally responsive teaching because it provides a target of how to reach students at different levels. The zone of proximal development is basically the distance between an individual's actual development level (achieve independently) and the achievement with assistance from others (proximal development level). Effective instruction is designed at the proximal level and social interactions must be supported at this level until students are able to perform on their own. Assisting a child at his/her actual level is pointless because his/her skills and abilities at this level already have been matured and mastered. The objective is to set a goal for a child at their proximal level and support and assist them at this level because a level that is too high or below their actual development is ineffective (Vygotsky, 1978). Vygotsky emphasizes that children's intellectual skills are associated with the relationship between the adult and the child. This implies that family, friends, culture, socioeconomic status, and education have an influence on everything about the child's character and cognitive ability. This supports all the viewpoints represented by culturally responsive teaching.

John Dewey's (1916, 1934, 1938) philosophy is that children learn through experiencing content—learning by doing—and the social interaction in a community of learners with the curriculum. Dewey (1938) stated that "education must be based on experience – which is always the actual life experience of some individual" (p. 113). Dewey did not acknowledge diversity or the influence of socioeconomic factors in his research; however, that a renowned philosopher, educator, and theorist recognized the importance of what each individual brings to learning supports the view of culturally responsive teaching. Educators quote and believe in Dewey's

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research concerning the impact that aesthetic experiences have on learning. For example, in *Art as Experience,* Dewey (1934) states:

> Any psychology that isolates the human being from the environment also shuts him off, save for external contacts, from his fellows. But an individual's desires take shape under the influence of the human environment. The materials of his thought and belief come to him from others with whom he lives……Expression of experience is public and communicating because the experiences expressed are what they are because of experiences of the living and the dead that have shaped them……its function and consequences are to effect communication, and this not by external accident but from the nature he shares with others. (pp. 281-282)

Culturally responsive teaching may be considered another name for teaching through aesthetic experiences. Taylor (2009) identifies Dewey in reference to this same point of view and indicates that educational terms may be new, but the basic characteristics and objectives remain the same. Taylor emphasizes how educators must create an environment that has high expectations, is engaging, and is relevant to the child's environment so that he or she can relate to the content presented. Both Dewey (1916, 1938) and Vygotsky (1978) view the mind and how it operates as a shared process. It is believed strongly that academic achievement of African Americans may improve if educators make content relevant to an individual's daily life experiences.

Racial Identity Development (RID) refers to the "process of defining for oneself the personal significance and social meaning of belonging to a particular racial group" (Tatum, 1997, p. 16). Helms (1996) defines racial identity as "the psychological or internalized consequences of being socialized in a racially oppressive environment and the characteristics of self that develop in response to or in synchrony with either benefiting from or suffering under such oppression" (p. 147). Helms also describes how the White racial identity development of any individual consists of moving past racial stereotypes and thoughts that have been developed due to negative perceptions displayed from members of one's own race. Cross (1991) explains five stages of RID for African Americans:

- Pre-encounter Stage – an individual does not think about the personal and social importance of where he or she fits in terms of race.

- Encounter Stage – an individual has an experience, good or bad, where he or she recognizes how racism affects his or her life.

- Immersion–Emersion Stage – an individual begins to delve into who they are by attending events of his or her kind, and then the attitudes and behaviors are relaxed.

- Internalization – the individual begins to come into who he or she is and where he or she fits in society.

- Internalization–Commitment Stage – the individual feels the need to devote his or her time into empowering the life and state for others of his or her own race.

The Pre-encounter Stage is the stage where parents and stakeholders can expose positive images and messages of being African American. This is where the child favors White culture – their art, the way they communicate, and academics. The Encounter Stage is where an experience leads an individual to become more aware of his or her racial status and desires to find more positive African American images with which to identify. The Immersion Stage is a period in which African Americans engage in activities that represent "Blackness." African Americans feel the need to express their dissatisfaction with Whites even if it means putting their lives in danger. In the Emersion Stage, African Americans may seek other African Americans with positive images to surround themselves and emulate. The African American is genuine and can function around and with other ethnic groups. The Internalization-Commitment Stage is where the African American begins to be an advocate for causes that are in the best interest for their race and others of the same race. Cross (1995) declares that an individual may not progress through the stages of identity, but factors (e.g., resources, character, experiences encountered, and available support) may influence an individual.

Moule (2003) designed a four-stage model using every day terms to help understand RID better:

- Stage 1: I'm OK, you're OK.
- Stage 2: Something is not OK.
- Stage 3: I'm OK, I'm not so sure about you.
- Stage 4: I'm OK, you're OK, we're OK.

After reviewing the five stages of RID by Cross (1995) and the four-stage model by Moule (2003), one can conclude that an African American student must have or be in the process of forming a positive racial identity to be academically successful. If a positive racial identity is

developed, one can expect the individual's attitude to be positive and his or her confidence level and self-esteem to be high (Diller & Moule, 2005). These are factors that would influence an African American student's desire to learn.

Children are affected normally by RID in their adolescent years (Tatum, 1997). Based on the descriptions of each stage of RID and analyzing a study of racial identify and achievement of Black males and females by Harris (1997), individuals in the Pre-encounter Stage, Internalization Stage, and Internalization-Commitment Stage probably would not be affected by racial issues because their racial attitudes would not be negative. Individuals in the Encounter Stage and Immersion-Emersion Stage probably would be so consumed with trying to figure out who they are that academics may not be as important. Lindstrom and San Vant (1986) claim the effects of RID on African American students academically to be an individual struggling between wanting to be academically successful and wanting to fit in and not be called an "Uncle Tom" or be accused of "Acting White." This idea creates feelings that make the individual want to negate the idea of excelling because he or she is lonely; therefore, little effort is applied academically and assignments begin to be incomplete or not done at all (Fordham, 1988). Racial Identify Development helps an individual understand what an African American is experiencing in their effort to learn.

All of the aforementioned theories assist in explaining the gap between the academic achievement of African Americans and Whites, determining how and why the academic gap exists, and measures to close the gap in science learning. Due to the theories that imply African Americans are inferior or cannot learn, many teachers believe this inaccurate viewpoint and their actions reflect their beliefs (Delpit, 1995).Vygotsky (1978) and Dewey's (1938) theories contribute to understanding why culturally responsive teaching should be implemented in classrooms to improve academic achievement. Many teachers are implementing culturally responsive teaching without knowing its name. These teachers realize that a child must connect with the content for true learning to take place. In order to know how to assist students with learning for mastery, educators first have to learn about the student—culturally responsive teaching.

Related Research

Culturally responsive teaching has been identified by many researchers as the most effective way to close the academic achievement gap between African Americans and Whites (Armento, 2001; Banks & Banks, 1989; Bonner, 2009; Cartledge & Lo, 2006; Chartock, 2010; Cole, 1995; Davis, 2006; Diller & Moule, 2005; Gay, 2000; Hale, 1986, 2001; Haycock, 2008; Hillard, 1989; Hollins & Oliver, 1999; Irvine, 2001; Irvine et al., 2001; Johnson & Kean, 1992; Kalantzis, Cope, Noble, & Poynting, 1990; King, 2007; Ladson-Billings, 1992a, 1992b, 1995a, 1995b; Lindsey et al., 2008; McElroy & Hollins, 1999; McKinley, 2010; Osborne, 1996; Shade, Kelly, & Oberg, 1997; Thompson, 2004; Villegas, 1991; Villegas & Lucas, 2002; Wang & Walberg, 1991; Wisniewski, Fawcett, Padak, & Rasinski, 2011; Zeichner, 1996). To understand this style of teaching better, culturally responsive teaching is discussed more in-depth. Culturally responsive teaching is a method of teaching that should be incorporated with best practices that have proven to achieve positive results in academic achievement. Culturally responsive teaching strategies, including culturally responsive behavioral strategies, are addressed in this section to assist in gaining a deeper understanding of this teaching strategy. Factors that must be considered when attempting to improve science achievement or use culturally responsive teaching are discussed. To provide evidence that culturally responsive teaching produces positive achievement for African Americans, studies of culturally responsive teaching are shared.

Culturally Responsive Teaching

Culturally responsive teaching often is referred to as culturally relevant teaching, culturally relevant pedagogy, culturally congruent, multicultural, culturally responsible, culturally responsive instruction, and culturally proficient teaching (Irvine et al., 2001; Lindsey, et al., 2008; Wisniewski et al., 2012). Ladson-Billings (2002) defines culturally relevant pedagogy as a "theoretical construct that rests on three propositions: successful teaching focuses on students' achievement, successful teaching supports students' cultural competence, and successful teaching promotes students' socio-political consciousness" (p. 111). Gay (2000) defines culturally responsive teaching as "using the cultural knowledge, prior experiences, frames of reference, and performance styles of ethnically diverse students to make learning encounters more relevant to and effective for them" (p. 29). Gay (2000) supports five components of culturally responsive teaching: the logic of the cultural heritages of all ethnic

groups is recognized; the connection of how and why home and school and is important is established; different learning strategies to meet the needs of all types of learning styles is utilized; self-respect and value of one's own culture is taught, as well as others; and multicultural education is incorporated in all programs implemented in school.

Irvine (2001) defines culturally responsive teaching as teachers appropriately responding to their students' learning by incorporating culture into teaching strategies. Culturally responsive instruction (CRI) is defined as "using knowledge of student cultures and modalities to select and apply strategies and resources for instruction, while engaging in self-reflection" (Wisniewski et al., 2012, p. 3). The five components of CRI can be subdivided into two parts: (a) teaching – includes teaching strategies, multiple texts, student cultures, and multiple modalities; and (b) teacher – including self-reflection. Banks and Banks (1989), advocates of multicultural education, believe helping children build their self-esteem and racial identity, as well as changing the views of the world dominated by European views as culturally responsive teaching.

Culturally responsive teaching means matching school culture to students' culture, using students' culture to help them understand who they and others are, and being able to conceptualize content and structure and organize social interactions (Ladson-Billings, 1994). Culturally responsive teaching is about "questioning (and preparing students to question) the structural inequality, the racism, and the injustice that exist in society" (p. 128). Culturally responsive teaching also is thought to be a means to empower and educate students holistically (Gay, 2000; Ladson-Billings, 2002; Thompson, 2004). It is considered to be all encompassing for all ethnicities because it demands teachers to teach the students to the best of their abilities regardless of their background (Frye & Vogt, 2010).

The purpose of culturally responsive teaching is to help students and teachers move past the "blame the victim" mentality. African American students, as well as others, can improve their academic success because it inspires them to be become better by developing critical thinking skills and informing them of the choices that are available (Thompson, 2004). In theory, morality, and transformation, culturally responsive teaching supports academic achievement of African Americans because "culture, teaching, and learning are interconnected and school achievement increases to the extent to which teaching employs the cultural referents of the students to whom it is directed" (Gay, 2000, p. 201). Gay also emphasizes that culturally responsive teaching will improve the academic success of African Americans because it respects

the students' complex culture and individual strengths to be taught in a rigorous environment that leads to academic success. Ladson-Billings (1994) advocates culturally responsive pedagogy because she believes that it will present the opportunities for African American students to achieve success and maintain a positive identity.

Culturally Responsive Teaching Strategies

Several researchers have identified instructional and behavioral level strategies to create an optimal learning environment for African American students to support their academic achievement. It is evident that a teacher should know specific subject matter; however, teachers also must become life-long learners to meet the needs of their students. Culturally responsive teaching can be applied with strategies proven to improve academic achievement of African Americans and other ethnic groups. It translates into the enhancement of students' academic knowledge, academic proficiency, development of self-esteem, ability to want to try, and the will to try (Gay, 2000). African American students must believe that they can achieve anything they attempt to learn, the teacher supports their same beliefs, and has the same expectations for them. Culturally responsive teaching is an effective teaching and learning strategy, but teachers must move beyond their prejudice—preconceived thoughts about African Americans, their abilities, and their way of life (Gay, 2000).

Ladson-Billings (1995a) concludes that the secret to culturally responsive pedagogy is making the students choose academic success by finding ways to challenge their abilities and value the skills they possess. She stresses that teachers should use culture to enhance learning, such as allowing students to bring in music they enjoy and use those rhythms and possibly the lyrics as a way to learn content. Vygotsky's (1978) theory of effective teaching and learning environments supports these thoughts. Students need to be able to think and critique content critically about social inequities (Ladson-Billings, 1995a). Students must be able to maintain cultural integrity with the understanding that academic success is not "acting white" or being true to oneself. Freire (1970) refers to this act of thinking critically about the world as conscientization.

To enact culturally responsive teaching, the teacher must: (a) not be afraid to discuss sensitive issues, such as race; (b) believe that inequities exist among African American students; (c) learn about African American culture; and (d) use the African American community as a

resource to help African American students achieve (Thompson, 2004). Lee (2001) argues that teachers must be knowledgeable of content and integrate students' cultures and languages in a meaningful way. Lee emphasizes how hard it is to integrate culture into science when the Eurocentric expectations are incompatible. Because of this pressure and resources to meet these expectations, teachers tend to ignore or not recognize the contributions that culture could add to the learning process. Irvine and Fraser (1998) believe that culturally responsive educators teach with authority where they are still warm, but demanding. An African American student identifies with these authoritative behaviors because it is exhibited by his/her parents, who are usually authoritative (Delpit, 1995). Six characteristics of culturally responsive teachers are identified by Villegas and Lucas (2002):

- They are socioculturally conscious*;*
- They have affirming views of students from diverse backgrounds;
- They see themselves as responsible for and capable of bringing about change to make schools more equitable;
- They understand how learners construct knowledge and are capable of promoting knowledge construction;
- They know about the lives of their students; and
- They design instruction that builds on what their students already know while stretching them beyond the familiar. (p. 20)

Hale (2001) proposes a model of culturally appropriate pedagogy with three components: (a) classroom instruction, (b) cultural enrichment, and (c) the instructional accountability infrastructure. The guiding principles of Hale's (2001) model are: "(1) Future success requires that children be connected to academic achievement; (2) It takes a whole village to raise a child; (3) Children learn what they are taught; (4) School is interesting; and (5) Learning is fun" (p. 112). The model builds on the rich culture and history of African Americans by employing intrinsic motivation (e.g., love of learning, academics are fun and interesting) and includes thematic units, creative arts, small group instruction, development of social and conflict resolution skills, balanced approached to literacy with phonics in the early grades, and hands-on activities that are aesthetically pleasing (Hale, 2001). The purpose is to develop higher-order thinking and creativity using curricula that complement African American culture (Hale, 2001). Hancock (1993) argues how to get students engaged and excited about reading by stating:

teachers encourage the exploration of options for expressing aesthetic response to literature with their students, they support the growing independence of each reader to interact with a book on his or her own terms…articulation of aesthetic response in the classroom…enables each reader to transform the printed page into a personal reading experience. (p. 474)

This supports culturally responsive teaching—making the student connect to the content to learn for mastery. Chartock (2010) identifies three principles and applications for becoming a culturally responsive teacher: (a) Culturally responsive teachers model behaviors that can be duplicated by their students; (b) Culturally responsive teachers should examine why a student is hesitant about learning so they can assist with this behavior; and (c) Culturally responsive teachers should be conscientious of the obstacles that they may face on the journey to diversity.

There is a pattern in the teaching strategies that improve the achievement of African American students. Classroom management is identified as the most critical area that evokes attention in improving the academic achievement of African Americans. Classroom management is the main area of cultural mismatch and cultural misunderstandings (Thompson, 2004). Conflict resolution is noted as one of the best strategies with African American students instead of taking action that causes rebellion, violence, "shut-down," and behaviors that disrupt the learning environment (Hale, 2001; Simmons, 2002). Thompson (2004) suggests offering alternate seating arrangements, a more challenging curriculum, enrichment activities, extra credit assignments, and peer-tutoring opportunities as a way to decrease boredom and reduce misbehavior. As a result of quality teaching strategies, effective classroom management skills follow. Thompson (2004) suggests seven culturally responsive strategies that encourage, stimulate, and produce good behavior:

- Be fair—isolating African Americans while ignoring other children of racial groups who commit the same act is racial profiling.
- Be positive and have an open mind.
- Be explicit, consistent, and sensible—Explain the rules verbally and in writing to parents and students while modeling them on a daily basis.
- Curriculum should be comprehensive, challenging, and culturally responsive engaging all styles of learners.

- Be focused on the act of teaching and not discipline by incorporating social skills and problem-solving in instructional style.

- Be firm, yet not mean—The teacher must allow her "actions to speak louder than her words" without yelling at or demeaning the students. For instance, staring at a student, standing in the student's space, or assigning a student a different seat are all actions that will inform the students who is in charge.

- Be patient and willing to address the needs of the "at-risk" or struggling students.

Thompson (2004) makes it clear that along with any strategy, the teacher must take charge of her class through earning respect and not allowing students to intimidate her. Students of any color will lose respect for teachers if they cannot control their class, display racism, exhibit unfair behavior based on stereotypes, or if the teacher is disrespectful toward them. The teacher should realize that if any behavior persists after implementing these classroom management strategies, the student is usually hiding a deficiency, such as reading or a family problem.

The skill in classroom management is being able to differentiate normal behavior from abnormal behavior and knowing when and when not to use certain strategies and punishments as a consequence for the behaviors exhibited. Thompson (2004) advises that not knowing who our students really are is the most bittersweet quality of being a teacher. A student may display a behavior at school then an additional behavior outside of school, not implying any psychotic condition. In a personal experience, a student was intelligent and exhibited ideal characteristics in class, but then robbed and killed a man at an automatic teller machine over the summer. I would have never imagined that this particular student could commit such an act or had any issues that would provoke a robbery. The "tattle-tale" in the classroom is not always trying to get another student in trouble, although he or she may be a victim of mistreatment by peers. Hale (2001) believes that teachers must understand the social context for misbehavior. A majority of African American students learn kinesthetically and this learning style often is perceived as misbehavior or a behavioral problem by White teachers. Gay (2000) shares how African Americans that are involved heavily in their culture display enthusiasm and liveliness; however, their actions are perceived as spontaneous, out-of-control, and extremely emotional by White teachers.

African American students experience mixed-messages from home and school because talking loudly is normal at home, but at school it is equated to being defiant or disrespectful by White teachers. Asking questions or being outspoken is allowed and encouraged at home, but it is thought to undermine the teacher's authority at school (Thompson, 2004). African Americans also are encouraged to be outspoken at church because they talk out during the minister's sermon showing that they agree and understand the message. For example, African Americans will say "Amen," "Hallelujah," or "Preach Pastor" while the minister is preaching to exemplify that he or she has been touched by something said in the message. Thompson (2004) proposes certain skills, such as classroom management, which must be learned by trial and error, professional development, and staying current with research.

Improving Achievement of African Americans

Research is clear that African Americans have a responsibility to apply efforts that maximize their potential to be academically successful and not blame Whites as the reason for their academic failure. Culturally responsive teaching has the potential to cause racial tension and division if not implemented appropriately because Whites must understand why it is important or necessary to learn about others' cultures (Stevens & Charles, 2005). How students perceive topics initially has an influence on how they view topics throughout their lives. For example, if racism or prejudicial thoughts about a specific topic are instilled in an individual as a child, then he or she will carry those thoughts throughout life (Wilhelm, 1998). Socioeconomic factors hinder some African Americans' academic success. Nevertheless, those factors cannot be controlled. The curriculum can be controlled and the quality of teaching can be enhanced by professional development opportunities.

A committed and dedicated teacher can change the life and direction of a child and it is the option of every educator to become this influential, life-changing teacher (Thompson, 2004). White teachers need to recognize that they must possess certain beliefs and attitudes to elicit specific outcomes from African Americans, such as:

- All children can learn.
- African American children are not tabula rasa (blank slates); they arrive at school with cultural capital and talents that should be built upon.

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- Most African American parents do care about their children and often assist them academically in ways that are invisible to teachers.

- Teachers must do their best with all students; it is not their job to judge students' culture, family, and so forth.

- It is not wrong to recognize racial and cultural differences among individuals; when it comes to viewing people, colorblindness does not exist (teachers who claim they are colorblind are merely in denial).

- Most African American children do want to learn, and when teachers seek the best in them that is usually what they find. (Thompson, 2004, p. 36)

Hale (2001) insists that White teachers willingly teach their own and children who are part of the "club" effectively. Thompson (2004) argues that African American students can learn Standard English and teachers can motivate them to learn this vernacular without their "home" language or dialect devalued. Teachers contribute to the main role in improving and advancing African Americans through raising their expectations and using effective instructional and behavioral strategies, including culturally responsive teaching, that do not deprive students of the skills, abilities, and knowledge required to compete for employment and entrance to college (Collins, 1992).

Gay (2003) shares that multicultural teaching cannot be achieved in one day or within one course taken in college. Multicultural teaching is a practice that develops over time as a teacher becomes more familiar with his or her own teaching skills and abilities, as well as cultural awareness of self and cultural knowledge. Thompson (2004) claims that teacher education programs are not preparing teachers adequately to teach diverse populations. Whites are at an advantage over African American children because they teach and tutor their children before lessons are taught in class (Hale, 2001; Thompson, 2004). Many Whites either have children who have had the materials or teacher in an earlier grade or can afford to buy the materials and resources to work with their children before the lesson is taught. Many White parents work with their children over the summer or put them in programs that will teach them the next year's content. These White children are receiving practice and becoming familiar with the content before African American children are exposed to it in the classroom, unless they belong to the middle-class (Hale, 2001; Thompson, 2004).

Hale (2001) acknowledges that middle-class African American parents who possess the power and knowledge to make a difference turn their backs on the lower class and working class by moving to suburban areas where quality schools are located or by enrolling their children in private schools. The middle class usually takes African Americans who are advocates for equality with them and the inner-city and working class African Americans are left to fight for themselves. Because African Americans are aware that there are effective teachers and research has proven to be effective in preparing quality teachers, middle class African Americans and African Americans of power should come forward and fight for change. Hale (2001) refers to an African proverb of taking more than parents (a village) to raise children to challenge African Americans as a community to play an integral role in the upbringing of their children. An accountability system should be put in place to support and supervise teachers so they are motivated to apply what they are required to implement and monitor if they are doing it (Hale. 2001). This action would put an end to "black flight" and all children can learn and be taught no matter who they are or where they live.

The mismatch between teachers and students can be reduced because teachers' attitudes can eliminate the cultural confusion and devaluation of students (Norman, Ault, Bentz, & Meskimen, 2001). The authors state that teachers can learn to use the cultural wealth of students' conversation for the best learning experience instead of interacting with them in a learning environment dominated by lectures or teacher-led discussions, students' lack of interest, and underachievement due to poor listening skills. Culturally responsive teachers integrate order by changing the problem of too much talking to an animated and awesome learning experience at high levels. The animated experiences incorporate cultural differences and provide an opportunity for teachable moments and to engage students in more in-depth learning. This is where the teacher-student disconnects often lies.

Studies of Culturally Responsive Classroom Teaching

In a mixed-method study using culturally responsive teaching in mathematics, Bonner (2009) presented her findings of what is needed to be successful in a culturally responsive mathematics classroom as: (a) knowing the content; (b) conveying the content in a familiar language based on cultural knowledge; (c) building relationships with the students; and (d) building trust with the students. She emphasizes that instruction and discipline coincide.

Hollins and Oliver (1999) identify effective culturally responsive teaching strategies from their study as the "use of kinship terms, cultural connectedness, warmth, control, and high expectations" (p. 31) with a "topic associated" cultural style in lieu of a "topic centered" style that they identify as commonly used with Whites. For example, an African American child may associate several events that relate to how a process in science works rather than use the vocabulary specific to the topic as would be expected in a standard Eurocentric curriculum. Although the African American student may not have used the correct science vocabulary initially, the association of culture with school made the content familiar. From this point, a teacher can assist the student in understanding and learning the content further. Hollins and Oliver (1999) state that the topic-associated style of learning is an "influence of socialization and its relation between culture and cognition" (p. 64).

In a collaborative research project Johnson and Kean (1992) conducted during a summer workshop with graduate students and university faculty members from the University of Nebraska-Lincoln (UNL) and administrators and science teachers from Omaha (Nebraska) Public Schools, an intervention program was implemented to provide educators with strategies and ideas to improve science students' achievement with an emphasis on minority students and girls. The intervention program implemented was based on a cultural conflict model, which assumes that "unequal school outcomes may be due to cultural differences between teachers and students in learning style, cognitive style, interaction style, prior knowledge, and language" (Johnson & Kean, 1992, p. 276). The belief was that the low-achieving students could learn science, but were choosing to disengage themselves because of what was being taught and how it was being delivered. The researchers state that other factors played a role in this disengagement (e.g., institutional norms, school culture, and conflict with teachers). The intervention plan included: (a) promoting cultural awareness because teachers from different backgrounds helped other teachers from different backgrounds to understand their culture; (b) confronting belief systems by sharing stories about culturally responsive experiences to show relationships between learning and self-esteem; and (c) changing the norms of schooling by designing culturally responsive lessons in their particular content area (Johnson & Kean, 1992). The project was designed with the goal of changing the teacher from the inside-out since teachers are considered limited (Johnson & Kean, 1992; Lindsey et al., 2008). Johnson and Kean (1992) discuss how the culturally responsive strategies and ideas gained from the summer workshop were implemented

during the following academic school year. The following changes were identified based on observations throughout the year and individual interviews with students, teachers, administrators, and parents:

- Changes in Student-Teacher Interactions—There were fewer behavioral problems, fewer office referrals, more flexible and helpful assistance offered to students and the classroom was more relaxed.

- Changes in the Role of the Teacher—There was an increase in the use of student-centered activities, seating charts that accommodated group work, open-ended problem-solving, and the teacher playing the role of a facilitator.

- Changes in Instructional Strategies—The teachers learned how to use cooperative learning more effectively, which was to teach social skills, and there was a decrease in formal assessments because cooperative learning activities were effective.

- Changes in Relationships with Parents and Community—There was an increase in activities building relationships from the high school level to elementary level, more activities involving the parents were developed, and more partnerships with community resources were created.

- Changes in the Classroom Climate—There were more opportunities for constructivist-type activities in difficult classes (e.g., cooperative learning), which created flexibility to incorporate multicultural curricula.

- Changes in Science Content—Science was taught more conceptually and thematically instead of teacher-led discussions focusing on memorization.

In a qualitative research study, Osborne (1996) conducted more than 70 ethnographies in classrooms to investigate teaching different ethnic groups in cross-cultural environments. Classes were considered cross-cultural because the teacher represented her own ethnic group and the students were represented by other ethnicities. Nine assertions were made about cultural pedagogy with two outcomes that teachers can use in their classroom. One outcome was for teachers to rethink how they teach because this would help them begin to see and understand how to teach the students they service better. This idea escaped blaming the victim, but still included family in the process of learning. The second outcome was teachers initiating social justice in the classroom. The author calls these starting points because some ideas presented may or may not work with certain populations of students and they can be expanded and improved

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over a period of time. The author mentions teachers who reflect on their teaching against social justice are participating in "practice-theory dialect" (Osborne, 1996, p. 286) that inspires both them and the students. The words marginalized and normalized were used in this research because Osborne (1996) states the ethnic groups studied: had a culture that was once their strength; their practices were demoralized although they were not understood; their views were disregarded and later used in an oppositional way; their resources that included education, healthcare, hygiene, and social activity were inadequate; and their cultures, beliefs, and political views had to be conformed to Western beliefs. The author's goal for his research was to inform educators of strategies that can be implemented holistically where minimal changes can be made in the classroom while working on changing the school's practices and policies.

Osborne (1996) identified the nine assertions that follow:

1. Culturally relevant teachers need not come from the same minority group as the students they teach.

2. Socio-historico-political realities beyond the school constrain much of what happens in classrooms and must be understood well by the culturally relevant teacher.

3. It is desirable to teach content that is culturally relevant to students' previous experiences, that fosters their natural cultural identity, and that empowers them with knowledge and practices to operate successfully in mainstream society.

4. It is desirable to involve the parents and families of children from marginalized and normalized groups.

5. It is desirable to include students' first languages in the school program and in classroom interactions.

6. Culturally responsive teachers are personally warm toward and respectful of, as well as academically demanding of, all students.

7. Teachers who teach in culturally relevant ways spell out the cultural assumptions on which the classroom (and schooling) operates.

8. There are five components of culturally relevant classroom management: using groups, controlling indirectly rather than confrontationally, avoiding "spotlighting," using an unhurried pace, using the home participation structures of the children.

9. Racism is prevalent in schools and needs to be addressed. (pp. 289-304)

Additional researchers who support Osborne's (1996) nine assertions include Clark (1991), Dillon (1989), Erickson (1987), Fordham and Ogbu (1986), Gay (1978), Hornberger (1990), John-Steiner and Smith (1978), Kalantzis, Cope, Noble, & Poynting (1990), Ladson-Billings (1990, 1992a, 1992b), Lomotey (1990), McDermott (1987), McDermott and Gospodinoff (1979), Ogbu (1987), Rosenfeld (1976), Trueba (1988), Walker (1988), and Willis (1977).

The first assertion makes the assumption that more marginalized students will succeed in school if teachers teach marginalized groups using culturally responsive strategies (Osborne, 1996). This recognizes and rewards this type of teacher and provides an opportunity for others who may not know how to teach these groups an example in the field to apply theory into practice. The second assertion is that the educational preparation received in school prepared teachers to believe and think that all students can achieve if they want, standardized tests are unbiased, and our classes are "classless" (Osborne, 1996, p. 291). This assertion helps teachers to realize the way students feel about the world socially, historically, and politically and the need to supplement those thoughts with analyses of how others feel about the world. The third assertion calls for self-awareness of teachers and how they view the world in reference to sex, class, and race, which may cause anger, disillusion, or hurt (Osborne, 1994) because otherwise it may not be possible to help students develop their views of the world (Connell, 1989; McLeod, 1986; Osborne, 1996; Weiler, 1988). The fourth assertion takes into account the limited time of teachers and pressures, so it advises teachers to incorporate what parents know about their child(ren) with their knowledge of the child. This assertion also recommends communicating with stakeholders (e.g., parents, community representatives, and other teachers) so "school practices, funding policies, and even curriculum content to enhance quality schooling for all our nation's children" (Osborne, 1996, p. 295). Giroux (1989) believes this collaborative effort could create the quality education desired for the students and by the teachers. The fifth assertion suggests that teachers incorporate the home language into the curriculum as much as possible wherever possible (Osborne, 1996). These efforts can be learned from other teachers or parent suggestions. From that point, both teachers and parents can work towards the implementation of activities into the formal curriculum.

The sixth assertion coincides with the idea that teachers who are warm and demanding build rapport with culturally sensitive students and are able to motivate and push them academically (Osborne, 1996). Ladson-Billings (1990) refers to this as when teachers respect the

students, and, in turn, the students will respect the teacher. Bruner and Watson (1983) refer to a teacher's warmth and care for the student as supporting the student and the academic demands will increase gradually. This explains how a competent and caring teacher's views about the world can damage how a student may view the world (Osborne, 1996). For example, a student can understand what is expected, explain expectations to others, and complete the expectations perfectly but not in the timeframe given; therefore, the student may be critiqued or ridiculed. This causes a reaction from the student that can be labeled as a behavior problem when the problem is another example of how a student's culture or view of the world was misunderstood. This student's culture could teach independence, careful observation of tasks, perfections, and self-sufficiency, which all could cause a child to miss the timed task although the student possesses the knowledge, ability, and skill (Osborne, 1996). The seventh assertion requires the teacher to reflect on the audience taught and be sure the class is aware of the culture of the class by the tone the teacher sets.

> The eighth assertion has five components: (a) using group work would improve achievement instead of individual competitiveness, (b) using group work will support attention being drawn to a child in a small, cross-cultural setting because some students are nervous or uncomfortable with speaking in front of others; (c) using indirect reinforcement for classroom management because the teacher has explained and negotiated the culture of the class and how it operates; (d) delaying the curriculum without losing academic rigor will increase the quality of responses; and (e) incorporating communication patterns from home will encourage participation, but standard forms of English should still be utilized without degrading a student's culture or home language. (Osborne, 1996, p. 303)

The ninth and last assertion recognizes that racism is oppressive and must be dealt with by teachers and students (Osborne, 1996). Freire (1970) emphasizes that an oppressor does not understand oppression. The author notes that this is not an easy task and at times, racism, classism, and sexism must be addressed. McLeod (1986) suggests introducing a critical literacy approach, such as reading an article and sharing responses, as a way to affect racism in the classroom. This study focused on starting points for educators to introduce critical relevant practices into the classroom and address academic failure of African Americans; however, he indicated that the teacher must delve beyond him/herself and work together with other

stakeholders, including other teachers, in order to change school and district policies (Osborne, 1996).

Jackson (1993/1994) identifies seven strategies in her research on literacy that play an integral role in culturally responsive pedagogy. She derived these strategies from several workshops provided to teachers on multicultural education that can be used with all subjects and all grades. The seven culturally responsive teaching strategies are:

1. Build trust.
2. Become culturally literate.
3. Build a repertoire of teaching strategies.
4. Use effective questioning techniques.
5. Provide effective feedback.
6. Analyze instructional materials.
7. Establish positive home-school relations.

Examples for building trust are learning the students' names, pronouncing the names correctly, or allowing the students to share information about their ethnic background, which affords the students an opportunity to analyze others in a non-threatening way. Jackson (1993/1994) notes that African Americans have to learn two cultures (Black and White), be bi-lingual (Standard English and the language that is spoken at home), and be intellectual in order to make it in the mainstream White society. Although some White teachers may be diverse in terms of beliefs, religions, and ideas, the United States teaching force is overwhelmingly White, which makes it critical for them to learn about and understand all students in their classrooms.

Hillard (1989) informs educators that African Americans do not learn in linear ways and they value cooperativeness among peers. Thus, strategies that are a cultural match between instructional styles and learning styles, such as cooperative learning and unison responses are recommended. The use of higher-order questions even with low-level learners develops critical thinking skills, confirms how they perceive themselves, and allows them to see themselves as knowledgeable instead of as a receiver of information. Jackson (1993/1994) also notes that teachers often provide feedback to African American students based on personality or neatness of work instead of quality of work; therefore, more constructive criticism needs to be incorporated so the student can correct his or her mistakes, learn from them, and improve. Analyzing instructional materials involves the teachers assessing the content and creating

materials that are familiar to the students and would make learning more interesting, such as finding content they like in order to learn the same skill. For example, a student could read text or a passage out of a familiar magazine or newspaper to learn the concept of main ideas. In order to establish positive home-school relationships, the teachers must make efforts to communicate with the parent besides only with challenging situations that deal with academics or behaviors. He or she can assign individual interview questions for homework and discussions can take place involving individuals students are familiar with instead of unfamiliar faces.

In the Seattle Public School District, McKinley (2010) conducted a 20-month study with 31 teachers and 20 principals on research-based instructional, management, and assessment strategies to improve student achievement of African Americans. McKinley (2010) and other researchers (e.g., Banks, Cookson, Gay, Hawley, Irvine, Nieto, Schofield, & Stephan, 2000; Cole, 1995; Irvine et al., 2001; Ladson-Billings, 1994, 1995b, 2000a; Pasch, Sparks-Langer, Gardner, Starko, & Moody, 1991; Shade, Kelly, & Oberg, 1997; Wang & Walberg, 1991; Zeichner, 1996) identified five factors that are essential to the improvement of the academic achievement of African Americans and eliminating the gap between Blacks and Whites:

- Constructive teacher attitudes and beliefs that nurture student motivation;
- Positive interpersonal relationships that draw on the social constructivist aspects of teaching;
- Social activist approaches that address racism, social injustices, and disparate expectations, conditions, and opportunities to learn;
- Establishment of a cultural context for learning based on students' backgrounds; and
- Effective and culturally responsive instruction and assessment. (p. 2).

Gail Thompson (2004) presented 18 effective strategies she identified to implement with African Americans from her research findings:

1. Let students know you care.
2. Share the real you, by letting them see you are a real human being—Share your hopes, dreams, and background with students.
3. Have high expectations.
4. Keep reminding them of the big picture and why what they are doing in class is important—Tell them constantly what the short-term and long-term benefits are.
5. Get to know students on a personal level.

6. Make the classroom experience relevant to the real world—In particular, emphasize relevance to their communities.

7. Use schema theory—Find out what they already know about the topics that will be covered, and help students link their prior knowledge to the new information.

8. Use storytelling to arouse their interest.

9. Showcase their talent.

10. Give students multiple ways to succeed academically.

11. Encourage them to synthesize.

12. Use questioning to spark discussion.

13. Encourage students to write letters to authors of books they have read.

14. Stress core vocabulary.

15. Use the old and the new—Make use of the postmodern literature, multicultural literature, and the classics.

16. Assign regular, beneficial homework—Assign worthwhile homework regularly (a minimum of three nights per week) to teach discipline and responsibility, as well as to reinforce classwork and improve skills. However, be aware that for elementary students too much homework can be counterproductive.

17. Offer multiple extra-credit opportunities.

18. Assess their skills and knowledge in advance—It is your responsibility to fill in as many gaps in their education as you can. (pp. 65-68)

Thompson (2004) believes the teacher should help the students envision their full potential and believe in themselves. She describes what she considers a small-wins theory in which the students learn new information in chunks, creating a greater chance that the students will comprehend the information because they can focus on learning without being stressed. She advocates the use of multiple approaches to learning because all children learn differently and various strategies will help the students understand the content and realize that they have the ability to learn anything that is put before them. Students' attitudes toward learning impact their academic achievement. In a study to examine the relationship between psychosocial factors, study skill factors, and college outcomes, Robbins, Lauver, Le, Davis, Langley, and Carlstrom (2004) found that the best predictors to improve academic achievement of any ethnic group were

self-efficacy and achievement motivation. These findings concur with the researchers' recommendations on how to improve student achievement of African Americans.

King (2007) reported culturally responsive teaching strategies for closing the achievement gap from her thesis research findings at Gannon University in Erie, Pennsylvania. Key research-based strategies included were:

- Use the data to close the gap—use data to drive planning and instruction;
- Become more aware of the role of prejudice, bias, and stereotyping in students' lives—use strategies that will determine student attitudes of his or her environment or real-life experiences;
- Become aware of students' attitudes about their learning environment—use strategies that will motivate the students to reveal his or her feelings about their environment;
- Change students' attitudes about learning or their environment—praise any accomplishment and not just academic achievement;
- Incorporate examples of distinguished minorities and their contributions—include racial/ethnic background and culture of the school into classroom lessons;
- Ensure equitable academic attention—differentiate instruction to increase participation in daily activities;
- Incorporate student background and culture into instruction—make connections and build backgrounds using multiculturalism;
- Raise own awareness of African American culture—survey your students and parents to find out more about your students;
- Increase parent involvement within the classroom—this will increase communication toward ensuring the child reaches expectations and standards;
- Invite input from African American groups—initiate mentor programs;
- Build relationships of mutual respect with students—create a positive learning environment and find a way to reach them and assure them that you care. (pp. 1-4)

Lindsey, Graham, Westphal, and Jew (2008) synthesized a list of culturally responsive strategies that schools and districts narrowing and closing the gaps successfully for underserved student groups are using: put achievement first; increase teaching and learning expectations; provide opportunities for professional development and collaboration; involve parents in academics; hold teachers accountable; use data-driven instruction practices; keep schools safe;

keep running records; keep teaching even when disappointments occur; and increase teacher-student time (p. 15).

Armento (2001) established nine fundamental principles that all culturally responsive teachers should have based on the feedback from a three-year pilot study of culturally responsive lessons implemented by middle school teachers in the Atlanta public schools and the college of education programs at Emory University and Georgia State University:

1. Hold high academic and personal expectations.

2. Provide for each child equitable access to the necessary learning resources and sufficient opportunities to learn.

3. Ensure the learning outcomes are meaningful, relevant, useful, and important to each child.

4. Nurture learning-support communities for each child (families, peers, homework hotlines, community centers).

5. Facilitate the maximum growth of each learner by making informed academic adaptations that match and build upon the learner's prior knowledge, experiences, skills, and beliefs.

6. Build positive and supportive school and classroom learning environments that are grounded in mutual and genuine respect for cultural diversity.

7. Promote classroom climates built on social justice, democracy, and equity. Promote individual empowerment, self-efficacy, positive self-regard, and a belief in societal reform.

8. Value diversity as well as human commonalities.

9. Believe that it is their role and responsibility to provide effective and empowering instruction for each child. (p. 23).

The author states that these nine basic beliefs of a culturally responsive teacher forms the core for mastery learning, equity, and effective teaching for all students.

Summary

Chapter Two examined the theories and pertinent research that inform this study. Race continues to be an issue in education. The Black-White achievement gap continues to exist. Critical Race Theory is the framework for analysis and interpretation of the data in this study

because the overarching objective is to bring all forms of oppression to an end. Best teaching strategies along with culturally responsive teaching implemented were identified as the methods to assist in closing the Black-White achievement gap. The deficit theories in this literature review were rationalizations reflecting why researchers say the Black-White achievement gap exists. Hence, these same theories serve as a premise to the development of culturally responsive teaching. This teaching method is learned in stages and is part of one's lifestyle (Gay, 2000; Hale, 2001; Ladson-Billings, 1992a; Thompson, 2004). Chapter Two examined teaching strategies, culturally responsive teaching, Critical Race Theory, and the literature to improve science learning of African Americans. It is believed that when incorporating culture and student backgrounds in the instructional process, African American students will make the connection and learn science (King, 2007).

Theories relating to how students learn content by Vygotsky (1978) and Dewey (1938) also were reviewed in Chapter Two. Vygotsky's (1978) theories on socio-constructivism and effective teaching and learning concur that children cannot learn unless relationships are formed between them and the person that is teaching. This corresponds to practices of culturally responsive teaching. Dewey's (1938) theory of experience where children learn best when they experience and interact with content they relate to their lives coincides with culturally responsive teaching. A child can learn if the content is relevant or related to a child's environment and is engaging (Gay, 2000; Hale, 2001; Hancock, 1993; Ladson-Billings, 1992a; Taylor, 2009).

Culturally responsive teaching is affective, cognitive, and psychological (Hale, 2001; Thompson, 2004). Affective learning comprises a student's motivation to learn and his/her attitude about learning. Cognitive learning is influenced by culture and motivation. Psychological learning involves the mindset of the individual. Culturally responsive teaching is learning by incorporating life's experiences that include the affective, cognitive, and psychological influences. In summation, all these theories and related research support the implementation of culturally responsive teaching with effective teaching strategies to improve African American science learning.

Chapter 3—Methodology

Introduction

This qualitative case study was designed to investigate the teaching strategies that seventh-grade teachers of one Alabama school implemented to improve science learning of African American students. This study examined the extent to which the teaching strategies used reflect culturally responsive teaching because researchers state that implementing culturally responsive teaching improves the academic success of African Americans (Armento, 2001; Gay, 2000; Hale, 2001; Hollins & Oliver, 1999; Johnson & Kean, 1992; King, 2007; Ladson-Billings, 1999; Lindsey et al., 2008; McKinley, 2010; McREL, 2000; Osborne, 1996; Thompson, 2004). This study determined if effective teaching strategies and culturally responsive teaching were used by the teachers. Critical Race Theory was the theoretical framework used to analyze and interpret the findings.

Chapter Three is organized in the following sections: (a) introduction; (b) overview of qualitative research design; (c) purpose of the research; (d) research questions; (e) research design of the study and rationale; (f) selection of the participants; (g) research site; (h) role of the researcher in qualitative research; (i) data collection; (j) trustworthiness of the data; (k) data analysis; and (l) summary.

Overview of Qualitative Research Design

This study's main purpose was to determine the teaching strategies used in seventh-grade science classrooms that impact African American student learning and if those teaching strategies reflect culturally responsive teaching. A detailed description of the methodology used in this research study is discussed in this chapter. This was a qualitative case study whose purpose was three-fold: (a) to investigate the teaching strategies that teachers used with African Americans to improve student learning in science; (b) to explore the existence or nonexistence of culturally responsive teaching in seventh-grade science teaching strategies; and (c) to determine if and how teaching strategies and/or culturally responsive teaching engages and enhances student learning.

Features of Qualitative Research

Qualitative research is a form of research that investigates a social or human problem based on a well-defined method of inquiry that does not involve the use of calculations or measurable data (Creswell, 2007). "The researcher builds a complex, holistic picture, analyzes words, reports detailed views of informants, and conducts the study in a natural setting" (Creswell, 2007, p. 249). Bogdan and Biklen (1998) describe qualitative research as "naturalistic, descriptive, concerned with process, inductive, and meaningful" (pp. 4-7). Qualitative research is defined by Gay, Mills, and Airasian (2009) as the "collection, analysis, and interpretation of comprehensive narrative and visual data to gain insights into a particular phenomenon of interest" (p. 605).

Creswell (2007) endorses five approaches to qualitative research: (a) case study, (b) narrative, (c) ethnography, (d) grounded theory, and (e) phenomenology. "All five approaches have in common the general process of research that begins with a research problem and proceeds to the questions, the data, the data analysis, and the research report" (Creswell, 2007, p. 76). All five approaches use some of the same processes to collect data, such as individual interviews, observations, and documents (Creswell, 2007; Polkinghorne, 2005). The approaches differ in their focus or what they are trying to achieve: (a) a case study seeks an "in-depth description and analysis of a case or multiple cases"; (b) a narrative "explores the life of an individual"; (c) an ethnography "describes and interprets a culture-sharing group"; (d) grounded theory "develops a theory grounded in data from the field"; and (e) phenomenology engages in "understanding the essence of the experience" (Creswell, 2007, p. 78).

Qualitative research is "any kind of research that produced findings not arrived by means of statistical procedures or other means of quantification" (Strauss & Corbin, 1990, p. 17). Polkinghorne (2005) states that qualitative research "describe[s] and clarify[ies] experience as it is lived and constituted in awareness" (p. 138). This research sought to examine and identify teaching strategies that are being used currently in seventh-grade science classrooms that contribute to the improvement of science learning of African American students. A Black-White achievement gap persists (NCES, 2006, 2011) and this research aspired to address the achievement gap in science. Lincoln and Guba (1985) state, "If you want people to understand better than they otherwise might, provide them information in the form in which they usually experience it" (p. 120).

Purpose of the Research

There are many incidents that marginalize African Americans' opportunities for an equitable education. Although laws, acts, and events have attempted to resolve these issues and afford African Americans access to an equal education, the issues remain unresolved. A number of theories have attempted to explain the causes of the Black-White achievement gap. Over the years, research has been conducted and reform efforts have been incorporated. None of the attempts thus far have closed the Black-White achievement gap, but evidence indicates how teaching strategies can be implemented in concert with culturally responsive teaching to support these efforts. Hillard (1995) attests that a relationship between the influence of culture and learning exists. This suggests additional research is needed on the impact that culture could have inside science classrooms and on science achievement (Thompson, 2004). Teachers need to explore other techniques and strategies to improve science learning because the Black-White gap still exists with current practices. This research may reveal some of the barriers that educators have about the notion that all children can learn and using culturally responsive teaching to achieve this goal. Therefore, this research provides a context to address the theories proposed to explain the underachievement of African Americans and expand the teaching strategies used to improve African American student learning in science.

Research Questions

This case study investigated what is taking place in seventh-grade science classrooms in an attempt to understand the impact that teaching and learning have on African American science learning. This study was guided by three research questions. In examining the teaching strategies and the extent of those practices reflecting culturally responsive teaching, the overall research question was: *What teaching strategies are being used in seventh-grade regular and advanced science classrooms that impact African American student learning?* The following sub-questions also were addressed in this study:

1. What do teachers think about the teaching strategies they employ to teach African American students?
2. What do African American students think about the teaching strategies that are used by their science teachers to impact their science learning?

3. To what extent do seventh-grade teachers' teaching strategies reflect culturally responsive teaching?

Research Design of the Study and Rationale

The research design for this study was a qualitative case study. Dyson and Genishi (2005) recognize that teachers and students are able to make the connection between talk and printed text in a physical setting (the classroom)—both academic and social interaction. Because the Black-White achievement gaps continue to exist in science, I wanted to find out why it is anticipated that the participants of this study represent both seventh-grade African American students that are academically achieving in science and African Americans that are adding to the achievement gap in science. This created an avenue for comparison to see whether culturally responsive teaching is or is not being utilized in science classrooms to improve African American science learning.

Case Study

Stake (1995) describes a case study as an analysis of a case or an issue with the case that is being studied. Gay, Mills, and Airasian (2009) define a case study as the "in-depth investigation of one unit" (p. 600), such as individual, group, institution, organization, program, or document. Qualitative research for this study offered a more comprehensive study of this case or issue with the case being "based on a diverse array of data collection materials and the researcher situate[ing] this system or case within its larger context or setting" (Creswell, 2007, p. 244). A case study is defined as "an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident" (Yin, 2003, p. 13). Gay, Mills, and Airasian (2009) emphasize that a case study must be bounded or identifiable within a particular setting to be considered an appropriate case study.

Using a case study perspective, meaningful investigations of seventh-grade African American science classrooms were conducted while maintaining the whole structure of the classroom and curricular content. This type of study also is meaningful because I sought to analyze why African Americans are failing in science. The process by which culturally responsive teaching improved or did not improve science achievement as well as if it was used at all is the purpose of this study.

Characteristics of Case Study

Case studies are characterized by the "size of their bounded case," meaning the number of individuals or subjects involved (i.e., one individual, more than one individual, event) (Creswell, 2007, p. 74). Three foci are noted for case studies: (a) the intrinsic case study where the actual case is studied because it is extraordinary and distinct in the sense that it deviates from the norm; (b) the instrumental case study where a particular issue is the focus and the research finds one particular case that exemplifies this issue and expounds on it; and (c) the collective case study, which often is referred to as multiple case study where one particular issue also is studied but more than one case is chosen to be the focus of the research (Stake, 1995). Yin (2003) recommends that researchers do not generalize the findings from qualitative research to other cases because the circumstances of each case differ.

Although there are several ways to conduct case study research, the following describes Stakes' (1995) approach to conducting case study research. The researcher should first ensure a case study will be an appropriate approach for the type of study that is being researched. The second step is for the researcher to identify a purposive sample of the case or cases that will be involved in the study. The third step is to decide which methods of data collection will be used and are best suited for the research study (e.g., observations, individual interviews, documents) (Creswell, 2007; Stake; 1995; Yin, 2003). The fourth step in case study research is determining how the data will be analyzed whether it is holistically (the entire case) or embedded analysis (a particular facet of the case) (Stake, 1995; Yin, 2003). The final step in a case study is the interpretive segment—lessons learned—where the researcher shares her or his findings whether it is about the issue or the circumstances of the issue (Lincoln & Guba, 1995).

Case studies employ many challenges to researchers. One challenge initially is identifying the case (Creswell, 2002). The challenge then becomes whom shall I study since there may be more than one possible candidate for a particular issue or topic. Creswell (2007) cautions researchers that the more cases a researcher involves, the analysis is weakened and it becomes more difficult to study more in-depth. However, Glesne and Peshkin (1992) argue that the more cases involved increase the chance of generalizability, although this is not a focus of qualitative research. Once the case is decided, a rationale must be established for how the researcher plans to select her or his purposive sample (Creswell, 2007; Stake, 1995). Case studies seek to investigate a case or cases more in-depth (Creswell, 2007, Stake, 1995; Yin,

2003). This results in the challenge of not knowing if enough information is available or will be gained from the research study. After the data collection is determined, boundaries must be set. Establishing boundaries may become difficult in a case study because there is no guarantee that the parameters set will be possible (Creswell, 2007; Yin, 2003). For example, the researcher may state that she or he would like to collect data at a specific time, but that time may not be feasible for the participants in the study. Case studies must be designed with the unexpected in mind because there is no guarantee that the research study will progress as planned.

In order to investigate the teaching strategies in the seventh-grade regular and advanced science classrooms of one Alabama school, I observed these classrooms over an extended period of time, in this case six weeks, and conducted semi-structured individual interviews with the seventh-grade teacher participants and seventh-grade student participants. The individual interviews were semi-structured because there were a specific set of open-ended questions asked to inquire about each participant's experiences in his or her seventh-grade science classroom (Gay, Mills, & Airasian, 2009). The set of prepared questions guided the individual interviews, but they presented opportunities for the participants to describe "who, what, where, when, why, and how" (Gay et al., 2009, p. 371). The individual interviews were proposed originally to be audio-taped, but at the request of the school district and school's administration, the individual interviews with teacher and student participants were not audio-taped. The teacher and student participants gave me permission to conduct their individual interviews with the use of my password protected laptop computer so I could capture their narratives more accurately and effectively. The use of the laptop computer did not distract the individual interview process because I maintained eye contact the entire time and looked down only when a new question was posed.

Selection of the Participants

Since the Black-White achievement gap in science persists (NCES, 2010), I strived to identify culturally responsive teaching strategies that are working in seventh-grade science classrooms observed to improve African American student learning. The objective of this research was to provide a deeper understanding of the issue; therefore, the selection of the participants for this research was based on a school that would provide the best data for this research study. Hence, purposive, convenience, and criterion sampling were used.

Purposive sampling generates "refinement and clarity to understanding an experience" (Polkinghorne, 2005, p. 140). Patton (1990) states that purposive samples are rich cases where one can learn more about an issue of importance. The participants in this case study were considered a convenience sample because: (a) I conducted the research over a six-week period rather than an entire school year; and (b) I selected a school district within 50 miles of where I live versus conducting research in the entire State of Alabama. Criterion sampling also was used in order to clarify the convenience and purposive sample because the teacher and student participants were selected based on their academic performance—the teachers' teaching ability and the students' academic ability. Criterion sampling also was involved in the teacher participant selection because the selected teachers must have had at least a 20% African American population in each classroom observed.

One middle school, Success Middle School (pseudonym), of one Alabama school district was selected to participate in this research study. This school district is comprised of surrounding rural areas and serviced approximately 9957 students during the 2009-2010 school term. The school district has seven elementary schools, three middle schools, and four high schools. There is an alternative and in-school suspension program housed at each school. Fifty-three percent of the school district was considered economically disadvantaged in 2009-2010 based on eligibility to receive free and reduced meals. This economically disadvantaged percentage was six percentage points higher than the State of Alabama. Success Middle School houses only two grade levels (seventh and eighth grades) with one principal, one assistant principal, two guidance counselors, and 44 highly qualified teachers. There are approximately 995 students with the seventh-grade representing 516 of those students. Twenty-one percent of the seventh-grade population is African American with 50% of that population considered economically disadvantaged based on the eligibility for free and reduced-priced meals.

Teacher Participants

All seventh-grade science teachers at each school possessed an opportunity to participate in this research. This study called for a regular seventh-grade science teacher and an advanced seventh-grade science teacher. The assistant principal recommended the advanced science teacher that participated in this study because she was the only advanced teacher at the research site and she also serves as the science department chairperson. This same individual recently

completed a certification in administration; therefore, she receives an additional period off besides planning (first period) to do administrative tasks for the school. The science department chairperson recommended one of the three seventh-grade science teachers to participate in this research study based on years of teaching experience and the teacher's passing rate of African American students on the Alabama Science Assessment. This method of selection for teacher participants seemed most logical because I did not know the students, the teachers' experience levels, the teachers' passing rate on previous years' Alabama Science Assessment scores, or which classes the teachers taught. These factors were necessary for consistency in the results of the study. The decision to select only one regular and one advanced seventh-grade science teacher was to limit the number of teachers with whom I needed to build relationships, secure permission from to participate in this study, and so I could observe each class more in-depth. The teacher sample selected to participate in this research study was purposive, based on convenience, and met the aforementioned criteria. Both teachers that participated in this study are described thoroughly and discussed in Chapter Four, but a brief introduction of each teacher and individual classroom environments are presented in this section.

Mrs. Mary: Seventh-Grade Regular Science Teacher

Mrs. Mary (pseudonym) was the regular seventh-grade science teacher selected to participate in this study. She is a White female in her late fifties with a Bachelor of Science degree in Physical Education and Health. After receiving her undergraduate degree and being offered a teaching position in science, she obtained her certification in Science (6-12). She has taught at the secondary level for 29.5 years and taught science at Success Middle School for 23 years. Mrs. Mary holds teaching certificates in life science, physical education, and health. Mrs. Mary teaches five one hour seventh-grade science classes with a one hour planning period. Special education students are mainstreamed into all of Mrs. Mary's classes with a special education resource teacher assigned to her for additional support. For this study, I observed two of Mrs. Mary's seventh-grade science classes in order to obtain a representative sample of African American students.

I visited two of Mrs. Mary's regular seventh-grade classes at Success Middle School. Both of the classes contained 26 students with six African American students in each, which constituted at least a 20% African American population. In one seventh-grade regular class observed, there were five African American boys and one African American girl. In another

seventh-grade regular class observed, there were six African American girls. Out of the seven African American students that participated in the two semi-structured individual interviews, five out of seven were categorized as economically disadvantaged based on their eligibility for free-reduced meals. None of these students qualified for special education services. For the purpose of this study, I observed two of Mrs. Mary's regular classes so I could observe more African American students and the similarities and/or differences used with each class. Both classes were observed before lunch.

Mrs. Leigh: Seventh-Grade Advanced Science Teacher

Mrs. Leigh (pseudonym) was the advanced seventh-grade science teacher selected to participate in this study and she also serves as the science department chairperson for Success Middle School. She is a White female in her mid-thirties with a Bachelor of Science degree in Biology Education, Master of Science in Middle Grades, and a certification in Instructional Leadership. Having completed her administrative certification the semester before my observation, Mrs. Leigh has one hour release from teaching to perform administrative duties at Success Middle School, which assists the administrative faculty and reduces cost for the school district. She has taught middle school science for ten years, all at Success Middle School. Mrs. Leigh teaches two 90-minute classes of advanced seventh-grade science instead of five one hour classes because advanced classes are considered Pre-Advanced Placement (Pre-AP); therefore, more contact hours are needed for an additional laboratory component, as well as to prepare them for the advanced placement course at the high school level. In order to be enrolled in Mrs. Leigh's advanced seventh-grade class, a student must have two teacher recommendations, pass a science entrance exam, and a minimum grade point average of 3.0. For this study, I observed one of Mrs. Leigh's seventh-grade advanced science classes because it was the only class out of the two with at least a 20% African American student population. Both teachers, as well as the entire science department, plan the last hour of the school day so they are able to collaborate and plan lessons together. Both teachers stated that they enjoy teaching middle school and expressed that this is the grade level they prefer to teach.

I visited one of Mrs. Leigh's advanced seventh-grade classes at Success Middle School. This class contained 21 students with four African American students—approximately 20% African American population, with two African Africans boys and two African American girls. One of the African American girls, Marie, had the highest average in advanced seventh-grade

science, including the other seventh-grade advanced science classes that Mrs. Leigh taught. Three of the African American advanced students participated in the study, while the other student displayed a nonchalant attitude about taking the consent letter and form home and bringing it back signed by a parent. Out of the three seventh-grade advanced science African American students that participated in the two semi-structured individual interviews, none were categorized as economically disadvantaged because they were not eligible for free-reduced meals. None of these students qualified for special education services. For the purpose of this study, I observed only one of Mrs. Leigh's advanced classes because this class was the only advanced seventh-grade class with at least 20% African American population.

Student Participants

Because each participating teacher had approximately 20% African American population in each seventh-grade science class observed, the participating teachers recommended all of their African American students to ensure I received a representative sample of seventh-grade student participants on each level (regular and advanced) based on their returned consent forms. I observed two regular seventh-grade classes and one advanced class with the most representation of African Americans. All students that participated in this study are described and discussed thoroughly in Chapter Four, but a brief introduction of each is presented in this section.

One of the regular classes had six African American students out of 28 students. Three of the six returned their consent forms to participate in two semi-structured individual interviews. The other regular class had six African American students out of 26 students. Five of the six African American students returned their consent forms to participate in the two semi-structured individual interviews, but one of them decided not to miss her elective (physical education) because she did not want to miss the opportunity to talk with friends. The seven regular student participants (pseudonyms) are:

- Ashley – a biracial (White/African American) 13-year-old girl that I nicknamed "Miss Beautiful" because she was pretty, quiet, participated in beauty pageants, as well as carried herself in that manner.

- Mekka – an African American 13-year-old girl that I nicknamed "Miss Humble" because she was smart, meek, and mild-mannered. She knew all of the answers to the questions

posed, yet she would downplay her intelligence to allow someone an opportunity to shine. Her focus was her school work.

- Bubbles – a multiracial (Asian/Puerto Rican/African American) 12-year-old girl that I nicknamed "Miss Vivacious" because of her outgoing personality.

- Chris – an African American 12-year-old boy that I nicknamed "Mr. Ambitious" because he always was determined to complete his work, help the teacher, participate in discussions, and already utilized the skills he believed were necessary to achieve his short and long-term goals.

- Alexis – an African American 12-year-old girl that I nicknamed "Miss Assertive" because she was quiet, but always ensured she had an opportunity to voice her opinion or respond to questions in the classroom.

- Tianna – a biracial (White/African American) 12-year-old girl that I nicknamed "Miss Spirited" because she had a disposition about herself that was kind, friendly, and she always made acquaintances with others.

- Tra'Von – an African American 12-year-old boy that I nicknamed "Mr. Gregarious" because he was always sociable, but made sure he completed his work.

The advanced class had four African American students out of 22 students, and three of the four African American students returned their consent forms to participate in the two semi-structured individual interviews. The three advanced participants (pseudonyms) are:

- Marie – a biracial (White/African American) 12-year-old girl that I nicknamed "Miss Valedictorian" because she was so smart with a natural talent and upheld the highest average of all the advanced classes all year.

- Tyrell – an African American 12-year-old boy that I nicknamed "Mr. Best All Around" because he was intelligent, athletic, and sociable, which made him popular and a leader for many at the school.

- Elizabeth – an African American 13-year-old girl that I nicknamed "Miss Athletic" because of her athletic ability, although she was highly intelligent and participated in the band. She possessed an athletic physique and athleticism, which seemed to be reflected in her character.

The data from the student participants is compared to the data I collected from observations and teacher individual interviews to see if the same themes emerged, and if the

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student and teacher participants interpret teaching strategies that are used with seventh-grade science to improve science learning the same way. Like the teacher participants, the student participants selected for this research study was purposive, convenient, and met the criteria of being an African American student.

Research Site

Success Middle School (pseudonym) selected to participate in this study is located in a rural area within the State of Alabama with a population of 5042 individuals. Eighty percent of the individuals in this area are categorized as White, 17% Black, <1% American Indian or Asian, and 2% multiracial. Seventy-eight percent of the individuals in this area have received a high school diploma or higher and 17% received a bachelor's degree or higher. Success Middle School was selected out of the other two middle schools in the Alabama school district because of its students' average performance on standardized exams in the content areas and the number of African Americans that attend the school. Because this study focused on the teaching strategies used in seventh-grade science classrooms to improve African American student learning, it made sense to choose a school whose performance was average on Alabama Science Assessments and contained at least a 20% African American population with a large number of them achieving academically in the area of science. This also afforded me the opportunity to compare data from African American students from different socioeconomic backgrounds from the data from observing the teaching strategies used by their teachers.

Success Middle School is comprised of seventh and eighth grade students. The school consists of five buildings: the main building that houses administrative offices and lunchroom; the seventh-grade building; the eighth-grade building; the building that houses the library, electives, and other empty rooms used for training/meetings; and the gym. These buildings are in a rectangular shape that leads from one to another and leaves the middle area clear with grass for a common area. The school has one principal, one assistant principal, two guidance counselors, and 44 highly qualified teachers as part of its faculty. Success Middle School also has achieved Adquate Yearly Progress (AYP) meeting 21 of 21 goals.

All core classes were held in the grade-level building. Each discipline (science, mathematics, English, and social studies) had four teachers and their rooms were across from each other. Each grade level had two large, fully equipped science laboratories (total of four

science laboratories) that were shared among four teachers. All disciplines planned the same period. Success Middle School's population for 2010-2011 was approximately 995 students with 516 seventh graders and 21% representing the African American population. There were approximately 60 African American seventh-grade students on free lunch and 13 on reduced meals. There were approximately 147 White seventh-grade students on free lunch and 38 on reduced-priced meals. This meant that 50% of the seventh-grade population was considered economically disadvantaged based on the eligibility of free and reduced-priced meals.

The class size average for Success Middle School science regular classes was 26 students and 24 students for the advanced seventh-grade classes. Success Middle School provided all students with their own student dictionary at the beginning of each year. The school did not provide hardcopy textbooks, but they have a classroom set that could be checked out on a daily basis at the end of the day, if needed, and online access to the textbook 24 hours a day. According to the teacher participants, this decision was due to funding and that most students did not take them home; some students would not return them at the end of the year; and the textbook was not the sole resource for instruction at Success Middle School.

Another funding issue dealt with teaching resources. The teachers received a $300 credit card to order supplies for the year (e.g., copy paper, dry erase markers, construction paper, pens, pencils) at the beginning of the school year and they received an account on the copy machine with 2000 copies pre-loaded each month. This amount came to a total of 20,000 copies over a 10-month period. The mathematics and science teachers ran out of their allowed copies each month and borrowed copies from the elective teachers because their allotted copies did not differ from the core subject areas and the elective courses did not use as many copies each month. If the teachers could not borrow copies at any point in the year, then they paid for the overage using the pre-loaded credit card or personal funds. As far as teaching resources for science (including mathematics), the Alabama Math, Science, and Technology Initiative (AMSTI) provided all mathematics and science teachers that completed their summer training with all the equipment and supplies needed for all students for each concept/unit. Alabama Math, Science, and Technology Initiative is a program to

> improve math and science teaching in Alabama so all students develop the knowledge
> and skills necessary for success in postsecondary studies and in the workforce. To
> accomplish this, AMSTI provides teachers with ongoing, grade and subject level

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professional development, and the equipment and materials needed to teach math and science using hands-on, activity based instruction. (AMSTI, 2012, para. 1)

A number of seventh-grade African American students at Success Middle School met or exceeded the 2010-2011 Alabama Science Assessment standards based on the state test results; however, it was not enough to close the Black-White achievement gap in science for this school district. Since 2008, the school district has maintained a gap of 15-20 percentage points in seventh-grade science with White seventh-graders out-performing African American seventh-grade students. In 2008, 72% of the seventh-grade African American students at Success Middle School met or exceeded the standards on the Alabama Science Assessment while 74% of the White students met or exceeded the standards on the Alabama Science Assessment. For Success Middle School, that represented a two percent gap and this data suggested that seventh-grade science teachers might have been implementing best teaching strategies and/or culturally responsive teaching that yielded higher levels of science learning for African American students. In 2009, the Black-White science gap began to widen by nine percentage points. In 2010-2011, 70% of African American seventh-graders met or exceeded the science content standards on the Alabama Science Assessment while 83% of the White seventh-grade students met or exceeded the seventh-grade science content standards. This represented a thirteen percentage point gap, although both populations were passing and considered average performing in seventh-grade science. Figure 3.1 depicts the contrast of the percentages of African American students who met or exceeded seventh-grade Alabama Science Assessment standards from 2008–2011 in comparison to their White counterparts. While the Alabama Science Assessment is only one form of assessment, this standardized exam provided the information related to science improvements in order to select my participants for this study.

District Scores
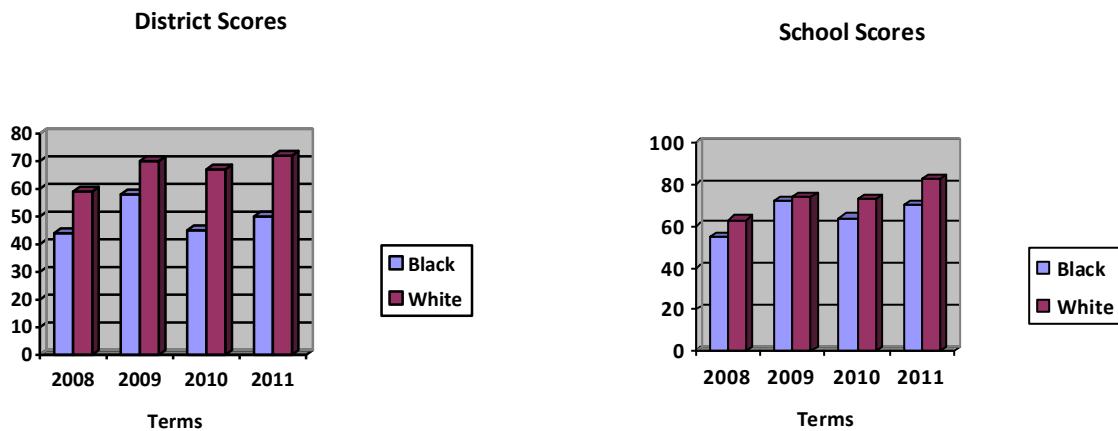
School Scores

Figure 3.1. Proficiency levels of seventh-grade Alabama science assessment scores of one school district and one middle school in the district of students who met or exceeded standards on the Alabama Science Assessment (ALASDE, 2011).

Mrs. Mary's Seventh-Grade Science Classroom

Upon entering Mrs. Mary's room, I observed that the room was overcrowded with flattop lab tables positioned adjacent to one another in rows with one lab table extended sideways across the front of the room to keep from covering the dry-erase board and another one positioned sideways against the wall. The teacher's desk was positioned in the back right corner of classroom with bookshelves located behind it and a small walkway, to maneuver in and out of the desk, adjacent to it. The desks were free of writing and the floors were free of trash. Mrs. Mary painted the desk tops and sides black to keep the writing on them from over the years from being visible and a distraction. There was a bookshelf positioned at the front of the room, adjacent to the door, for submitting and receiving assignments. This also was where the Bellwork and make-up work binders are kept, so the students can find the work they missed independently. Bellwork is an activity that is assigned as soon as the tardy bell sounds utilizing reading strategies, processing skills with measurements, charts, and graphs on the content discussed currently to prepare them for the seventh-grade Alabama Science Assessment. A long, dry-erase board was positioned at the front of the classroom.

The classroom was fairly large, although the laboratory desks made the room look crowded. It was decorated brightly with school-related pictures and the school's mascot— panther pawprints—used as the border around the ceiling. The following items were posted around the room: objectives, classroom rules, folders for submitting assignments, folders for

graded work designated by periods (students' work is folded in half where only their name is revealed), daily assignments posted by the week with each day noted, a continuous nine-week table of contents chart, and a few posters with artwork that indicate rituals and/or routines. For example, the table of contents chart has a magnetic pencil that Mrs. Mary moved down daily stating, "ADD to your table of contents." Another folder that stated, "Help! I don't know my name," holds all papers with no name on them. A classroom set of seventh-grade science textbooks lined the shelves because the students are issued an online version of the science textbook unless they do not have internet access, then those students are issued a hardcopy of the textbook.

There were five small, light boxes with a lamp kit built into it for small classroom experiments, such as growing Wisconsin Fast Plants. Wisconsin Fast Plants was one of the experiments I observed on the plant unit where this plant is used in a classroom setting because the seeds were genetically engineered to produce leaves/fruit within a short period of time so they could be observed in the classroom. Mrs. Mary had another shelf that cornered off her desk with several plastic boxes with lids that contained supplies used for group and independent classroom activities (e.g., scissors, markers, colored pencils, rulers). Adjacent to the light boxes was a podium and tall stool that the teacher used occasionally when she was in the front of the room. There is another tall chair positioned in front of the bookshelf that corners Mrs. Mary's desk. A LCD is installed in the ceiling for the use of technology for displaying videos, computer data, and other technology uses, and it projects onto a space on the wall that she has bordered to serve as the projector screen. This method is utilized to maximize the use of the space of the room and to keep from covering the dry-erase board. This setup allows both sources to be used simultaneously.

Upon entering on the initial observation day, my first impression of this classroom was that the room was crowded, but well-organized and conducive for learning. The students entered the classroom and began to get on-task with Bellwork without being prompted. The students were working diligently. Mrs. Mary changes the students' seats each nine-week period as a classroom management strategy so the students can work with different students.

Mrs. Leigh's Seventh-Grade Advanced Science Classroom

Upon entering Mrs. Leigh's classroom, my initial thoughts were that the room was clean, orderly, conducive for learning, and cold. The air conditioner was continuously on in this classroom because Mrs. Leigh was usually hot due to being pregnant. The room was bright, clean, and had single desks arranged in vertical rows. Mrs. Leigh preferred this type of desk arrangement and the students pushed them together when they performed group activities. Like Mrs. Mary's class, the students entered the classroom and began to get on-task with Bellwork without being prompted. The students worked diligently and began to prepare their materials to begin the day's activities when Bellwork was completed. The students were not in assigned desks, but the seating changed as needed for discipline issues or special needs.

Mrs. Leigh's teacher desk was L-shaped and positioned in the back corner with shelves behind it that held school supplies (e.g., paper, pencils, pens, sanitizer, soap, paper towels) with a curtain pulled across for privacy. One part of the desk contained a desktop computer and the other part of the desk held a laptop computer, which she used daily to teach using the LCD projector. The LCD projector was located centrally in the ceiling of the room. All rooms at Success Middle School were equipped with LCD projectors mounted in the ceiling.

On the other back wall were four bookshelves that housed manipulatives and science kits for classroom activities. Adjacent to those shelves was one bookshelf that held a classroom set of textbooks, dictionaries, medical reference books, and fiction books that were science-related. The desks were free of writing and the floors were free of trash. There was a dry-erase board at the front of the room with a projector screen that pulls down over it. In front of the dry-erase board and rows of vertical desks was a small table positioned in the center of the room used as a resource table for hand-outs, submitting assignments, and retrieving supplies. There was a plastic bin located at the front of the room adjacent to the trash can and the entrance where a binder containing Bellwork and all classroom activities, so absentees can check and make-up work missed while absent.

The classroom was fairly large and appeared spacious because of the single desks versus the laboratory desks in Mrs. Mary's classroom. It was decorated brightly with pictures of the school's mascot as border around the ceiling. On one side of the front wall was a bulletin board that was decorated nicely that contained school and classroom news. There was a strip of cork lined against another wall with the words, "What Do You Owe" above it. This was where Mrs.

Leigh attached a sheet with assignments and the names of students that missed that assignment. Another wall contained a word wall, where Mrs. Leigh continuously posted each vocabulary word and concept as they were covered. The last wall contained a row of windows with five light boxes arranged in a row beneath the windows. Each seventh-grade class had five light boxes because they usually teach five classes with one planning period. The light boxes were provided free of charge by AMSTI because of the teachers' participation in their summer program designed to provide science resources and activities to enhance science learning and offset state funding issues. A long dry erase board was located centrally across the front of the classroom. Mrs. Leigh used border paper to section off one side of the dry erase board to be used for objectives and the weekly agenda.

Role of the Researcher in Qualitative Research

During this qualitative case study of three seventh-grade science classrooms in one Alabama school, my main roles as the researcher were to be an observer of classroom instruction and to conduct individual interviews with teachers and student participants for data collection. Although it was difficult to be an observer in a classroom without being noticed by the students, my objective was to observe student-teacher interactions and teaching strategies. Upon the teacher participants' requests, I participated and/or assisted in the classroom. My intentions were not be involved in the instructional process; however, I played a supportive role as needed or requested. Loftland and Loftland (1995) advise that opportunities may present themselves for questions to be asked and new information may emerge during the process of observations because the researcher's role is known.

The intent of this study was to observe the teachers' teaching strategies, students' participation, and student interaction in the natural setting of the classroom; therefore, I ensured the teachers felt comfortable with me in their presence so as not to be a distraction. My presence and appearance played a major part in the respect I received from all students of each ethnicity; therefore, I was on-time, present when the students arrived to class, greeted them whenever we crossed paths, and dressed professionally each day. Bogdan and Biklen (2003) state the researcher must remain low-profile by how she dresses, the demeanor displayed, and/or expressions (Bogdan & Biklen, 2003). These actions were necessary because I wanted honest responses during individual interviews from all participants and this created the environment for

this type of behavior to be reciprocated. Letters of consent for the teacher and student participants are included in Appendix C.

Due to the nature of this research study, I served as an "instrument" (Patton, 2001, p. 14) because data was collected at multiple levels, situations were evaluated as a whole and in part, some data were processed immediately, any feedback needed received an immediate response and was verified, and the unexpected was investigated. I made concentrated efforts to be objective and involved only upon request. I acknowledge and reveal my assumptions and biases in the following section (Creswell, 2007; Gay, Mills, & Airasian, 2009; Lincoln & Guba, 1995). To encourage honesty among the participants and researcher, all efforts were put forth to establish rapport (Gaglio, Nelson, & King, 2006). I ensured ethics were followed closely by abiding by the participants' rights—to be informed of information about the study, to volunteer to participate in the study, and to decline to participate in the study. Pseudonyms were used for the participants and the research site so the identification of any participating parties is not revealed. The participants were provided an opportunity for member checking so they could approve how their voice was conveyed in the research and to make sure that their voice was communicated accurately. Orb, Eisenhauer, and Wynaden (2001) state that the voices of all participants can be recognized through their stories or words.

Researcher Assumptions and Bias

To assist in establishing trustworthiness, I clarified my biases that concern this research study. The prologue identified my subjective basis for this study and brings further credibility to the findings of this study. Malterud (2001) indicates that the background of a researcher can affect the area she or he is studying. It is acknowledged that my views may have an influence on how the data was interpreted; therefore, I was conscientious in ensuring trustworthiness was established. Creswell (2007) recommends two procedures to establish trustworthiness, but I chose seven procedures since I am both an African American and a science educator.

Rapport

I define rapport as building trust among all participants in this research study. Gaglio, Nelson, and King (2006) suggest that the researcher acknowledges power structures carefully to ensure balance between participants. I made every effort to make the teachers feel comfortable with the research topic and that they were not intimidated by the nature of the research. I ensured

that the participants understood that the purpose for this research was to add to the body of knowledge to improve science learning rather than to exploit the participants involved in the study. Harrison, MacGibbon, and Morton (2001) claim that establishing rapport with all participants will allow "thick, rich, description and in-depth, intimate individual interviews" (p. 323).

Ethics

Beyond Success Middle School's Alabama Science Assessment scores obtained from the internet, all other data collected for this study was obtained from the school's administration, observations, and semi-structured individual interviews with the seventh-grade teachers and students. Due to this, the researcher ensured the data obtained and utilized was for the well-being of the participants and in their best interest (Polkinghorn, 2005). Creswell (2007) warns researchers that data gained from participants may be sensitive; therefore, ethics is of the utmost importance. Careful measures were taken to ensure I did not marginalize the African American students further or manipulate the information obtained about and from the teachers to exploit their teaching strategies. The research was approved by the Institutional Review Board (IRB) to ensure all participants are protected and free from any type of harm whether emotional, mental, or physical.

Data Collection

I communicated the purpose and objectives of this research study with the Assistant Superintendent of Curriculum and Instruction of the Alabama school district, the two building administrators of the one Alabama school, the two teacher participants (regular and advanced), and all classes observed with more details provided to the ten African American students that participated in individual interviews. For this study, I planned to collect data for one seventh-grade science unit in one regular education and one advanced classroom of one Alabama school from multiple sources including observations, semi-structured individual interviews, and documents. Because of the wait for Institutional Review Board (IRB) approval (received over winter holidays) and permission to be granted from a school district and school to conduct this research, I began collecting data the third week of the second semester, which was the third nine-week grading period. Each class that was selected to participate was based on the classes with the highest African American population. I decided to observe two regular seventh-grade

science classes so I could observe more of the seventh-grade regular teacher's teaching strategies, more African American students, and more student-teacher interactions in the classroom. I observed one advanced class because the class observed was the only class with at least a 20% African American population. I used the Teaching Strategy Analysis Chart (Refer to Appendix A-1) to record my field notes and comments examining the teaching strategies that the teachers used and recorded any instances during which culturally responsive teaching was implemented.

I observed two seventh-grade regular science classes with one teacher participant and one advanced seventh-grade class with second teacher participant. I observed each regular class for sixty minutes and the advanced class was observed for two hours. The advanced class met longer because it was Pre-Advanced Placement (Pre-AP), covered content more in-depth, and included the 30 minute block of time designated for lunch. The Pre-AP course also included a laboratory component to prepare the students for the Advanced Placement (AP) science classes in high school.

Success Middle School seventh-grade science class content covered the diversity of life unit, which included topics such as bacteria, protists, fungi, plants, and animals. Success Middle School covered these topics within the first two weeks because they were small chapters and administered a formative assessment on the Wednesday of the third week, which was my first week and third day of observations. Pre-tests were administered the same day as formative assessments throughout the observation period, so I could determine how much prior knowledge the seventh-grade African American students that participated had concerning the content covered and if the teaching strategies used improved science learning when the post-test was administered. My data collection then included only plants and animals to complete the diversity of life unit. Due to the Pre-AP seventh-grade science class focusing more in-depth on the plants and animals chapters, that class spent four weeks on the topics while the regular seventh-grade classes spent approximately two to three weeks and moved on to body systems (skeletal and muscular). Because I had to be there to complete the diversity of life unit (plants and animals), I continued observing the regular seventh-grade classes teaching strategies used to teach the body systems. The formative assessment was the post-test and it was used to see if the seventh-grade African American participants improved science learning on content covered based on the teaching strategies that were implemented with content and the individual interviews. This

constituted my data collection over a six-week period. The last nine weeks of each grading period is catered towards summative assessments and mock Alabama Science Assessment Exams on the standards covered thus far.

Two semi-structured individual interviews were conducted individually with each selected student and teacher participant in the advanced teacher's administrative office provided for administrative duties in the same building. The room was comfortable, contained a teacher's desk, computer, rolling chair, and two seats for students that sat across from the teacher's desk. Each student individual interview (Refer to Appendices B-4 and B-5) was 30 minutes in duration with a few lasting up to one hour and fifteen minutes because some of the student participants expounded on the individual interview questions posed during each individual interview (Interview One and Two). Each teacher individual interview (Refer to Appendices B-2 and B-3) was planned to last at least 45 minutes to one hour; however, both individual interviews with each teacher participant lasted approximately two to two and one-half hours.

To refrain from interrupting the academic learning process, I proposed that all individual interviews take place before or after school. Because all of the student participants ride a school bus for transportation due to the school's rural location, Success Middle School administration approved for all student participants to be interviewed individually during their physical education period. The administration explained that students are not allowed to miss physical education often and physical education is not thought of as less important than core subjects. Administration proceeded with the understanding that my individual interviews would not have been possible due to transportation issues if this accommodation was not made for me. I provided the school Assistant Principal (AP) with a schedule of individual interviews indicating the students' names, assigned teacher, and assigned period of physical education and the AP sent an email granting permission for the student participants to miss physical education class on the specified days and times. I kept a roster of participants' participation and reporting times and provided that list to the AP upon the completion of each set of individual interviews. The AP then used this completed individual interview list to record accurate attendance for those days and time periods.

During Week 2 of the six-week observation period, the classes had guidance time, so the teacher participants did their first individual interview during the time periods the students were scheduled for guidance counseling (two one-hour class periods for the regular seventh-grade

science teacher and one two-hour class period for the advanced seventh-grade science teacher).
The second individual teacher interview with the advanced seventh-grade science teacher was
conducted after school for approximately two and one-half hours in Week 5. The second
individual teacher interview with the regular seventh-grade science teacher was conducted after
school for approximately two and one-half hours in Week 6. Both of these individual interviews
did not distract them from the instructional process.

Individual interviews made it possible for more information to emerge and contributed to
a more in-depth understanding to guide future observations. The individual interview protocol
(Refer to Appendix B-1) was explained to all teacher and student participants. The interviewees
were provided with all individual interview questions 24-48 hours in advance so he or she could
develop thought-provoking responses that illustrated a true representation of the individual so the
findings also could be more meaningful and more comprehensive. I proposed originally that all
individual interviews be recorded on audio-tapes and then transcribed to ensure accuracy of the
data from student and teacher participants, but the district and school administration, as well as
the teacher participants, preferred that it not be audio-taped. However, the teacher and student
participants granted me, the researcher, permission to use a laptop computer to type the
individual interviews while they spoke in lieu of audio-tapes.

Typing the individual interview while the participants spoke was beneficial because it
allowed me to portray accurately the data they presented, since I could not audio record them.
The laptop and typing during the individual interview were not distracting because I type
approximately 60 WPM with 0% error and remained eye contact the entire time providing them
with one-on-one attention. The only time my attention was not directly on the interviewee was
when I read the next question. Bogdan and Biklen (2003) advise that being an active listener
usually stimulates the participant to talk more. I reviewed the individual interview transcripts
daily, printed them out, and provided them to each participant to check for accuracy (member
checking) the following day. None of the participants noticed any errors in the interview
transcripts or an inaccurate portrayal of the message they conveyed. In accordance with the
Kansas State University's IRB, the transcripts from the individual interviews are secured and
will not be shared with another party.

Classroom observations and individual participant interviews granted insight into the
teaching strategies that impacted African American students' science learning. Both of these

forms of data collection helped me gain insight for the teaching strategies that improved science learning, the seventh-grade teacher, and student participants' perceptions of the teaching strategies that impacted science learning, and the extent those teaching strategies reflected culturally responsive teaching strategies that impacted science learning of seventh-grade African Americans.

Documents were collected to assist in learning the culture of the school and classrooms observed. Public data (e.g., school report card, seventh-grade Alabama science curriculum, and seventh-grade Alabama Assessment reports) for the seventh-grade schools and classes selected were obtained to assist me with data analysis. Other documents were collected as they became available from the seventh-grade teachers (e.g., science unit/lesson plans, seating charts, student reports from pre-and-post tests, student work samples). All documents that were not public records were photocopied because the originals must remain at the school site in the possession of the seventh-grade teacher participants.

In accordance with Kansas State University's IRB, all data collected are secured in one drawer of the my fireproof file cabinet at home, on a password protected laptop and external drive until the dissertation is complete, and in a locked portable file box while at the school site and in transition. Once the dissertation is complete, all data collected for this research study will be stored and secured for three years. The data collection procedure I used included: (a) protection of human subjects, (b) research timeline, (c) semi-structured individual interviews, and (d) observational data and visual data.

Protection of Human Subjects

To protect human subjects participating in this study, the research was proposed to the doctoral committee and their recommendations incorporated for review by the Institutional Review Board (IRB) at Kansas State University. The approval of the research proposal ensured that I made all the necessary preparations and took all the necessary precautions to comply with policies—both legal and ethical—to protect all human subjects that participated in this research. No risks to the participants of this study could be identified.

In accordance with Kansas State University's IRB, all printed materials are secured in one drawer of my fireproof file cabinet at home, on a laptop and external drive with password protection until the dissertation is complete, and in a locked portable file box while I was at the

school site or in transition. Once the dissertation is complete, all data collected for this research study will be stored and secured for three years. After three years, all files used in this research study will be destroyed by a document shredder and permanently deleted from all electronic devices. The reports and information I obtained for the Alabama Science Assessment were public information.

From the data obtained, one school in one Alabama school district was identified based on its average performance as a school and its overall average performance of African American students on the Alabama Science Assessment. The school was identified in the study as Success Middle School to maintain anonymity. The teachers and students were not identified by their legal names. Each participant selected a pseudonym to differentiate and protect them in this study. This effort was to maintain confidentiality.

The potential benefits for this study are for research and practice. For practice, this research study includes a list of teaching and culturally responsive teaching strategies that improve science learning, do not improve science learning, or have no impact on science learning for African American students. For research, this study contributes to the body of knowledge on Critical Race Theory, culturally responsive teaching, science achievement of seventh-grade African American students, teaching strategies that may improve science achievement of African Americans and possibly be beneficial to other ethnicities and Critical Race Theory. Again, African American students were the focus because this population continues to show a gap in science achievement across the United States (NCES, 2011), and this study's purpose was to identify strategies to improve their science learning.

Research Timeline

This research was proposed to my committee members Fall 2011. Upon the committee's approval of the proposed research with suggestions, I applied to the Institutional Review Board (IRB) for approval to proceed with data collection. I received approval in December 2011 over the winter holidays, then I approached the potential school district for permission to collect data in one of their schools. Permission was granted January 12, 2012, so I met with the participating school's administration and participating teachers concerning my research the following day. My data collection began January 17, 2012, the second semester of public school (Spring 2012) during the third week of the third nine-week grading period.

My timeline for data collection was originally nine weeks—the time I estimated that it should take to observe a science unit. I planned to observe an entire science unit, but due to permission being granted two weeks after the unit began, I collected data on the remaining topics (plants and animals) within the diversity of life unit, which took approximately six weeks. The last week in the nine-week reporting period is for mock Alabama Science Assessments on the topics covered within the nine-week reporting period. I observed two 60-minute seventh-grade regular science classes daily for six weeks. I also observed one two-hour seventh-grade advanced class for approximately four and one-half weeks due to the advanced teacher's maternity leave of absence. Nevertheless, the advanced teacher completed the science unit set to observe.

Individual interviews were scheduled during Week 2 and Week 6 for the seventh-grade regular science teacher and seventh-grade regular science African American student participants and Week 2 and Week 5 for the seventh-grade advanced science teacher and seventh-grade advanced science African American student participants. The individual interviews were conducted in a comfortable office free from distractions outside the teacher's instructional time and the students' academic classes. Individual interviews were conducted to provide a detailed account of each participant's experience (Polkinghorne, 2005) with seventh-grade science and the teaching strategies used to either improve or not improve science learning.

The timeline in Table 3.1 specifies the days that I observed in the seventh-grade science classrooms and conducted individual interviews with the teacher and student participants. The observational period was scheduled to begin the second day of Week 1 for six weeks. The first week was planned for initial observations to obtain a sense of the classroom culture including teacher rituals and routines, seating arrangements, instructional materials, and students. The observation period was scheduled at the beginning of the school's nine-week period, but permission to collect data at Success Middle School was not granted until the end of Week 2 of the nine-week grading period. The initial observations provided more background information to assist me in analyzing and interpreting my data.

Table 3.1. Timeline for Study at Success Middle School

Day	Activity
Week 1 **1**	Martin Luther King Holiday – No School!
2	Initial day of observations at research site
3	Observations

Day	Activity
4	Observations
5	Observations
Week 2 **6**	Observations 30-75 minute Individual Interview 1 with 3 students
7	Observations 30-75 minute Individual Interview 1 with 2 students 2 hour Individual Interview 1 with Regular 7th grade science teacher
8	Observations 30-75 minute Individual Interview 1 with 5 students
9	Observations
10	Observations 2 hour Individual Interview 1 with Advanced 7th grade science teacher
Week 3 **11**	Observations
12	Observations
13	Observations
14	Observations
15	Observations
Week 4 **16**	Observations
17	Observations
18	Observations
19	Observations
20	Observations
Week 5 **21**	Observations 30-75 minute Individual Interview 2 with 3 students
22	Observations with Regular Class Final Observations with Advanced Class 2.5 hour Individual Interview 2 with Advanced 7th grade science teacher
23	Observations with Regular Class Final Observations with Advanced Class
24	Observations
25	Observations
Week 6 **26**	Observations
27	Observations 30-75 minute Individual Interview 2 with 2 students 2.5 hour Individual Interview 2 with Regular 7th grade science teacher
28	Observations 30-75 minute Individual Interview 2 with 5 students

Day	Activity
29	Final Observations
30	Final Observations

Individual Interviews

Teacher Individual Interviews

Throughout this observation period, I planned two individual interviews with each seventh-grade science teacher (regular and advanced). The first individual interview lasted approximately two hours and the second individual interview lasted two and one-half hours. The individual interview protocol was explained carefully and the individual interview questions (Refer to Appendix B-2) were provided to each participant 48 hours in advance.

The first individual interview with both teacher participants was conducted after the first week of initial classroom observations so I could familiarize myself with the teachers' rituals and routines, teaching styles, as well as students and their learning styles. The first individual interview was planned to be conducted before or after school; however, each class had scheduled guidance counseling; therefore, the individual interviews were conducted during guidance counseling without interrupting the learning process or intruding on the participating teachers' personal time. The questions posed in the first individual interview provided me with some background information on the individual teachers (i.e., demographics), the teachers' perceptions of the student participants, and the teachers' perceptions of the practices that impact seventh-grade African American science students both positively and negatively.

The second individual interview with the teacher participants was to be conducted at the completion of the observation period once a formative assessment was administered and graded on the content observed. The teacher participants were again provided the questions 48 hours in advance (Refer to Appendix B-3), which was after the formative assessment was administered and graded. This presented situations for certain behaviors of the teacher to be observed before she had an opportunity to change due to the nature of the questions and content. These questions focused on each teacher's perceptions of their teaching styles used for the topics within the diversity of life unit observed, student test results from the pre-and-post formative assessments, and the teachers' perceptions about what they think is needed for African American students to be academically successful in science. I did not want to ask the series of questions scheduled for the second individual interview initially to avoid the teacher participants responding with

answers that they thought I expected or desired to receive. I asked questions and held informal discussions with the seventh-grade teachers and student participants throughout the study to clarify any data observed (e.g., teaching strategies, rituals and routines, seating arrangements, school policies). The information shared from these individuals provided me with more insight into the case study.

Student Individual Interviews

A total of ten students (seven regular and three advanced) participated in two semi-structured individual interviews. Because the class contained about 20% African American students, the participating teachers recommended all African American students to participate to ensure I received a representative sample of consent forms returned by the parents. Three out of six returned signed consent forms in one regular class; five out of six returned their consent forms in the other regular class; and three out of four returned their consent forms in the advanced class. This constitutes a total of eleven returned student consent forms, but one of the students did not come to the scheduled individual interview because the student did not want to miss talking with friends in the physical education class where he/she would have been excused.

All of the student first individual interviews lasted about 45 minutes to one hour and fifteen minutes. Each individual interview took place in the advanced teacher's administrative office in the same building during his/her physical education class period. The Assistant Principal (AP) approved all student participants to be excused from physical education (elective) to participate in the individual interview because Success Middle School is located in a rural area and all the participating students rode the school bus for transportation and otherwise would not have been able to participate due to no transportation. The individual interview protocol was explained carefully and the individual interview questions (Refer to Appendix B-4) were provided to each participant 48 hours in advance. These questions provided me with some background information (i.e., demographics) about each student, the students' learning styles, and the students' perceptions about seventh-grade science. The first individual interview took place after initial classroom observations during the first three days of Week Two.

The second student individual interview took place after formative assessments on topics covered were administered. The second individual student interviews ranged from 30 minutes to one hour and fifteen minutes. These second individual interview questions (Refer to Appendix B-5) were provided 48 hours in advance but after the unit was completed and the formative

assessment was administered and graded. The questions for the second individual interview focused on each student's perception of the teacher, their teacher's teaching style, how the teaching style matched the student's learning style, and the student's perceptions about what he/she thought was needed for him/her to be academically successful in science. I did not want to ask the series of questions that were scheduled for the second individual interview before the students received their formative assessment scores because I did not want the students to respond with answers that he or she thought I might want to receive.

I conducted informal guided conversations with all the students in the seventh-grade class to make the participants more comfortable and to see if the seventh-grade participants would share their thoughts and ideas more freely around and with other students. These informal guided conversations did not occur until I thought the students were comfortable with my presence and permission was granted by the seventh-grade teacher participant. Other conversations among the students were observed and field notes were recorded throughout the study and included in the data analysis.

I sought to determine if there was a relationship between culturally responsive teaching and science learning. Therefore, I examined to what extent the teaching strategies used by the seventh-grade teacher participants were culturally responsive, if at all. I remained open for new ideas and themes to emerge from the data obtained in this study. I used the following data collection and analysis chart to show how the research questions were connected to the data that was collected and how it was analyzed (Refer to Table 3.2).

Table 3.2. Data Collection and Analysis Chart

Overall Question: What teaching strategies are being used in seventh-grade regular and advanced science classrooms that impact African American student learning?		
Research Questions	**Data Collection**	**Data Analysis**
What do teachers think about the teaching strategies they employ to teach African American students?	Observation Field Notes Teacher Individual Interviews	List and describe methods and activities Relationship of data to tenets of Critical Race Theory Evidence of commonalities and differences in planning for and teaching African American students Identify common themes among teachers
What do African American students think about the teaching strategies that are used by their science teachers to impact their science learning?	Observation Field Notes Student Individual Interviews	Relationship of data to tenets of Critical Race Theory Evidence of commonalities and differences in African American students' Perceptions Identify common themes among students
To what extent do seventh-grade teachers' strategies reflect culturally responsive teaching?	Observation Field Notes Student Individual Interviews Teacher Individual Interviews Documents Collected	Relationship of data to tenets of Critical Race Theory Evidence of commonalities and differences in planning for and teaching African American students Identify common themes among students and teachers' perceptions

Observational Data and Visual Data

According to Loftland and Loftland (1995), a researcher conducts observations in the field (classroom setting) over an extensive period of time to gain a better understanding and appreciation of a condition or relationship. Polkinghorne (2005) suggests that researchers pay

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attention to participants' behavior, facial expressions, bodily tone, gestures, and any other nonverbal signals. I kept detailed field notes daily using a teaching strategies analysis chart (Refer to Appendix A-1) for each day where observations of the classroom were recorded in a narrative format. Out of five columns on the chart, one column on the chart provided space for activity(ies) used for that day and another two columns allowed me to elaborate if the teaching strategies used were academic instructional effective strategies, culturally responsive teaching, and/or both. A third column provided space for detailed classroom observations and a final column provided space for my notes and comments. My observations in the seventh-grade regular and advanced classrooms provided me the opportunity to observe seventh-grade teaching strategies, students, teachers, and student-teacher relationships. Based on my observations and field notes, I examined them to see the extent culturally responsive teaching was implemented in the seventh-grade classrooms.

My field notes also included detailed descriptions of the participants, physical classroom settings, classroom teaching strategies, classroom activities, and researcher's behavior (Bogdan & Biklen, 2003). The comment section was created so I could reflect on the observations and record comments that were used in the analyses. I reviewed and reflected on the field notes daily after each classroom visit to assist in guiding me with the following day's observations. A five-inch binder was used, along with a laptop computer, as the main resources to record and organize field notes for this research. An external drive with a protected password was used to save and protect data collected throughout the study. Documents from the science unit observed were collected as they became available from the teachers so I could evaluate the classroom atmosphere as it related to students' learning levels and learning styles based on the type of activities and questioning used in activities.

Documents from the teacher and instructional process were collected daily as they became available so I could use them to compare the data obtained to observations and individual interviews. According to Yin (1994), using multiple sources of data collection adds rigor and more insight to the study. Documents that became available during the study included unit plans, weekly lesson plans, students' grades from pre-and-post formative tests, seventh-grade science curriculum, seventh-grade Alabama Science Assessment reports, and student work samples completed during the topics observed. All documents obtained were photocopied

because the original had to remain at the Success Middle School and so I could use them as needed for this study.

Trustworthiness of the Data

In a qualitative research study, it is important to establish trustworthiness (Creswell, 2007; Merriam, 1998; Rubin, 2000; Yin, 1994), which is described as research that addresses the credibility, transferability, dependability, and confirmability of the findings from the study (Gay et al., 2009; Lincoln & Guba, 1985; Yin, 1994). I exercised 11 approaches to ensure trustworthiness: prolonged engagement in field, triangulation of data, peer debriefing, member checks, rich, thick descriptions, purposive sampling, convenience sampling, criterion sampling, audit trail, reflexivity, and clarified researcher's bias (Anfera, Brown, & Mangione, 2002; Creswell, 2007; Gay et al., 2009). Creswell (2007) suggests employing at least two strategies to ensure trustworthiness, which adds rigor to the study. Along with rigor, subjectivity is achieved when trustworthiness is established (Eisner, 1991; Lincoln & Guba, 1995; Morrow, 2005).

Credibility

Credibility addresses the complications and difficulties within a study (Gay et al., 2009). To establish credibility, I had prolonged engagement in the field. I devoted the entire 60-minute class period in two regular seventh-grade science and one two-hour seventh-grade advanced class during the six weeks at Success Middle School for observations. The study was designed over a school's nine-week grading period, but due to permission being granted two weeks after nine weeks had begun, I collected data for six weeks to observe the remaining topics of diversity of life unit (plants and animals). I did not have any knowledge of the participating teachers, teaching styles, or students upon initial observations; however, I have taught science since 1999 on the content and the level of students observed, including the levels of learners (regular and advanced) and diverse populations. My ethnic background, as an African American, and my professional experience fostered trust with the teacher and student participants and built rapport with them. I possessed data on seventh-grade Alabama Science Assessment for the state, district, and school. This was a form of criterion sampling because I sought to find a representative sample for the nature of information that was explored (Sandelowski, 1995). However, prolonged engagement in the field afforded me the opportunity to "overcome distortions produced by the presence of researchers and … test biases and perceptions" (Gay et

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al., 2009, p. 376). This prolonged engagement and on-going observations in the classroom also assisted me in learning the culture of the school and classroom (Creswell, 2007; Erlandson, Harris, Skipper & Allen, 1993).

Triangulation was used by combining data from multiple data sources and multiple methods of collecting data to establish credibility (Creswell, 2007; Gay et al., 2009). Before the data collection period began, I collected data by retrieving and analyzing the seventh-grade Alabama Science Assessments from 2008-2011 for Success Middle School. These data were used to identify the one school that was chosen and asked to participate in this research. Semi-structured individual interviews with the seventh-grade teachers and students were conducted. Field notes from observations (Refer to Appendix A-1) and the transcripts from individual interviews of the teachers and students served as additional data sources for triangulation purposes. I selected this strategy to provide a more comprehensive image of what was being researched and to confirm the data collected and observed (Gay et al., 2009).

As part of establishing creditability, one of my committee members, who volunteered to serve in this role, reviewed the data collected to confirm that the data obtained from observations and individual interviews were being interpreted and represented appropriately. This is referred to as peer debriefing. Creswell (2005) states that peer debriefing from an outside source provides additional feedback to benefit and enhance the study. This examination of my data was conducted at the completion of the observation period of Success Middle School. All recorded data were shared to receive constructive feedback. The role of a peer debriefer is to present the difficult questions about the research study's data collection procedures and process, interpretations, and findings to make it a more reputable study (Gay et al., 2009). I listened attentively and recorded notes of each peer debriefing to ensure all feedback was reviewed and applied in future work.

Member checks are one of the most significant strategies for ensuring credibility (Lincoln & Guba, 1985). In this process, I requested that the participants review the individual interview transcripts and provide their opinions and understandings of the accuracy and credibility of the data I collected, as well as the findings and interpretations (Creswell, 2007; Erlandson et al., 1993; Miles & Huberman, 1994). This also was a way to build rapport with the participants. The two participating teachers and ten participating students in this study received a copy of the transcribed individual interviews and findings for review. None of them were returned with any

errors or changes. Rough drafts of my data collection, data analysis, data interpretations, and data findings were shared with teacher participants for review throughout this study to request their thoughts on credibility. I reviewed supplementary materials (Refer to Appendix A-1) with the teacher participants and feedback from the two teachers regarding the teaching strategies, student-teacher interaction, and students were discussed and annotated. All of the attempts to establish rapport with the participants enhanced credibility and served as a way to balance the power dynamics between the participants and me (Gaglio et al., 2006). Rather than validity, credibility is sought in qualitative research. Seeking credibility ensured my confidence about the data that were collected, interpreted, and analyzed (Eisner, 1991). Through the use of prolonged engagement in the field, triangulation, peer debriefing, and member checks, I established trustworthiness in the area of credibility.

Transferability

Transferability concerns the researcher's views of qualitative research being context-bound (Gay et al., 2009). The researcher addressed transferability by providing rich, thick-descriptions. I, as researcher, also ensured purposive sampling of the participants that were observed and interviewed individually and the selection of Success Middle School. Through the duration of this case study, I provided rich, thick descriptions. I also provided detailed descriptions of Success Middle School, the seventh-grade classrooms, the seventh-grade regular and advanced teachers, and the seventh-grade students in order to examine the instructional environment. These details give readers insight as though they were introduced to the class and familiar with each teaching setting. Detailed descriptions of the teaching strategies were provided so readers of this study can envision the instructional atmosphere of the classroom. This affords the opportunity to see the extent culturally responsive teaching was reflected in teaching strategies used in the seventh-grade science classrooms and if these strategies, when used, are improving science learning or not making a difference at all for African American students. This also created opportunities for recognition of any teaching strategies that improved or did not improve science learning of African Americans. An abundance of details were provided regarding the reactions and participation among students and teachers within each classroom. All of these details were observed, recorded, and presented in this study. The thick descriptions enabled individuals that read this research to be able to take the data and transfer it to other settings and see if the findings can be transferred due to the characteristics that are

shared (Erlandson et al., 1993). Detailed descriptions allow the data to be compared in which the transferability of data can be considered (Gay et al., 2009).

Another strategy to achieve transferability of this case study was by obtaining a purposive sample. A purposive sample is a population that is considered to be a good representative of the study. In this particular case study, the researcher utilized purposive sampling with the selection of Success Middle School, the seventh-grade classrooms that were selected to be observed, the two teachers that were observed and individually interviewed, and the ten students that were observed and individually interviewed. The researcher used the 2008-2011Alabama Science Assessment scores of one school district to select the one school observed. Due to the study focusing on teaching strategies that improve science learning of African Americans and the extent of those strategies reflecting a culturally responsive teacher, I considered schools that had a minimum of 20% African Americans enrolled with a maximum of 80% enrollment of African Americans. The school selected was based on average performance of the district, school, and African American students' performance on the Alabama Science Assessments from 2008-2011. After the school was selected, the Assistant Principal (AP) recommended the advanced teacher, who was the department chairperson, and the department chairperson provided me with a recommendation of which seventh-grade regular science classroom to observe based on the teacher's passing rate of African Americans on the Alabama Science Assessment and the years of experience of the teacher. Creswell (2007) states that a purposive sample "applies to both the selection of the case to study and the sampling of information used within the case" (p. 246).

Creswell (2002) reminds researchers that qualitative research is context-bound. This means that the researchers seek information that others are able to experience for themselves; not "draw conclusions that can be generalized to larger groups of people" (Gay et al., 2009, p. 374). To address the transferability of this research study, I provided thick descriptions and utilized purposive samples.

Dependability

To establish dependability of this research study, I created an audit trail, as well as used triangulation and peer debriefing (Anfara et al., 2002; Creswell, 2007; & Gay et al., 2009). Dependability concerns the strength of the data that is collected. It gives reference to the systematic documentation of research (Morrow, 2005; Patton, 2001). This provides the

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opportunity for in-depth details so an individual interested in the research can understand the research fully and repeat the study, if desired (Shenton, 2004). Creswell (2007) suggests that dependability is the quantitative research's counterpart for reliability.

I addressed dependability by creating an audit trail (Anfara et al., 2002; Creswell, 2007; Gay et al., 2009). For this study, a volunteer auditor, who is a recent PhD graduate, examined the processes that took place with data collection, analysis, and interpretation (Creswell, 2007; Gay et al., 2009). I provided this individual access to my original field notes and all necessary documents to assist with this process of investigating my process and findings for accuracy. This audit trail sought to determine if the data that were presented support the researcher's findings, interpretations, and conclusions (Creswell, 2007).

Using the audit trail as a resource, the auditor also participated in peer debriefing. Further, peer debriefing was conducted by a committee member who volunteered to serve in this capacity. This individual could not serve as an auditor in the audit trail because she is a committee member. Creswell (2007) states that an individual that serves in the capacity of an auditor should not be associated with the research study. The peer debriefer will "keep the researcher honest; ask hard questions about methods, meanings, and interpretations; and provide the researcher with the opportunity for catharsis by sympathetically listening to the researcher's feelings" (Creswell, 2007, p. 208). I listened attentively and recorded notes of each peer review session to ensure all feedback could be reviewed and applied in future work.

Triangulation was used to address dependability in this study (Anfara et al., 2002). As the researcher, I combined, analyzed, and interpreted data from multiple data sources and utilized multiple methods of collecting data (Creswell, 2007; Gay et al., 2009). This strategy also provided a more comprehensive image of what was researched and validated the data collected and observed (Gay et al., 2009). From this comprehensive data analysis, themes emerged.

Confirmability

Confirmability concerns me, as the researcher, and my interpretations of the findings (Morrow, 2005; Shenton, 2004). Lincoln and Guba (1985) define confirmability as "the degree to which findings are determined by the respondents and conditions of the inquiry and not by the biases, motivations, interests or perspective of the inquirer" (p. 290). To address confirmability, which deals with the "neutrality or objectivity of the data collected" (Gay et al., 2009, p. 376), I practiced reflexivity and triangulation.

One practice of reflexivity was keeping a methodological log (i.e., daily journal of reflections) after each observation period, as well as reflections in the last column of the teaching strategies analysis chart (Refer to Appendix A-1). Being an active listener during individual interviews with teacher and student participants was another practice of reflexivity. A third reflexive practice was to ensure data were recorded exactly how they were observed or presented. Charts and graphs were created and presented in this study as a practice of reflexivity to assist the research committee members and readers of this study in seeing the data for themselves. All of these aforementioned techniques were practices of reflexivity, which assisted in achieving confirmability of the research study.

Triangulation was another strategy that was implemented to address confirmability of this research study. Shenton (2004) states that confirmability involves the researcher acknowledging personal predispositions and assumptions. I maintained objectivity by stating my assumptions and biases and utilizing triangulation. The researcher combined data from multiple data sources and multiple data collection methods (Creswell, 2007; Gay et al., 2009). The researcher utilized field notes, transcripts from individual interviews, scores from formative assessments on the topics covered, documents collected, and any other additional data source to obtain a more inclusive understanding of the research and to confirm the findings (Creswell, 2007; Gay et al., 2009).

I established trustworthiness of this case study by addressing the credibility, transferability, dependability, and confirmability of the findings from the research. Several strategies were employed to deal with each area. Prolonged engagement in the field, triangulation, peer debriefing, and member checks were exercised to address credibility. Transferability was addressed by providing rich, thick descriptions of the research data and obtaining purposive samples. An audit trail was created, peer debriefing sessions were held, and triangulation was practiced to address dependability. Confirmability was addressed by practicing reflexivity and triangulation.

Data Analysis

To determine teaching strategies that impact science learning positively and the potential effects that culturally responsive teaching have on science learning of seventh-grade African Americans in one Alabama school district, data were collected and analyzed from multiple

sources: pre-and-post tests, observations, semi-structured individual interviews, and documents (e.g., science unit/lesson plans, seating charts, school progress reports, seventh-grade Alabama Science Assessment scores) collected. The overarching question concerned what actually took place in seventh-grade regular and advanced science classrooms that impacts student learning of African Americans. To achieve a response to the overarching question, teaching strategies that did or did not improve science learning were analyzed based on observations and field notes. The extent to which culturally responsive teaching was used and impacted science learning also was examined to determine teaching strategies that improve science learning of African American students.

Critical Race Theory (CRT) was used as the framework in analyzing all data. Critical Race Theory seeks social justice by concentrating on the effects of race, racism, and the hegemonic structure of White supremacy (DeCuir & Dixson, 2004). Using CRT to analyze and interpret this research data, student-teacher interactions of African Americans were interrogated and provided a more in-depth examination of what took place in seventh-grade science classrooms, both positively and negatively. Critical Race Theory also provides an explanation of how observed teaching methods impact science learning of African Americans. Data analysis consists of obtaining a broad understanding of all the data collected by reviewing notes recorded on my teaching strategies analysis chart, individual interview transcripts, reflective journals, and any documents obtained. I recorded notes in the methodological log to provide an overall reflection of observations made throughout the research study. I also acquired feedback from the seventh-grade student and teacher participants through member checks to clarify and confirm the accuracy of the data obtained.

After all data were obtained, reviewed, clarified, and confirmed, I organized the data systematically by assigning codes. These codes were written in the margins of the field notes and interview transcripts and highlighted to be distinguished easily from any initial coding that may have been initiated throughout the data collection period. The field notes and researcher's comments first were coded and categorized from the classroom observations. The categories were:

- African American students' attitudes and behaviors about the teaching strategies including classroom management, the teacher, and student-teacher interactions.

- Participating teachers' attitudes and behaviors about the teaching strategies including classroom management, the students, and teacher-student interactions.
- Evidence of Critical Race Theory tenets in the instructional process with teachers.
- Evidence of Critical Race Theory tenets in the instructional process with students.
- Evidence of culturally responsive teaching in the instructional process.

I initially organized the responses for each question together. Then, I sorted the responses by commonalities of the student responses and then the teacher responses. The participants' responses were then categorized by the students' attitudes toward science, attitudes about their teacher, teaching strategies used in their seventh-grade classroom, teaching strategies that each student believed impacted their science learning, and background information. The responses from each teacher were then categorized by their teaching styles, the teaching strategies they used in the class, the teaching strategies they believed impacted African Americans, and then their background information. The background information for both, teachers and students, helped me to understand them further and make associations. Lastly, I explored the extent of culturally responsive teaching by analyzing my codes from classroom observations and transcripts from individual interviews.

The categories from the data collected from the classroom observations, student individual interviews, and teacher individual interviews were sorted. I then analyzed each category and identified the themes that emerged. Coding the data thematically allows relationships among the data to be grouped together. After all data were coded, I identified these themes collectively (see in Table 4.5 in Chapter 4) using the data analysis spiral (Creswell, 2007).

Data Analysis Spiral

The data analysis spiral is when I, the researcher, processed the data analyzed in the research in a circular pattern as opposed to a fixed, linear approach (Creswell, 2007). This refers to the idea that I "entered with data of text or images … and exited with an account or a narrative. In between, I touched on several facets of analysis and circles around and around" (Creswell, 2007, p. 150). Dey argues that researchers "learn by doing" (1993, p. 6) and depend on the "I's—insight, intuition, and impression" (1995, p. 78). The data analysis spiral involved

the following aspects: (a) data managing; (b) reading and writing memos; (c) describing, classifying, and interpreting; and (d) representing and visualizing.

Data Managing

I began the process of data analysis with the first loop in the spiral—data management (Creswell, 2007). Throughout the research, data were systematically organized into files, whether by hard copies in file folders or computer file folders. This organization system involved the data being converted into words or sentences so it could be accessed easily. I did this process of data analysis spiraling by hand.

Reading and Writing Memos

This component of the data analysis spiral consists becoming familiar with all data collected. Agar (1980) recommends researchers "read the transcripts in their entirety several times. Immerse yourself in the details, trying to get a sense of the individual interview as a whole before breaking it into parts" (p. 103). I read each transcript five times while writing memos (i.e., short phrases, conceptual ideas) in the margins of the interview transcripts and analyzing data to help with the initial investigation. After reading and writing memos on all of the data, I reflected on the memos and grouped the data by commonalities. After reflecting and regrouping the data, I reviewed the participants' transcripts in their entirety approximately three more times trying to make certain that I interpreted the data collected appropriately.

Describing, Classifying, and Interpreting

Creswell (2007) states that this loop is where "researchers describe in detail, develop themes or dimensions through some classification system, and provide an interpretation in light of their own views or views of perspectives in the literature" (p. 151). I took the groups of commonalities from reading and writing memos and assigned codes or categories to the data. Along with assigning codes to the teaching strategies data, I coded the data for the tenets of Critical Race Theory with the understanding that other themes may have emerged.

Creswell (2007) suggests beginning coding data with five or six categories and then expanding the categories as the data are reviewed again. Huberman and Miles (1994) suggest that one way of analyzing the codes within the data is by counting the frequency of the occurrence of each code. Creswell (2007) argues that this method of coding has a quantitative

orientation; however, it cannot be used to represent equal importance because it may represent contradictory views, although it may occur several times. For example, I may code a section as dealing with culturally responsive teaching; however, the passage may express a teacher's thoughts of how she feels it does not impact science achievement and another teacher may be expressing thoughts of how she believes it influences positive achievement in science. I did not use pre-exiting or priori codes alone because this would have limited new codes from emerging (Creswell, 2007).

Interpreting data represents my understanding of the experience(s) investigated. Because this is a case study, I sought detailed descriptions of the particular cases. I connected parts of the research to provide an understanding of the whole research experience (Creswell, 2007). These interpretations were based on "hunches, insights, and intuition" (Creswell, 2007, p. 154). Accordingly, I developed naturalistic generalizations from these interpretations.

Representing and Visualizing

The final step in the data analysis spiral was representing and visualizing. This phase involved me presenting the data using text, not numbers (Creswell, 2007). This representation showed how all the different sources of information could be categorized into themes. This provided an in-depth illustration of the cases studied in the form of tables and narratives. The data were organized into a table (Refer to Table 4.5) showing the relationships among categories. From analyzing this table, naturalistic generalizations were drawn by observing the commonalities and differentiations of the cases being explored.

Summary

A qualitative case study was conducted in three seventh-grade science classrooms in one Alabama middle school to investigate the teaching strategies that improve or deter the science learning of African American students. The research further sought to determine the extent culturally responsive teaching was implemented in the science curriculum to improve science learning of African American students. The one school that participated in this research was selected by its average performance of African American students on the Alabama Science Assessment from 2008-2011. This selection provided the means for me to investigate more teacher, student, and student-teacher interactions and take into account socioeconomic factors

proven to influence the Black-White science achievement gap (Haycock, 1998; Lindsey et al., 2008; Paige & Witty, 2010; Rothstein, 2004).

The seventh-grade advanced science teacher participant, who also was the science department chairperson, was recommended by the Assistant Principal (AP) and she recommended the participating regular teacher based on teaching experience and passing rate of African American students on the Alabama Science Assessments in the past. Each of the two teachers participated in two semi-structured individual interviews with me—the first interview was two hours and the second interview was two and one-half hours. The individual interviews were conducted so I could gain more insight into the study. These individual interviews also were compared to classroom observations to see how well the information obtained in the individual interviews matched what actually took place in the classroom.

Once the two seventh-grade teacher participants were selected, each one recommended their African American students to participate in a minimum of a 30 minute semi-structured individual interview. The original study called for three to five recommendations, but because I desired at least 20% African American population, they recommended all African American students in each class to ensure I received a representative sample of African American students' returned consent forms. Throughout this study, I observed three seventh-grade science classrooms (two regular and one advanced) and individually interviewed ten seventh-grade African American students. Data were collected, analyzed, and interpreted to determine the teaching strategies that impact science learning and the extent those teaching strategies reflected culturally responsive teaching.

This qualitative research was concerned with what was happening in seventh-grade classrooms that causes students to achieve or underachieve in science. As such, generalizability was difficult because of the samples that I used in this study – one school district, one middle school in the district, three seventh-grade classes (two regular and one advanced), two seventh-grade science teachers (one regular and one advanced), and ten African American students. Further, generalizability is not a goal of qualitative research. One of my purposes was to identify teaching strategies and culturally responsive teaching that improve science learning (Gay et al., 2009).

The trustworthiness of this study addressed its credibility, transferability, dependability, and confirmability (Gay et al., 2009; Lincoln & Guba, 1985; Yin, 1994). Procedures for me to

gain credibility of the research were through extended periods in the field, triangulation, member checks, and reflexivity (Creswell, 2007; Gay et al., 2009). Peer debriefing established credibility and confirmability. Transferability was achieved by making sure I provided detailed descriptions of the data. Dependability was ensured by keeping an audit trail. Confirmability was assured through reflexivity and triangulation.

Chapter Four provides details and descriptions of my findings from observations and individual interviews with teachers and students of seventh-grade science classrooms. Chapter Five provides discussion of the research findings of this observational case study of one seventh-grade Alabama middle school. My conclusions were drawn and implications for science educators and recommendations for future research are provided . Chapter Five closes with my final thoughts and insights about this research.

Chapter 4—Findings

Overview

Chapter Four offers rich, thick descriptions of my research findings. The factors that influenced this research were: (a) my experience with education over the past 13 years, (b) the African American academic achievement gap in the subject area of science, (c) culturally responsive teaching, and (d) Critical Race Theory. This study investigated teaching strategies utilized in seventh-grade science classes of one Alabama middle school and the extent to which those practices reflected culturally responsive teaching. Thus, this research provides a context to explain the underachievement of African Americans and expand the strategies used to improve African American achievement in science. This chapter is divided into the following four sections: (a) demographic data of the teacher and student participants; (b) personal narratives of each teacher and student participant; (c) findings of the case study presented by research questions and emerging themes; and (d) summary of the chapter.

This qualitative case study was conducted during the Spring 2012 semester of the 2011-2012 school year from January 17, 2012 through February 24, 2012 (approximately six weeks). Two regular seventh-grade science classes were observed for sixty minutes each per day and one advanced seventh-grade class was observed for approximately two hours each day. Plants, Animals, Skeletal System and Muscular System were the units observed in regular seventh-grade science over the six-week period. Only Plants and Animals were observed in advanced seventh-grade science because: (a) the advanced seventh-grade science class went more in-depth into the topics, and (b) the advanced teacher went on maternity leave of absence after four and one-half weeks. Pre-tests were administered before the content was observed in each class and a post-test was administered after content was taught and observed. This case study involved two semi-structured individual interviews with each teacher and student participant. The first individual interviews with all participants were conducted after the first week of initial observations in the seventh-grade science classrooms. The first individual interview with the teachers was approximately two hours and the second individual interview was approximately two and one-half hours. The first individual student interviews lasted approximately 45 minutes to one hour and fifteen minutes and the second individual student interviews ranged from 30 minutes to one hour and fifteen minutes. Prior to each individual interview, the protocol was explained

thoroughly and the participants received the interview questions 48 hours before the individual interviews took place. The individual interviews provided the ten African American students and the two teacher participants an opportunity to tell their stories about the teaching strategies that were used in seventh-grade science and how they impacted science learning. I analyzed the relationships between the perceptions of the student and teacher participants in comparison to my observations to determine if they complemented each other. The relationships or associations also were examined to determine the impact the teaching strategies had on learning.

There were seven themes that emerged from this research. These themes are presented in the findings of this chapter through the following three research questions:

1. What do teachers think about the teaching strategies they employ to teach African American students?

    (a) The participating teachers' teaching strategies encompassed all of the students' learning styles, abilities, attitudes towards science, and motivational levels about learning science, with no emphasis on the African American student population.

    (b) The participating teachers taught the state content standards simultaneously using the same instructional model daily, incorporating other content areas when possible.

2. What do African American students think about the teaching strategies that are used by their science teachers to impact their science learning?

    (c) The participating African American students believed their seventh-grade science teachers used a variety of teaching strategies to ensure science learning took place, that science learning was fun, and that science learning was engaging.

    (d) The participating African American students genuinely liked their teacher.

    (e) The participating African American students revealed high self-efficacy.

    (f) African American student participants' parents value education and moved to Success Middle School district for better educational opportunities.

3. To what extent do seventh-grade teachers' teaching strategies reflect culturally responsive teaching?

    (g) Teachers were not familiar with the term "culturally responsive teaching," but there was evidence that several aspects of it were present in the seventh-grade science classroom environment.

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I present the experiences of the student and teacher participants in a narrative format based on the in-depth individual interviews. These narratives support storytelling, one of the tenets of Critical Race Theory, the framework from which I interpreted and analyzed the findings. Storytelling was a method I chose to explore the teaching strategies that impact African American students' science learning. While culturally responsive teaching was the focus in this study, CRT's storytelling tenet informed the analysis further in addition to its other tenets used for analysis and interpretation of the data. The teachers shared their knowledge and experiences with teaching strategies that they believed impacted African American students' science learning. African American student participants also shared their knowledge and experiences of the teaching strategies they believed impacted their science learning.

Originally, I became interested in Critical Race Theory because I was disgusted with the injustice principals exercised in the public school system as a whole, especially with the African American population. There were separate endorsements and trainings provided for English as a Second Language (ESL) students, with an emphasis on the Hispanic population, but never any specific training programs, or strategies presented to improve African American student learning beyond special education and prescriptive programs. Reading programs have been introduced widely; however, the reading programs improve all students' academic achievement, not just African Americans. In this study, I assumed originally the data collected would be negative and the negative undertones would be embedded heavily in the predominantly white culture of the school. While this research study yielded primarily positive results overall, Critical Race Theory gave voice to the participants' stories and unmasked their experiences.

Demographics

Demographic characteristics were collected for each participant in this study. The following demographic characteristics for the two seventh-grade science teacher participants are presented in Table 4.1: (a) pseudonym, (b) self-identification, (c) degree level(s), (d) endorsements on teaching certificate, and (e) years of teaching experience.

Table 4.1. Seventh-Grade Teacher Participants' Demographic Information

Pseudonym	Mary	Leigh
Self-Identification	White	White
Degree Level(s)	B.S. in Physical Education & Health	B.S. in Biology Education M.Ed. in Middle Grades Education M.S. in Instructional Leadership
Endorsements on Teaching Certificate	Physical Education, Health, and Science	Biology, Middle School Science, and Education Leadership
Years of Teaching Experience	29.5	10

The following demographic characteristics for the seven regular African American seventh-grade science students are presented in Table 4.2 and three advanced students are presented in Table 4.3: (a) pseudonym, (b) school labeled identification, (c) birthplace, (d) age (e) parents at home,(f) highest education level of parents, (g) siblings, (h) birth order, (i) free-reduced meal status, and (j) pre-and-post-test science average.

Table 4.2. Seventh-Grade Regular Science Participants' Demographic Information

Pseudonym	Ashley	Mekka	Bubbles	Chris	Alexis	Tianna	Tra'Von
School-Labeled Identification	Black - mixed white (biracial)	Black	Black-mixed Asian and Puerto Rican (multi-racial)	Black	Black	Black-mixed with white (biracial)	Black
Birthplace	South	South	South	South	Southwest	Southeast	South
Age	13	13	12	12	12	12	13
Parents at Home	Both	Mom	Mom	Mom	Mom	Mom & Stepdad	Mom
Parents' Highest Level of Education	Both College Graduates	High School	Some College	College Graduate	High School	Mom-Some college Stepdad-High School	Some College
Siblings	1 Bro 1 Sis	2 Bro 1 Sis	1 Bro 1 Sis	1 Bro 1 Sis	1 Bro 1 Sis	1 Bro 1 Sis	3 Bro 1 Sis
Birth Order	3 of 3	2 of 4	1 of 3	2 of 3	2 of 3	1 of 3	3 of 5
Free/Reduced Meals	Reduced	Free	Free	Free	No	No	Free
Pre-and-Post Test Average	84	80	84	38	78	75	74

Bro=Brothers and Sis=Sisters

Table 4.3. Seventh-Grade Advanced Science Participants' Demographic Information

Pseudonym	Marie	Tyrell	Elizabeth
School Labeled Identification	Black-mixed White, (biracial)	Black	Black
Birthplace	South	South	South
Age	12	12	13
Parents at Home	Both	Both	Mom
Parents' Highest Level of Education	Mom-College Graduate Dad-High School	Mom-College Graduate Dad-High School	Mom-College Graduate
Siblings	1 Bro 1 Sis	1 Bro 1 Sis	1 Sis
Birth Order	2 of 3	3 of 3	1 of 2
Free/Reduced Meals	No	No	No
Pre-and-Post Test Average	97	70	75

Bro=Brothers and Sis=Sisters

Personal Narratives of Participants

The personal narratives are descriptions of the demographics of the two seventh-grade teacher participants, seven regular seventh-grade regular African American science student participants, and three advanced seventh-grade African American science student participants. These data were collected from individual participant interviews and from classroom observations inside the classroom. Each personal narrative familiarizes readers familiar with the African American students and their teachers that participated in this study and identifies the teaching strategies they believed impacted their learning in seventh-grade science. The seven regular student participants were enrolled in Mrs. Mary's seventh-grade class, and the three advanced student participants were enrolled in Mrs. Leigh's seventh-grade class.

Teacher Participants

One teacher, Mrs. Mary, taught regular seventh-grade science and the other teacher, Mrs. Leigh, taught advanced seventh-grade science. Both participating teachers have been teaching at the same school in the same district for the past ten years. Both teachers self-identified as White Americans. They both were over 30 years old with at least ten years of experience at Success

Middle School. They were born and raised in the State of Alabama, and attended an Alabama college or university. Both participating teachers were monolingual and both are women.

Regular Teacher Narrative: Mrs. Mary

Mrs. Mary, a native of Alabama, teaches seventh-grade regular science at Success Middle School. She is a White female in her late fifties who possesses a bachelor's degree in physical education and health from Auburn University with approximately 29.5 years of teaching experience. Four of those years were in the private school setting, two and one-half years were with another school system, and 23 were with her current school system. After teaching for a few years, physical education positions became hard to obtain, so she matriculated into school to complete her certification in science, since she had several science courses. Mrs. Mary currently holds Alabama certification in physical education, health, and secondary science. The majority of Mrs. Mary's teaching years of experience have been in the middle school setting. She shared the unique story of graduating from college without ever obtaining a high school diploma: "I was friends with an individual that had a lot to do with the university and had a pull; therefore, he waived my senior year because of my grades. I started Auburn University at 17 and graduated at 20." Because of Mrs. Mary's academic ability, Auburn University gave her a chance.   She is married with an adult son and daughter.

Mrs. Mary thought that she would always teach high school physical education and health, which she did for four years, but she was offered a job with her current school system in Alabama teaching science.

> I was filling in a physical education position with a [neighboring county] when I
> received a call at 10:30p.m. from [current county] on a Sunday night to teach science.
> [Neighboring county] let me out of my contract a week before school started. This
> position was not more money, but half the distance. Different environment:

[neighboring county] was 100% African American; low socioeconomic environment. She believed the university teacher education program she attended prepared her adequately to teach middle school science because they presented numerous science activities that could be adjusted to age appropriate audiences. However, she informed me that the teacher education program at Auburn University 30 years ago did not have a specialized middle school program, but a program that was kindergarten through twelfth grade (K-12). She described how she took classes in physical education, health, and science, but there were no methods courses like teacher

education programs have today. She also revealed that she was never sent into the class to observe or do a teacher internship. "Besides going to an achievement center working with special need students, I don't think they ever sent us inside the class." Her expression was that "it was dumped in my lap and to do whatever with it."

Years of experience and professional development have shaped Mrs. Mary's teaching skills and abilities. She explained a program that is available for Alabama schools called Alabama Math, Science, & Technology Initiative (AMSTI) at the University of Alabama. This is a hands-on program developed around incorporating cooperative groups for each activity. Alabama Math, Science, & Technology Initiative provides the schools with six fully-equipped kits with all the necessary resources needed to serve all students successfully. In order to participate in this program and receive the equipment, the participating teachers had to attend two stipend-paid workshops during the summer where the participants are taught how to do each activity. Mrs. Mary explained, "a teacher participant only receives the resources each year for the summer session(s) completed." These fully-equipped science kits are provided for each school. The actual AMSTI activities and handouts are given to the teacher participants in a binder and a copy is provided on a compact disk (CD). Mrs. Mary described AMSTI as a good program, but some aspects of it are boring to her and the students; therefore, she selects the activities from the program that she implements in her classroom instruction.

> All of the activities are hands-on activities, and they have videos of somebody else teaching. For example, if studying the rainforest, they would have someone filming in a rainforest. If studying volcanoes, then somebody would film near a volcano. That was interesting, but the students got bored with it after the first nine-weeks. The person that selected materials picked certain films depending on their enjoyment. The integrated science unit was the best because it was a variety: life, physical, and earth.

She clarified that her ability to teach effectively would diminish if this program was not available. She described how the school system provided funding for supplies, but it is not enough to furnish the activities; therefore, those funds are used to furnish the classroom with a stock of supplies to last throughout the school year, such as copy paper, scissors, staplers, staples, hole punch, pens, dry-erase markers, etc.

Advanced Teacher Narrative: Mrs. Leigh

Mrs. Leigh, a native of Alabama, teaches seventh-grade advanced science at Success Middle School. She is a White female in her mid-thirties who possesses a bachelor's degree in biology education from Auburn University and a Master of Education degree from Columbus State in middle school education. Mrs. Leigh recently completed her certification in Instructional Leadership from Troy University. She has ten years of experience teaching at the middle school level all at Success Middle School. She has taught seventh and eighth-grade over the course of the ten years, but the last six years are at the seventh-grade level. Mrs. Leigh informed me that this school year is the second year with the advanced, Pre-Advanced Placement (Pre-AP), seventh-grade science, and she has taught it since it was initiated. She was selected by administration to be the department head of Success Middle School. She is married with a three year-old daughter and currently pregnant with another daughter.

Mrs. Leigh explained that Auburn University's teacher education program did not have a middle-school program when she received her bachelor's degree. By the time she attended Auburn University, they had begun observations in the classroom with coursework and a teacher internship. She described observing one semester in a high school setting and one semester in a middle school setting for a teaching methods class. She explained that middle school was where she wanted to teach after conducting observations in the middle school setting. Mrs. Leigh said she knew she wanted to stay at the middle school level "forever"; therefore, she pursued her masters in middle-grades (6-12). She enlightened me that the State of Alabama does not allow middle school only certification, so teachers must become certified in sixth through twelfth grades if they want to teach at the secondary level. Mrs. Leigh described her undergraduate education degree in biology as mainly taking courses in science where the instructor taught more in-depth while the middle school program did not. She made it clear that taking the more in-depth science courses prepared her for teaching Pre-AP courses. She clarified that she has to revisit or research content because she conceptually understands life science; nevertheless, she reviews specific science content so she will know it and understand it to share just in case a question arises in class.

Mrs. Leigh also discussed AMSTI professional development available to support teaching advanced seventh-grade science. She stated that the program "provides materials to integrate activities and allows us [teachers] to integrate more hands-on activities that I feel are

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beneficial, and I leave out the others that I do not see beneficial or not relevant to course of study." She explained that most of the professional development provided by the school system is geared towards math and reading because those are the areas where accountability lies for the No Child Left Behind Act (NCLB), but AMSTI concerns science directly. Mrs. Leigh stated that she has not attended any professional development opportunities for culturally and linguistically diverse populations. She emphasized that African Americans and other groups categorized as economically disadvantaged do not perform as well on the Alabama Reading and Math Test (ARMT). Therefore, training is provided to assist all students, not specifically African Americans or economically disadvantaged groups. She continued to explain her other trainings: (a) Alabama Reading Initiative, which focuses on strategic lesson planning integrating more graphic organizers and structuring class periods with beginning, middle, and ending activities trying to promote student learning; and (b) Making Middle School Works, which is not being utilized currently as much at Success Middle School this school year but is basically a program of research-based strategies where other educators share what has worked for them.

Mrs. Leigh stated that she has the necessary resources and equipment to teach seventh-grade advanced science effectively because AMSTI provides fully-stocked kits for all activities. She explained how the kits provided by AMSTI are better for advanced students than regular students because they are developed for higher-order thinking skills. Mrs. Leigh informed me that other school systems in Alabama and surrounding Alabama counties are not receiving the same funding that Success Middle School is and do not have the same or adequate supplies because they are not members of the AMSTI program. Their former superintendent of the school system ensured enough money was in reserve for funding issues. She explained further how the former school superintendent wanted to ensure finances would not be a hindrance to the learning process. She mentioned that there are some schools that are not conducting many hands-on activities and laboratory experiences, if any, because of lack of funding.

Mrs. Leigh said that she does not follow AMSTI's curriculum exactly as it is prescribed because she has "vertical alignment with the high school," and must implement activities that best fit the needs of her current students: "It is hard to be able to teach all the concepts you need to teach plus the background information they [students] need to understand it." She also noted, "I use the AMSTI activities that I feel are beneficial, and I leave out the others that I do not see beneficial or not relevant to the Alabama Course of Study."

She described the problem that hinders her from being effective is that the students are coming to middle school with limited or no science instruction at the elementary level. Her comment about this issue was, "I am left with the job of trying to teach seventh-grade science and having to go back and teach necessary skills like measurements, lab safety, and how to behave in a science laboratory." Mrs. Leigh made it clear that educators and stakeholders understand that money or access to materials to conduct hands-on activities and an emphasis on science in elementary are necessary to support middle school science and to be an effective middle school teacher.

Student Participants

There were ten student participants in this case study of seventh-grade science in one Alabama middle school. All ten students were identified as African American by Success Middle School. The average age of the student participants was 12. Four of the student participants were born in Georgia, four were born in Alabama, one was born in Alaska, and one was born in North Carolina. None of the participants were bilingual. Seven of the student participants were in regular seventh-grade science and the other three were in advanced seventh-grade science. None of the African American student participants were eligible for special education services; however, both regular and advanced seventh-grade science classes were considered inclusion classes, i.e., classes that had special education students mainstreamed in the least restrictive environment. Although this information is confidential, I was made aware by the participating teachers that none of the participating African American students were labeled as having an Individualized Education Plan (IEP).

The student participants' gender included seven females and three males. All participants in this study varied in size, height, and shades of skin color, although they were considered African American. All participants had siblings. All student participants, except two, attended the same elementary school and Success Middle School: One African American student attended sixth-grade in Alaska and the other African American student attended a neighboring Alabama school that is currently in year five of not meeting Adequate Yearly Progress (AYP) according to the NCLB requirements.

In regular seventh-grade science, pre-and-post tests were administered to all students on Plants and Animals and another on Skeletal and Muscular Systems. In advanced seventh-grade

science, pre- and post-tests were administered to all students on Plants and another on Animals. Appendix E-1 presents the pre- and post-test results of all participating African American seventh-grade students and their pre-and-post test averages. While this case study was qualitative, the descriptive data (Refer to Tables 4.2 and 4.3) revealed the amount of science learning using the teaching strategies implemented in seventh-grade regular and advanced science. Although Chris was the only student that had a failing pre- and post-test average, his post-test scores showed improvement. He was one of the main students that participated actively in class and may not test well.

Regular Student Narrative: Ashley "Miss Beautiful"

Ashley is a 13-year-old female that has a white mother and a black father and Success Middle School labeled her as African American. She was born in a city in Georgia that neighbors Success Middle School, but the family moved to Alabama for better schools. Ashley lives with both parents and is the third child of three. She has an older brother and sister. Both of her parents are college graduates; however, Ashley qualified for reduced meals at Success Middle School. Ashley is a tall, thin, and fair-skinned girl with long, straight strands of brown hair that extend approximately three inches below her neckline. Ashley was enrolled in seventh-grade regular science with Mrs. Mary.

Ashley participates in beauty pageants and plays softball. She stated that her most recent pageant was June 2011 and she was first runner-up. Ashley stated that she wanted to participate on Success Middle School's softball team but she did not make the team. She believed it was because she wore shorts when they requested pants and also due to messing up on her pop flies, a softball skill. Ashley described the day of try-outs where she received a pass out of class to call her mother around lunchtime because she was nervous. She assured her mother that she had everything she needed. During the last 30 minutes of the school day, she realized that she did not have her softball pants but she was afraid to ask for another pass to the office because she had already gone earlier and may have missed too much class. Ashley participates in book buddies, which she described as a "club where you can go and read books to the little ones. You have to make up an activity so they can do it at the elementary school across the street. We walk on club day." She mentioned that she joined the club because she likes to read books to children.

Ashley stated her favorite subject is "life science because you get to dissect things and see what parts of the body are what." She commented that dissection affords her the opportunity

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"to see what's really inside of your body and what it does." Ashley continued that she aspires to be a veterinarian because she "likes playing with little kittens and taking care of them." She stated that she likes all kinds of animals:

> I have three dogs and six fish. I don't remember what kind of fish. I have one Shih Tzu, one Chihuahua , and one chocolate Labrador retriever mixed with bulldog. The chocolate lab is an outdoor dog. The outside dog is my dad and brother's dog and the ones inside are me and my mom's.

Ashley said that there is nothing that she dislikes about science.

When asked about her preferred learning style, Ashley stated that she learns best when Mrs. Mary reviews content continuously until the students grasp the information. She mentioned that she also likes when Mrs. Mary asks questions while she is going over the content. Ashley acknowledged that her most comfortable method of demonstrating her science learning is by taking a paper-pencil test because she can then show Mrs. Mary how much she has learned. She stated that she could also show learning with a project but "it would take more effort when you can just take a test and show her." Ashley stated that she does not particularly like science projects because "they take a lot of time do it and then it falls apart."

Ashley describes Mrs. Mary as a "good teacher that is intelligent and courageous." She stated that Mrs. Mary, the regular seventh-grade science teacher, is courageous because

> She has the courage to be a teacher and to talk about all the stuff she taught us. It takes a lot of courage to tell a student that is acting bad to stop and keep on talking to them. Then you have to call the office, have to fill out paperwork, and do write ups for them.

Ashley believed Mrs. Mary would describe her as "intelligent, well-behaved, and a good student." When asked about the preference of middle school over elementary school, Ashley favored middle school because she spends a longer period of time in each subject, rather than elementary school where the students always did math. She said, "Middle school is kind of doing the same thing, but the middle school teacher gets to focus on one area more." She believes middle school teachers are more effective than elementary teachers because "Middle school teachers teach a lot of harder things than elementary teachers. Like in elementary school, you learn time tables and in middle school, you learn how to do geometry, shapes, and scale drawings."

Ashley suggested that Success Middle School and Mrs. Mary could do more labs and dissections, "like eyeballs to see what's inside." Ashley is confident that she and her peers perform equally in science. Her words were, "I study hard, but even when I don't study, I usually make a good grade." She mentions that "my parents do not have to make me study, but sometimes I forget." She believes strongly that she is "smart and not because my parents help me." Ashley's advice to middle school teachers that want to improve would be to "do more things to help you understand things better." Her closing comments about science learning were based on the premise that African Americans are graded by their scores on standardized exams and they are labeled negatively based on that score, however, they may not test well.

A pre-test and post-test on Plants and Animals and Skeletal and Muscular Systems were administered. Both pre-tests showed that Ashley had little prior knowledge before the content was taught. Ashley made a 64/D on the pre-test and a 101/A on the post-test for the Plant and Animals content. She made a 46/F on the pre-test and a 67/D on the post-test for the Skeletal and Muscular content yielding an 84/B post-test average on the content taught and observed. Based on these results, student individual interviews, and classroom observations, science learning took place for Ashley.

Regular Student Narrative: Mekka "Miss Humble"

Mekka is a 13-year-old female that self-identified and Success Middle School labeled as African American. She was born in a small city in Alabama that neighbors Success Middle School but the family moved to this particular school district in Alabama for better schools. Mekka lives with her mother and is the second child of four. She has an older brother and two younger sisters. Neither parent attended college, but both completed high school. Mekka qualified for free meals at Success Middle School. Mekka is a quiet, shy, tall, thin, dark-skinned, mild-mannered female with long hair that she generally wears in a ponytail with a ribbon. Mekka was enrolled in seventh-grade regular science with Mrs. Mary.

Mekka attended a neighboring Alabama school for sixth-grade, then she moved to Success Middle School district for a better educational experience. She stated that she is enjoying her new middle school because they "handle behavior differently." Mekka described a situation at her previous school during sixth-grade where an African American boy continuously touched her and her cousin "in the wrong spot" on the school bus almost every afternoon but the administration or the police did not do anything to protect them. Reports were filed, but no

actions occurred for several months until the minor child molester withdrew from elementary school. Mekka offered the information that her grades are better at Success Middle School than elementary school because Mrs. Mary explains the content better and goes more in-depth for understanding.

Mekka was selected for Beta Club based on her academic achievement but she declined to participate because she was afraid she would get behind in class because the students are pulled out of class for club meetings. Mekka does not participate in any extra-curricular activities. Mekka stated her favorite subject is math because she likes the subject and always receives assistance from her math teacher if she has a problem. She stated that she does not like and is not interested in some of the topics covered in seventh-grade science but she likes the tests because Mrs. Mary always plays a review game before tests to help the students learn the content. In the review game, the teacher asks the class a question or fill-in-the-blank statement and the students receive a bonus point on their test if they raise their hand, are called on, and get the correct answer to the question.

Mekka stated that she desires to be a nurse. She mentioned that she plays doctor with her younger sister all the time at home and she rarely lets her sister take the role of the doctor. Mekka commented that she does not like science but does well because she asks a lot of questions and Mrs. Mary assists her whenever she needs help. She stated that she would love to visit places, such as aquariums because she loves to observe the animals, but other museums, such as the Coca Cola museum in Atlanta, Georgia, were not interesting. When asked about her preferred learning style, Mekka proposed that she prefers note-taking because "They help me get better grades on test because I look over them. Without the notes, I would not understand some of the stuff." Mekka acknowledged that her most comfortable method of demonstrating her science learning is through group work because she and her peers can help one another.

Mekka described Mrs. Mary as "helpful and nice," and that she never gets into any trouble. She stated that Mrs. Mary would describe her as "shy, nice, and hardworking." When asked about the preference of middle school over elementary school, Mekka favored elementary school because "Last year, they told us what we missed and this year they don't. We have to ask what we missed in middle school." She believes elementary school teachers were more effective than middle school teachers because "Elementary teachers assist students more than middle school teachers." Mekka expressed that elementary teachers took the time to help students with

their needs. Mekka declared that her middle school teacher(s) could spend more time helping students with questions and problems. She mentioned that if there was any type of afterschool program, such as a tutorial program, she would probably attend.

Mekka believed that she performs higher in science than some of her peers but there are some that perform higher than she does. Her thoughts concerning her achieving lower than other peers were "probably due to the fact that I may not have taken the time out to study like others may have or I probably was just not interested in the topic." Mekka's advice to middle school teachers who want to improve is to "help students more." Her closing comments about science learning were that, "African Americans do not learn differently, they just may not study as hard as others or just not interested."

A pre-test and post-test on Plants and Animals and Skeletal and Muscular Systems were administered. Both pre-tests showed that Mekka had little prior knowledge before the content was taught. Mekka made a 73/C on the pre-test and a 97/A on the post-test for the Plant and Animals content. She made a 50/F on the pre-test and a 63/D on the post-test for the Skeletal and Muscular content yielding an 80/B post-test average on the content taught and observed. Based on these results, student individual interviews, and classroom observations, science learning took place for Mekka.

Regular Student Narrative: Bubbles "Miss Vivacious"

Bubbles is a 12-year-old female with a mother who is African American and Asian and a father that is African American and Puerto Rican. Success Middle School labeled her as African American, but she identifies with all ethnic groups that make up her composition. She was born in a city in Georgia that neighbors Success Middle School but the family moved to Alabama for better schools. Bubbles lives with her mother and is the first child of three. She has a younger brother and sister. Her mother has some college education and her father graduated from high school. Bubbles was eligible for free meals at Success Middle School. Bubbles is a petite, fair-skinned girl with long, curly strands of brownish-black hair that extends approximately two inches below her neckline. Bubbles was enrolled in seventh-grade regular science with Mrs. Mary.

She described herself as a "choc-o-holic" and stated that her favorite colors are hot pink and green. Bubbles participated in book buddies, which is "A club where you go to different schools, but still in the county, and you read to little kids or they read to you and you have to

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create an activity for the little kids about the book." Bubbles emphasized how much she liked changing classes in middle school because she is learning "responsibility, like being a young adult." Bubbles mentioned that her grandmother takes her, her eight-year-old sister, and cousin to different places, like museums, aquariums, and theme parks during the summer because she wants them to spend time together. She explained that her mother usually joins them but did not the past summer because she had a newborn and did not want to come along with a "crying baby."

Bubbles' favorite subject is writing because she likes to write and read books. She stated that she remembers what she reads if she writes about it. She is sure that she wants to go to college but is not sure of her major. She expressed that it would be a career that is "hard" because she likes to show how smart she is and do things that other people think she cannot do. She said that she likes the science activities that are presented in class because they are fun and help her learn better. Bubbles commented that taking a test is the thing she likes least about science because she does not understand some of the questions and so she typically gets the wrong answer when she actually knows and understands the content.

When asked about her preferred learning style, Bubbles described lecture-discussion because Mrs. Mary teaches the content in a form that she understands, can take notes on, ask questions, and go back and study. She provided an example of "If Jimmy cut the male part of a flower in half, what is the center of that part called? What is the male part called? Where is this part that is closest to the male part called?" Bubbles recognizes that her most comfortable method of demonstrating her science learning is by paper and pencil tests because she is able to explain everything that she knows. She explained further that she may get nervous and forget the content if she had to take an oral exam. She expanded her view stating that she loves to talk, but it depends on the nature of the content.

Bubbles described Mrs. Mary as "nice, sweet, intellectual, and stylish." She stated that Mrs. Mary would describe her as "fun, energetic, and colorful." When asked about her preference of middle school over elementary school, Bubbles favored middle school because she thought elementary school treated the students like infants and middle school teachers treat them like young adults. She believed middle school teachers were more effective than elementary teachers because "You have to study all the time and keep reading over what you done until you

get." She said, "I believe some subjects are hard, but when they are explained and I keep re-reading it. I get it."

Bubbles proclaimed that Mrs. Mary could do more fun projects to help the students learn. Bubbles described science as a subject that can be "boring at times" because of all the writing but fun as well. She believed that there may be "two or three students" that are smarter than she in the class but she considered herself an average student because there are times when she understands the content and others when she does not. Bubbles' advice to middle school teachers that want to improve is to "Make your class more fun so the kids will get into learning." She provided the following examples: (a) do more science projects, (b) do PowerPoint presentations in math, (c) do plays, movies, and/or home projects in creative writing, and (d) watch news channels or old videos to see how things reflect social studies. Bubbles' advice to Success Middle School to improve student learning was to improve the school lunches. She stated that there needs to be a variety of items on the menu. She commented that, "It is sad when you can remember the menu. We should have more variety like make a couple things daily and get what we want and put it on our tray. We don't want to eat the same things every day." Her closing comments about science learning of African Americans were that, "I don't think some teachers actually teach the African Americans; they just tell them to do something [assigned work], but I don't see that at Success Middle School."

A pre-test and post-test on Plants and Animals and Skeletal and Muscular Systems were administered. Both pre-tests showed that Bubbles had little prior knowledge before the content was taught. Bubbles made a 55/F on the pre-test and a 97/A on the post-test for the Plant and Animals content. She made a 42/F on the pre-test and a 70/C on the post-test for the Skeletal and Muscular content yielding an 84/B post-test average on the content taught and observed. Based on these results, student individual interviews, and classroom observations, science learning took place for Bubbles.

Regular Student Narrative: Chris "Mr. Ambitious"

Chris is a 12-year-old male that self-identified and Success Middle School labeled as African American. He was born in a small city in Alabama that neighbors Success Middle School but the family moved to this school district in Alabama for better schools and his mother's new job after his parents divorced. Chris lives with his mother and is the second child of three. He has an older sister and a younger brother. His mother is a college graduate and his

father completed high school. Chris' parents are divorced but his dad re-married, lives in another part of Alabama about two hours away, and picks up Chris to visit with him during the summer and holidays. Chris said that he is with his aunt "a lot" due to his mother working all the time. He stated that most of his spare time is spent in church with his mom when she is not working. Chris qualified for free meals at Success Middle School. Chris is a tall, thin, fair-skinned, and talkative male with low, nicely-groomed haircut. Chris was enrolled in seventh-grade regular science with Mrs. Mary.

Chris attended a neighboring Alabama school for fifth-grade and moved to Success Middle School district for a better educational experience after his parents' divorce. He stated that they moved from their former area because of the violence in the schools in that county. Chris played football and basketball the previous years before coming to Success Middle School but he was with his father during the summer when they held football try-outs at Success Middle School for the current year and at his grandmother's house when they held basketball try-outs. He stated that he was going to try to arrange his visitation with his father later this coming summer so he would not miss football try-outs. Chris offered the information of training schedules for each sport, which showed his interest. He informed me that he was going to try-out for wrestling this spring at Success Middle School.

Chris participated in Fellow Christian Athletes (FCA), which is a Christian-based club for athletes. Chris said, "It was club day, and I had decided to be in there because it talks about Christians. I am a Christian myself, and I go to church a lot." Chris does not participate in any extra-curricular activities because he states that he would rather play with his friends and people with whom he is familiar. Chris expressed that he enjoys middle school because

> You get more freedom than elementary because they did not let you have that much freedom in elementary. You get to walk around and go to different classes. At my other school, all of the subjects were in one class with one teacher.

Chris stated his favorite subject is English because "it is easier. Right now we are doing poems, and I think it is better and easier. I can relate and understand English better." He mentioned he likes to do laboratory experiences in science the most because they are "fun and I get it." Chris pinpointed that the class was learning about plants and doing labs on plants was fun and better than writing notes. He emphasized that he does not like writing notes because he has to physically write a lot but he highlighted that he understands his notes, remembers because

he wrote them, and can go back and review them. He confirmed this with, "Well, I take notes because if it is a test the next day, I can go back through those notes over and over until I can remember."

Chris assured me that he was not interested in majoring in a science-related field; however, he plans to enlist in the United States Air Force after high school so they can pay for college. Chris stated his plan after he graduates from college is to be the "chief executive officer (CEO)" of his own business. He did not know what type of business at this point in his life. He has thought about a shoe store but he says it depends on what he wants to do at that time. Chris made it known that his aunt has taken him to Orlando, FL, but they did not go to Sea World. He mentioned that his aunt is always taking him places but it is usually history related, like the Civil Rights Museum or local Army infantry museum. When asked about his preferred learning style, Chris stated that he prefers lecture-discussion because he understands it better, write it, and go back and review content. Chris confessed that although he learns a lot with notetaking and a lecture-discussion teaching method, he is most comfortable demonstrating his science learning with group work. Chris noted that, "We can all put our ideas together and sum it all up. I am usually the speaker in our class, but we all have different roles and we all come up with the answer."   Chris believed he learns better in groups when he is the speaker because he has to actually know what he is talking about. He said that, "Some people don't know what they are saying or how to explain it." He believed strongly that he would still play a key role in group work if he was not the speaker because he would help them solve the problem regardless. His words were, "I still won't just sit there and watch them get the problem."

Chris described Mrs. Mary as "nice and helpful," and he believes that Mrs. Mary would describe him as "nice and smart." When asked about his preference of middle school over elementary school, Chris favored middle school because there is more freedom, which helps him mature. He reflected on the words of his middle school teachers where they informed the students that they are maturing and should know how to behave. Chris believed middle school teachers were more effective than elementary school teachers for him because his elementary teacher did not help him with any of his subjects. He exclaimed,

> I don't know why, but she used to scream at me. She did not like me, and I don't know why. And I did not like her and I know why. She mentioned that if there was any type of after school program (e.g., tutoring), she would probably come. She thought every time

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that somebody did something, it was me. She would send me in the hall. It got to a point where I marked my own spot in the hall. My mom actually sat in the classroom with me. The teacher was actually acting nice when she'd come. That is why I was glad to get out of her class.

Chris stated that he outperforms some of his peers and some of his peers outperform him in science. He believed it is due to he does not study that much. He revealed that he studies right before a test but not regularly. Chris informed me that his daily schedule consisted of him coming home, taking a nap, eating something, watching television, and going to church (on Wednesdays). He stressed that not studying and low performance is an issue of all races, not just African Americans. Chris' advice to middle school teachers that want to improve is to "offer more opportunities to do something extra to bring your grade up and break the content down more." His closing comments about science learning were that African Americans should study more and the teachers should explain the content more.

A pre-test and post-test on Plants and Animals and Skeletal and Muscular Systems were administered. Both pre-tests showed that Chris had little prior knowledge before the content was taught. Chris made an 18/F on the pre-test and a 49/F on the post-test for the Plant and Animals content. He made a 15/F on the pre-test and a 26/F on the post-test for the Skeletal and Muscular content yielding a 38/F post-test average on the content taught and observed. Based on these results, student individual interviews, and classroom observations, Chris quantitatively did not receive a passing post-test average of 70% or above on the content observed; however, it should be noted that he was one of the main individuals involved in the class discussions and question-answer sessions. Therefore, Chris may not test well.

Regular Student Narrative: Alexis "Miss Assertive"

Alexis is a 12-year-old female that self-identified and Success Middle School labeled as African American. She was born in Alaska but her mother and siblings moved to this school district in Alabama because this was where her grandmother lives, the schools were better, and there is more to do for children. Alexis lives with her mother and is the second child of three. She has an older brother and a younger sister. Her parents are divorced. Neither parent attended college, but both completed high school. She noted that her mother works for the federal government and transferred her job "down South." Alexis did not qualify for free-reduced meals at Success Middle School. Alexis is a girl that is neither shy nor quiet but talks when necessary,

average height and build, dark-skinned, and has straight-curly hair that extends to her neckline. She wears her hair mainly in one bushy ponytail. Alexis was enrolled in seventh-grade regular science with Mrs. Mary.

Alexis attended a school in Alaska for sixth-grade. She stated that her middle school experience has been "good and different." She commented,

> The school I went to before was an elementary and middle school combined. At my old school, I was around kids that were older and younger than me. At this school, it is just kids my age. It's a better experience because of the maturity level. At the other school, they were not as mature as the kids here. Because the kids in Alaska are not around kids their age, they are around younger kids, so it makes them not act the way they should.

Alexis participated in Success Middle School's choir, the girls' basketball team, and the peer helper program. A peer helper is a volunteer group organized by the counselor to be of assistance to others in the school. Alexis explained that this program has a requirement of As and Bs and the student member cannot be involved in any fights or have behavior issues.

Alexis stated her favorite subject is math because she is "really good at it and [I] just do it well." She stated that she likes laboratory experiences the most in science because she likes to dissect things and it is more physical. Her words were, "I don't have to think about it, it is just easy." She believed she is not good at reading and writing because she scores below her reading grade-level and she gets bored when she reads. She noted that she would read a book if she selected it. She did not prefer notetaking in science because she feels she writes slowly and it takes her longer to write a lot of information in comparison to her peers, although she remarked that "the notes are the answers to what's going to be on the test, so they do help."

Alexis aspires to be a fashion designer. She does not believe that she will do well in a science-related field. She mentioned that she did not think she was good in science until she came to Success Middle School. When asked why she believes she did not do well in science in Alaska, Alexis replied,

> In Alaska, the school was different; they only make you do reading, writing, and math. Then, you pick three classes of your own interest. They require you to take science and history for whole year, but you don't have to have that class so in science, they teach you in different kinds of ways. Stuff we are learning right now is new to me so they didn't teach it in Alaska. I took topics, like earthquakes, as my science class. I had to pick from

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a variety, but I don't like the ones that I had to choose from. Different teachers taught it—five or six different teachers. You can take as many as you want, you can choose when you want to take it as long as you took two the whole year, so two first semester and none second semester, for example. I feel like math, reading, and writing is a review to me. I feel like I already know the information, but in science and social studies, it is new to me.

She stated that she has been to museums, science centers, such as aquariums, with her mother and summer programs. She reminded me that this was one of the reasons her family moved "down South"—because there is more to do. When asked about her preferred learning style, Alexis stated that she is a visual learner: "I like when she [Mrs. Mary] does an example because I have to see it. She does it first and after we see what she did, next we do it." Alexis credited paper-and-pencil tests as the most comfortable method of demonstrating her science learning because she believes she knows what the teacher is looking for and can tell her the answer.

Alexis described Mrs. Mary teacher as "fun and nice" and she thought Mrs. Mary would describe her as "creative, outgoing, smart, and talkative." When asked about the preference of middle school over elementary school, Alexis favored elementary school because middle school teachers are "more strict and expect more of the students. Responsibility—like keeping our stuff organized and doing our assignments on time." She believed elementary school teachers were more effective than middle school teachers because "Elementary teachers prepared us [students] for middle school, taught us more, and more time was spent with the teacher in classes." Alexis expressed that elementary teachers took the time to help students with their needs. Alexis declared that Mrs. Mary or Success Middle School could start a science club to get students more interested in science.

Alexis trusted that she performs as well as her peers in science. She felt that most of her classmates do not take the time to study like they should. She stated, "I believe that when I take the Alabama Science Assessment this year, I will score just as high as everybody else." She blamed poor study habits and work ethic as her reasoning for African Americans scoring low in comparison to other ethnic groups. She stated she and her mom had this discussion when she shared the interview questions provided in advance.

We [African Americans] don't do as much as other races do. For example, Asians, I feel

like they are more strict, do more homework, learn faster than we do. The way they teach, they are harder on their kids. They don't really watch TV. She [her mom] makes me do my homework, but once I am done, I can do whatever. If I were them [Asians], I would be bored with learning.

Alexis' advice to middle school teachers that want to improve is that "in reading, use tapes." She said,

I like to listen to books rather than read. In science, I don't like writing. They can give the notes to us printed out. My other teachers [in Alaska] had a website you can go on and you can print the notes so most of my notes were printed out. Also, what they can do to improve, they can make the missing assignments available online because you get behind on work. If I am out, I can do the work we are currently on and have it when I return. If I lose something from a while back, I can find it online and print it off.

A pre-test and post-test on Plants and Animals and Skeletal and Muscular Systems were administered. Both pre-tests showed that Alexis had little prior knowledge before the content was taught. Alexis made a 45/F on the pre-test and a 92/A on the post-test for the Plant and Animals content. She made a 27/F on the pre-test and a 63/D on the post-test for the Skeletal and Muscular content yielding a 78/C post-test average on the content taught and observed. Based on these results, student individual interviews, and classroom observations, science learning took place for Alexis.

Regular Student Narrative: Tiana "Miss Spirited"

Tiana is a 12-year-old female that self-identified and Success Middle School labeled as African American. Tiana has an African American mother and a White father. She was born in North Carolina but the family moved to this school district when Tiana was in the early grades of elementary school. Tiana lives with her mother and step-father. She is the first child of three. She has a younger brother and sister. Tiana's mother has completed some college and her father completed high school. Tiana did not qualify for free-reduced meals at Success Middle School. Tiana is a fair-skinned, friendly, average size female with long hair that extended approximately three inches past her neckline but she cut it during my observation period. She wears her hair mainly loose in a bob haircut, but because of the mixed texture of her hair, she has found difficulty in managing it. Tiana was enrolled in seventh-grade regular science with Mrs. Mary.

Tiana sings and participates in tumbling and cheerleading with an outside organization. She mentioned that she partakes in beauty pageants often. She discussed how middle school is easy for her, although her hardest class is science. She reflected on how she remembers content when she studies but she sometimes forgets when the time comes to take a test. She described how the questions with which she usually has difficulty are the questions that she remembers the day of the test.

Tiana participated in Fellow Christian Athletes (FCA) club at Success Middle School because she states that she is a Christian; therefore, she made the decision to join that club. She also commented that she has really good grades and likes helping people. Tiana said her favorite subject is math because she likes "having to actually work to get the problem. I have to actually think about the problem and have to participate to understand." She stated that writing notes is what she likes least about science because "it takes forever." She believed the teacher should photocopy the notes for the students or go over them daily if funding is an issue. Tiana said that she enjoys the laboratory experiences and lab reports because they are class activities that involve doing something rather than writing.

Tiana's aim is to become a Federal Bureau Investigation (FBI) Agent because it seems exciting when she watches the television show, "Criminal Minds." She communicated that she thought it would be a fun profession. Tiana admitted that she does not engage in too many science-related activities outside of school but would love to if time permitted. She explained that her family travels throughout the summer and she has too much homework during the school year. When asked about her preferred learning style, Tiana described auditory learning as her preferred method because she stated that she has to "hear it then study out-loud, reading the notes, I had to write." She also expressed that she learns better when she has to draw and label the concept, which reflects visual and kinesthetic characteristics. She beamed with excitement as she described projects as being her most comfortable method of demonstrating her science learning. She stated that she "loves getting the poster board, the glitter, and everything [supplies]."

Tiana described Mrs. Mary as "smart" and she believed Mrs. Mary would describe her as an "A-B student and maybe talkative." When asked about her preference of middle school or elementary school, Tiana favored middle school because she feels middle school teachers don't "baby the students. You don't have to walk in line to get from class to class. You don't have to

ask to go to the bathroom between classes, and you don't have to stay in class with the same teacher all day." Tiana commented about why she believed middle school teachers are more effective than elementary school teachers, "I am learning more than I got to than last year. I like what we are learning now." She mentioned that

> If there was any type of after school program (e.g., tutoring), I would probably come. We get to learn a lot more than we ever got to. For example, I get to learn life science and last year, we did not get to do science because we never had the time for it. My class was really bad. We only got to do math and reading. I believe we only got to do social studies maybe twice last year and science; we never got to do science. My teacher wanted to do it, but they [elementary classmates] were just too bad. She spent most of her time writing students up, monitoring silent lunch, or getting the student moved to another class.

Tiana believed her science learning is good compared to her peers because she states that her friend, who is White, has a "really bad grade." She declared that she does not believe her friend really cares about her grades because she "acts up a lot." She continued that, "I think it depends on how you are raised from birth. If your parents care, then they would tell you if something is good or bad, if you should study or not. I believe it is the parents." Tiana's advice to middle school teachers that want to improve would be to

> Separate friends in groups. Don't let them be together. Put some well-behaved kids with other kids to give them a good example. Don't put friends that you know are not going to be good together in groups because you know they are just going to be rude and disrespectful.

Her closing comments about science learning of African Americans were that

> it is upsetting when people talk about Black-White achievement gap because I believe some people just don't care about their scores, not that they cannot do it. I don't make grades below a B in my courses. To me, I think scores may show a difference on Alabama Science Assessment, but I also think it is a stereotypical comment.

A pre-test and post-test on Plants and Animals and Skeletal and Muscular Systems were administered. Both pre-tests showed that Tiana had little prior knowledge before the content was taught. Tiana made a 55/F on the pre-test and a 72/C on the post-test for the Plant and Animals content. She made a 50/F on the pre-test and a 78/C on the post-test for the Skeletal and Muscular content yielding a 75/C post-test average on the content taught and observed. Based on

these results, student individual interviews, and classroom observations, science learning took place for Tiana.

 Regular Student Narrative: Tra'Von "Mr. Gregarious"

Tra'Von is a 12-year-old male that self-identified and Success Middle School labeled as African American. He was born in a small city in Georgia that neighbors Success Middle School but the family moved to this school district in Alabama for better schools. Tra'Von lives with his mother and is the third child of five. He has an older sister and brother and two younger brothers. His mother has some college experience and his father completed high school. Tra'Von's parents are not married or living in the same household. Tra'Von qualified for free meals at Success Middle School. He is a short, averaged-size, brown-skinned boy with a low, nicely-groomed haircut and is well-liked by his peers. He is enrolled in seventh-grade regular science with Mrs. Mary. Tra'Von made an effort to inform me in his introduction:

> I make As and Bs mostly and one C in English. I don't get in too much trouble at school, but at home, I do get in trouble a lot because my mom has to tell me to do stuff more than once. I don't know why, I guess I just must be tired. Like last night, she told me to get the trash out my room, and I forgot because I was getting my clothes ready for today. Then, I took a shower, and she got all mad. I mostly play video games at home when I don't have to do nothing.

Tra'Von played football for Success Middle School, and participated in Fellow Christian Athletes (FCA), which is a Christian-based club for athletes.

> I might run track and play basketball. My mom wants me to play, but I don't want to. I really don't like basketball, but she was real good in basketball and track, so she wants me to play. Like now, I am just sitting around doing nothing, so she wants me to play basketball to get me out of the house, stay in shape, and keep me out of trouble.

Tra'Von stated that Success Middle School is a "good place" and the teachers are "nice." He mentioned the food could be better. He noted that there was a lot to do at Success Middle School, like sports and about ten clubs that he could join.

Tra'Von's favorite subject is math because he believes it is easier for him than any other content-area subject. He stated that he likes doing science experiments and dissecting stuff in his seventh-grade science class but he dislikes taking notes because he does not like writing. Although he stated he disliked writing, he thought it is the best way for him to master learning

because, "It is easier to remember if I write it more than once; I am reading and writing it." He believed that he disliked the act of writing so much because his mother made him write spelling words all the time. Tra'Von stated that his most comfortable mode of demonstrating mastery of learning is through group work—telling his classmates the answer. He stated that he likes that he can ask a classmate to explain something if he does not understand: "Sometimes when the teacher explains something, I don't get it, but when we are in groups, someone else can better." At the time, Tra'Von did not know what he wants to major in when he graduates from high school but he does know that he wants to play football. He stated that, "If that dream does not come into fruition, then I may consider a science profession, but I dislike that science-related fields require an individual to remember too much, such as the periodic table."

Tra'Von described Mrs. Mary as "nice and mean" because "She is not afraid to give you a zero." He believed Mrs. Mary would describe him as "quiet, but sometimes loud, and she knows that I can get my work done and if I don't, that means I have been playing." When asked about the preference of middle school over elementary school, Tra'Von mentioned the differences in middle school in comparison to elementary school. He stated that middle school teachers are "nicer, less strict, and they may give you one to two chances to do your work, but elementary teachers give students many opportunities to do assignments." Tra'Von pinpointed that elementary teachers had some aspects that helped him learn better, such as spelling tests because they helped him learn how to spell. He brought it to my attention that spelling tests are not given in middle school, so students either get penalized or have to look up each word in a dictionary when needed. He also mentioned that elementary teachers "wait on the slow person to catch up," but middle school teachers will "go ahead and skip through if you are taking too long. You will just miss what you did not do."

When Tra'Von compared himself to his peers, he believed he is just as smart as they are, but it takes him longer to do his work. He explained how he is distracted easily, and his teachers have to assist him on staying on-task. He described how his teachers would tell him to stop and do his work if they saw him daydreaming. Tra'Von's advice to middle school teachers that wanted to improve would be to "think like a student and come up with activities that students would enjoy to help remember science."

A pre-test and post-test on Plants and Animals and Skeletal and Muscular Systems were administered. Both pre-tests showed that Tra'Von had little prior knowledge before the content

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was taught. Tra'Von made a 55/F on the pre-test and a 70/C on the post-test for the Plant and Animals content. He made a 46/F on the pre-test and a 78/C on the post-test for the Skeletal and Muscular content yielding a 74/C post-test average on the content taught and observed. Based on these results, student individual interviews, and classroom observations, science learning took place for Tra'Von.

Advanced Student Narrative: Marie "Miss Valedictorian"

Marie is a 12-year-old female that self-identified as mixed but Success Middle School labeled as African American. Marie has a white mother and a black father. She was born in the same city where Success Middle School is located. Marie lives with both parents and is the second child of three. She has an older sister and a younger brother. Her mother is currently going back to college to complete her undergraduate degree and her father completed high school. Marie did not qualify for free-reduced meals at Success Middle School. Marie is a tall, thin, fair-skinned quiet girl with long, thick straight strands of brown hair that extend approximately three inches below her neckline. Marie was enrolled in seventh-grade advanced, Pre-Advanced Placement (Pre-AP) science with Mrs. Leigh. She also is enrolled in Pre-AP English and Pre-AP Math. Pre-AP advanced courses prepare middle school students for advanced placement courses in high school. In high school, students who take AP courses can receive college credit if they pass the AP end-of-course exam successfully that is given by the College Board. This score is determined by the College Board and affords students the opportunity to receive a high school diploma and a head start on their undergraduate college education.

Marie had the highest average of all the advanced science classes and all the ethnic groups that are enrolled in seventh-grade advanced science. Marie is intelligent but is adamant about her academic abilities not being highlighted. She was selected automatically to participate in Beta Club, a club that she described as "a club for smart people that meet during school hours." She was placed in this club based on a straight A average. Marie stated that she was a member of the club first semester because it was free but she did not want to pay $25 dues to be a member, so she chose not to pay it. She stated that she really did not want to be in the club. Marie said that she would have signed up for Fellow Christian Athletes (FCA) club, but she really did not want to be a member.

I do not know if they would be teaching it or actually operating in its name. I did not want some teacher yelling at me the whole time. So, I just stay in class when they do clubs because I did not want to miss class and have to make up all the work.

Marie said that she enjoys middle school, and it allows her to see all of her friends and meet a lot of other people.

Marie's favorite subject is science because she likes to do science experiments. She exclaimed, "I like to see what happens, like under a microscope, rather to having to learn everything, like human bones, because that is a lot to remember." Marie aspires to be a science teacher. She said that science is fun and hard for many people but not hard for her. When asked about her preferred learning style, Marie stated that she learns best with hands-on activities because she can see what happens. She also stated that notetaking was a preferred learning style because she can go back and review the notes instead of trying to remember the content. Marie enlightened me that she prefers projects to demonstrate mastery of learning because she can show others what she has learned. She stated that she does not participate in any science-related activities outside of school because she would rather go on vacation.

Marie describes Mrs. Leigh as a "great teacher." When asked what makes her advanced teacher a great teacher, she responded,

She gives us a lot of things to look at and observations to help you visualize yourself. If we go to the lab, we are going to see things and have to draw scientific drawings to see what it is supposed to look like, which would help make observations about yourself.

Marie said Mrs. Leigh would describe her as "smart and awesome" because she was" those things." She stated that middle school requires you to learn a lot in one hour with a lot of notes. When asked about the preference of middle school over elementary school, Marie favored middle school because she thought students learned more. She believed middle school is more effective because the numerous notes allow her to go back and review: "I never took notes last year in elementary, maybe once or twice, but notes allow you to go back and look at something when the teachers are not there to help you." Marie suggested Success Middle School and/or her advanced teacher should do more experiments to help students improve in science because they can "see what happens rather than just hear what happens" and give notes, if they don't already.

If they don't give notes, give them notes and give science experiments to go along with those lessons. If you already do this, further explain it, like if they just have the student writing them done and going through them fast, break them down more.

Marie was extremely confident that she outperforms her peers, including other ethnic groups, in seventh-grade advanced science. She expressed that "I guess I get it a lot faster than other students. My brain works a lot faster. I am like that in all my classes." Marie was asked to elaborate on her comment concerning her brain "working faster" than others and her comments continued:

My parents always pushed me to be smart in general. Every time I make all As on my report card, I get $10. If I did not make all As, I may only have gotten $5, but that has never happened. I probably would try harder if they would have stopped giving me money, but most of the time, she forgets to give me money. She [mom] always say she got to get paid and then they [parents] always have to go shopping and get something at the store. My mom does not really help me because she does not really understand it either. I only have trouble in math, and she does not know how to do it. I am not really that close to my dad, so I don't really ask my dad. My mom is just a lot nicer and dad is more authoritative and usually at work. He always wants you to clean something, so I always go to my room so he won't ask me to do nothing. If it is like Saturday, my mom will turn up music really loud and he would bang on my door and wake me up to clean something. My sister helps me sometimes when I am doing my math, and she always gives me the most complicated way to do it, so I rarely ask her. Me, my sister, and my brother naturally make good grades, so they really never had to tell us to do our work. I help my little brother, if he has a problem. My sister knew the alphabet by the time she was two, so they [parents] might have taught her.

Marie's views on why students of all ethnicities are not improving in science was because "they may not learn as fast as other people and some play around." She did not believe that African Americans, in particular, learn differently; she believed that some just do not pay attention.

Because advanced science classes teach seventh-grade standards more in-depth, only the chapters on Plants and Animals were observed over a four and one-half week period. Approximately two weeks were spent on Plants and two and one-half weeks were spent on Animals. The class took a pre-test before both topics were taught, and two out of three students

showed little prior knowledge before the content was taught, but Marie scored an average of 70-75% on both pre-tests. Marie made a 71/C on the pre-test and a 100/A on the post-test for content on Plants. She made a 75/C on the pre-test and a 94/A on the post-test for the content on Animals yielding a 97/A post-test average on the content taught and observed. Based on these results, student individual interviews, and classroom observations, science learning took place for Marie.

Advanced Student Narrative: Tyrell "Mr. Best All Around"

Tyrell is a 12-year-old male that self-identified and Success Middle School labeled as African American. He was born in a neighboring city in Georgia near Success Middle School, but attends Success Middle School because his mother works at the school as a middle school teacher. Tyrell lives with both parents and is the third child of three. He has two older sisters. His mother completed college and his father completed high school. Tyrell does not qualify for free-reduced meals at Success Middle School. Tyrell is a tall, brown-skinned male with an athletic build and long strands of neatly groomed, dreaded hair that extends approximately three inches below his neckline. Tyrell was enrolled in seventh-grade advanced, Pre-Advanced Placement (Pre-AP) science with Mrs. Leigh. Tyrell was considered a popular student at the school because of his athletic, academic, and social skills and abilities. He recognized that he has leadership potential and works hard to make good decisions that would reflect his character while being "cool and well-liked by peers."

Tyrell believed Success Middle School is a good and safe school that has more than enough room. He was a football and basketball team member during the fall semester and plans to play baseball, track, and wrestling this upcoming spring. Along with sports, he was a member of Future Business Leaders of America (FBLA). He stated that he joined FBLA because it "sounded like it was going to be a good learning experience for me and would help me with being able to speak in front of people." Tyrell's mother is the coordinator of this club, and he stated that it is hard having her as a teacher at the school and as coordinator of the club. He is a member of the club because "She is on my back for everything I do. I have to do good in my school work and I can't really get into trouble at school." Tyrell described his middle school physical education experience particularly because he stated that the program is a really good program and different from elementary school because there is a planned activity daily that does

not involve just playing. His words to describe Success Middle School physical education program were,

> We are not just sitting down, exercising, or talking. If you play a sport, you have to go in the weight room and workout on two days each week (one sport on Mondays and Wednesdays, another sport on Tuesday and Thursday, and girls on Friday). The days that we are not working out in the weight room, we have to participate with our regular PE class. The regular class has to dress out, exercise, and play an organized sport with all classmates participating. If you don't participate, then you have to walk around the track or gym the entire time and receive a deduction in participation points. The physical education program gives us more endurance and builds up our strength so you won't get hurt easily.

Tyrell stated that he did not have a favorite subject, but enjoys science and math equally. He said,

> In science, you have a chance to do more experiments and stuff, like hands-on activities, and in math, I just like math. Math has always been one of my favorite subjects because I have always thought it was important to learn about numbers because math follows you everywhere.

Tyrell stated that he learns best with hands-on activities because he is an athletic [kinesthetic] guy and likes to use his hands.

> I actually get to feel and see what's going on instead of just talking about it. Say if you are listening to what's going on, like writing notes, you can easily miss something they said and think that you heard everything and not write it down.

Tyrell commented on how he prefers to do science projects to demonstrate mastery of learning in science, but reiterated that it depends on the content. He provided an example of the science project he made to learn about the plant, its cell parts, and its functions. Mrs. Leigh provided the class with options of writing a paper about the plant or making a game about the plant. Tyrell said that he preferred to create a game about the plant because he imagined he would learn more. He said that he made an electronic matching game of the plant diagram. He described this project by stating,

> You had to label all the plant cell parts on a diagram, then put their functions on separate cards. You then, mix all the function cards up. You have to match the functions with the

correct cell parts. If you match the correct plant cell function with the correct cell part, a light will show up. If the light does not come on, then you have the wrong answer. My dad helped me with this project. We got wires and we had to use push pins, something metal so when you put the wires on it, it would work, control the light to make it come on. You had to connect one wire to the correct answer, so when those two match up, the light would come on. The teacher helped me come up with the idea, but my father helped me with it.

Tyrell informed me that doing this project on the plant cell parts, rather than writing about it, was a more fun way of learning about the plant and showing the teacher he knew the content.

Tyrell was confident that he wanted to become a science or math teacher and coach sports at the school where he is employed when he graduates from college. He expressed how he hopes to play professional football, basketball, baseball, track, and/or wrestling initially, and become a teacher when he retires from professional sports. Tyrell mentioned that he also would like to participate in science-related activities outside of school, but enlightened me that he would not be able to because of sports. He stated that he prefers sports over science-related activities because he could easily stay healthy and work towards playing professional sports.

Tyrell described Mrs. Leigh as 'intelligent and smart," and he believed that Mrs. Leigh would describe him as "intelligent, smart, athletic, and sometimes talkative." He explained that his teacher may also describe him as "talkative" because

I don't have time to talk to my friends at school really, so sometimes I try to squeeze in time to talk in class. Like after school, I don't have a chance to meet up with my friends or get on-line and chat because most of the time, I have practice or games that last a long time and when get home late. Then, I have to do my homework.

He stated that the only difference he sees in middle school teachers in comparison to elementary teachers is that they are stricter; however, he understands that middle school teachers must be this way to help the students "mature and get ready to be young adults." Tyrell believed middle school is more effective because the students have to change classes and the teachers only have to focus on the one subject they teach. He believed Success Middle School and/or his advanced teacher should do more science experiments and activities that require them to learn by doing and/or something to which the students can relate. He provided an example of relating the plant or animal cell to something one enjoys (e.g., football), "Like a nucleus is the control center

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of the cell and the cell can't really do much without it; the football can be compared to the nucleus because the football game cannot go on without the football itself." Tyrell also was confident that he learned faster than his peers.

> I'm not saying they are smarter than me or me smarter than they are, I'm just saying that I may learn quicker than others. I think I have the ability to learn as quick. I am a quick learner and some people do not learn as fast as me.

The advice that Tyrell shared to help a middle school teacher improve science learning was to

> Get the student involved and try not to leave anyone out. I think that some students might not have as much confidence because they are afraid to get the answer wrong. In our class, nobody really gets left out because everybody has a chance to answer questions. Some students just need to build up their confidence. They can study more, take a shot at answering the questions, and don't be afraid to get it wrong.

When Tyrell was asked to describe how a student can build his or her self-confidence, he commented,

> I'm just not a shy guy. I am not afraid to get up and do stuff, so it was never a problem for me not to get involved. I have always been the type of guy that if you ask me to do something, I will go and do it. I guess I was just raised that way. If I do not know how to do something, I would ask questions on how to do it and still give it my best shot. I believe how you are raised impacts school.

Tyrell's closing comments were:

> I think some African Americans may not do well because they may be worried about their problems at home, such as financial problems, rather than think about what is going on at school. I think I score lower than what I could because I have less time to study due to sports activities. I think teachers should just try to get all students involved. Like, if there is someone in class that you [the teacher] noticed is not raising their hands or trying not to get involved. Ask them if they know the subject or what you [the teacher] is talking about or it they are just not comfortable with it [the content]. Then, try to set up an afterschool session or provide extra assistance in class.

Because advanced science classes taught seventh-grade standards more in-depth, only Plants and Animals were observed over a four and one-half week period. Approximately two weeks were spent on Plants and two and one-half weeks were spent on Animals. The class took a

pre-test before both topics were taught, and Tyrell showed little prior knowledge before the content was taught. Tyrell made a 57/F on the pre-test and a 72/C on the post-test for content on Plants. He made a 32/F on the pre-test and a 68/D on the post-test for the content on Animals yielding a 70/C post-test average on the content taught and observed. Based on these results, student individual interviews, and classroom observations, science learning took place for Tyrell.

Advanced Student Narrative: Elizabeth "Miss Athletic"

Elizabeth is a 13-year-old female that self-identifies and Success Middle School labeled as African American. She was born in the same city as Success Middle School. Elizabeth lives with her mother and is the first child of two. She has a younger sister. Her mother completed college and her father completed high school. Elizabeth's parents are divorced. She did not qualify for free-reduced meals at Success Middle School. She is a tall, quiet, slender, brown-skinned female with long, straight strands of neatly-groomed hair that she wears in a bob hairstyle that extends approximately two inches below her neckline. Elizabeth was enrolled in seventh-grade advanced, Pre-Advanced Placement (Pre-AP) science with Mrs. Leigh. She participated in track, cross-country, softball, basketball, and soccer at Success Middle School, and she also plays the clarinet in the school's band and is a member of Fellow Christian Athletes (FCA). She stated that she maintains As and Bs, and that it is not hard.

Elizabeth described her middle school experience as fun with plenty to do to help her learn. She provided the following examples:

We usually go to the science lab every week. We have math activities that help us out. In language, we go to the computer lab to do our projects. In geography, we always have clips to show us pictures of all the different places we learn about. In here, she has slides and articles to tell us [the students] about what we are learning. In PE, we exercise and learn a different organized sport. In band, we learn new music every day. Next year, I am going to try out for honor band. We have a lot of school clubs, and they take us places. We went to Auburn University for a breakfast in FCA.

Elizabeth explained how middle school has six classes and how a student can actually be late for class. She continued to explain how middle school changes classes and how students remain in one class all day in elementary school. She mentioned that there are a lot more students, so students get a chance to make a lot of new friends. She stated that middle school teachers are different from elementary school teachers in the sense that they dissect and translate

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the content better. She described how she really is engulfed into the learning process at Success Middle School but she has to wait "anxiously" until the next day to continue enjoying learning because it is only one hour (60 minute periods) and she really enjoys Mrs. Leigh. She provided an example of how she had to learn fourth-grade division from a boy in her class because her fourth-grade teacher did not do a good job or assist her as requested. Elizabeth credited elementary teachers as being more effective, although she seems to enjoy middle school. She had a fond memory of her elementary experience with her fifth-grade teacher and commented on that experience.

> He taught us [students] everything we needed to know and re-taught the content we did not know from fourth-grade. He was an old, Caucasian guy that truly cared about if we [all students] learn or not. If we did not know something, he would just teach it. He would go back in the book, find it then teach it. He would not skip it and let us move on without knowing it. If we had a problem, he would just help us until we could solve it. We still were able to cover the content we needed to learn in fifth-grade.

Elizabeth's favorite subject is math because it is "challenging and has a lot more stuff to do than any other subject." She said that, "It is like the numbers never stop." She stated that science is similar because the content keeps building on previous knowledge. Mrs. Leigh is what Elizabeth liked the most about science because she is "nice and breaks everything down" so the students can understand. Notes were what she disliked about science.

Elizabeth did not know what she wants to be in the future, but she stated that she knows her career will be in a field that helps babies, possibly a pediatrician or neonatologist. She expressed her interest in science by mentioning that she goes to museums, aquariums, and theme parks, such as Sea World and Animal Kingdom. She stated that her mother usually takes her and her younger sister to a different place annually, but her mother accepted a new job that "keeps her busy, work on Saturdays, and works during the summertime so we don't go as many places or as long as we use to."

Elizabeth described Mrs. Leigh as "nice, smart, and pretty" and she believed that Mrs. Leigh would describe her as "quiet, nice, and smart." She did not know the specific name for her learning style but she described it as the teacher having to teach [lecture] breaking the information down providing examples [discussion] and doing some kind of activity to reinforce the skill or concept taught [hands-on activity]. She shared that her best way to demonstrate

mastery of learning is taking a paper-and-pencil exam because she is "able to show I know everything because I answer specific questions opposed to having to show understanding with a project and not know all of what the teacher is expecting." Elizabeth believed that there were some students in the class that may be smarter than she is but she guaranteed that she knows the content by the end of the chapter. She believed Success Middle School and/or Mrs. Leigh should do a science fair to get the students more interested in science. She stated that she believed it "would show students how interesting science is and a chance to showcase what the students know and they can compete." Her advice to middle school teachers that want to improve science learning is that they should "never give up; try your best at all times. If a student needs help, just help them without making a big problem out of it." Her closing comments included:

> African Americans may not do as well because they may not pay attention sometimes. Some people, like me, don't catch on as fast as other people. They may not ask for help because they feel embarrassed. Sometimes students [African Americans] need their parents because the teachers may not help you or you still need more help. Some black people don't care about school period. They just do what they want to. Some of us try our hardest and just don't get some of the stuff. My teachers teach the same to everybody; some of us [African Americans] just don't get it.

Because advanced science classes taught seventh-grade standards more in-depth, only Plants and Animals were observed over a four and one-half week period. Approximately two weeks were spent on Plants and two and one-half weeks were spent on Animals. The class took a pre-test before both topics were taught, and Elizabeth showed little prior knowledge before the content was taught. Elizabeth made a 14/F on the pre-test and a 68/D on the post-test for content on Plants. She made a 16/F on the pre-test and an 81/B on the post-test for the content on Animals yielding a 75/C post-test average on the content taught and observed. Based on these results, student individual interviews, and classroom observations, science learning took place for Elizabeth.

Findings by Research Questions and Emerging Themes

The three research questions were addressed using the data collected from the classroom observations and teacher and student individual interviews. The results of this study provide a structure to answer the research questions that guided this study. With the answers to these

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research questions, themes emerged and teacher and student narratives are shared. Following each research question and emerging theme, an analysis of the data is presented using CRT. Table 4.4 presents a visual representation of the connections between the research questions, emerging themes, and CRT tenets.

Table 4.4. Connections between research questions, emerging themes, and Critical Race Theory Tenets

Research Questions	Emerging Themes	Critical Race Theory Tenets
What do teachers think about the teaching strategies they employ to teach African American students?	The participating teachers' teaching strategies encompassed all of the students' learning styles, abilities, attitudes towards science, and motivational levels about learning science, with no emphasis on the African American student population. The participating teachers taught the state content standards simultaneously using the same instructional model daily, incorporating other content areas when possible.	Racism is Normal Colorblindness Interest-Convergence Contextual-Historical Analysis
What do African American students think about the teaching strategies that are used by their science teachers?	The participating African American students believed their seventh-grade science teachers used a variety of teaching strategies to ensure science learning took place, that science learning was fun, and that science learning was engaging. The participating African American students genuinely liked their teacher. The participating African American students revealed high self-efficacy. African American student participants' parents value education and moved to Success Middle School district for better educational opportunities.	Racism is Normal Storytelling-Counterstorytelling
To what extent do seventh-grade science teachers' teaching strategies reflect culturally responsive teaching?	Teachers were not familiar with the term "culturally responsive teaching," but there was evidence that several aspects of it were present in the seventh-grade science classroom environment.	Racism is Normal Colorblindness Social Transformation

Research Question 1: What do teachers think about the teaching strategies they employ to teach African American students?

Theme 1: The participating teachers' teaching strategies encompassed all of the students' learning styles, abilities, attitudes towards science, and motivational levels about learning science, with no emphasis on the African American student population.

Theme 1 emerged from the data because each of the participating teachers described the variety of teaching strategies that they implemented in their seventh-grade science classrooms based on the content and needs of all of their students. The teaching strategies that were employed in the teacher participants' seventh-grade science classrooms were noted from: (a) Mrs. Mary, regular science and (b) Mrs. Leigh, advanced science.

Mrs. Mary, Regular Seventh-grade Science Teacher

The teaching strategies Mrs. Mary indicated she used more frequently in her regular seventh-grade science class were lecture-discussion, notetaking, hands-on activities, and cooperative group activities. When interviewed about the teaching strategies utilized specifically with African Americans, Mrs. Mary's response was,

> I don't think they learn any differently than the rest. I don't do anything differently for them than any other child. I can't count how many of each I had. To me, they are all seventh-grade children. I don't think they have any more needs than any other race. I have to change a little bit for deaf and blind students or students in wheelchairs, but I don't do anything special for those [African American students] people than I have to do for any others.

Mrs. Mary communicated that she does not see any challenges for African Americans in science because she views African American students the same as any of the other ethnic groups. She stated,

> I believe my African Americans students, if compared grade-wise, would compare to any of the other students. I don't see any challenges for African Americans because I see them all the same. I believe my African American students, if you compare grades, are no different. If you ask Chris or Mekka, they are straight A students. All my African

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American students are A and B students. I only have one African American student not passing [not a participant in this study].

Mrs. Mary's belief was that the students, in particular, must have parents that help them at home. Mrs. Mary stated that she believed grading classwork and allowing the students to turn in missed assignments late helps African American students. This practice is not restricted to African American students but extended to all students in seventh-grade science.

Mrs. Mary also communicated that she believed the instruction received at school and the activities conducted and completed at school are the teaching strategies that have a positive influence on the African American population. She said, "I don't think they would do anything at home." She indicated that cooperative group activities, notetaking, and handouts also contribute to science learning of African Americans. Mrs. Mary informed me that not having supplies, such as paper and pencils, hinders some African American students from learning. She made sure I understood that this was not due to being African American but was a socioeconomic issue. Mrs. Mary pointed out that she did not believe there was a disconnect between the performance of African American students in comparison to other ethnic groups in her classroom because all of her African American students being observed were making As and Bs, no less than a C, except one student who had been out of school long-term due to medical reasons. Mrs. Mary commented on another African American female student that was not observed and how one can look at her and tell that she had a home issue because of her hygiene, how she was clothed, and her lack of supplies.

When Mrs. Mary was asked what is needed to assist her with closing the Black-White achievement gap in her classroom, she replied,

I don't believe there is a gap in my room. I believe there is an economic gap, but not race. Even with the economic gap, I don't see where it has an effect on academic performance, except with the African American student that is referenced with a hygiene issue. There is a big difference in our students' performance on standardized tests that receive free-reduced meals than the students that pay full price rather than race. That is the big signal that lets you know that there is not a lot of support at home for school. A lot of the students go home and there is no parent at home.

Mrs. Mary expounded on her comment of not seeing one race any differently than the other. She believed strongly that her African American students' scores will not be any lower than

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other ethnic group's scores. She mentioned that the problem she sees with some students is that they cannot read (i.e., pronounce words), so they "fall between the cracks and get left behind." Mrs. Mary was asked about the students not having a hard copy of the textbook to take home and if she thought that was an issue for African American students. She responded,

> I believe that this does not have an effect on any of the students because they still may not read it and would only study what is in the notes. I give them everything they need, which contains content from the book so this keeps them from being overwhelmed and have to carry around a heavy book. I also found that most of them would not bring them to class anyway and have to go back to their lockers.

Mrs. Leigh, Advanced Seventh-grade Science Teacher

Mrs. Leigh stated that she uses the following teaching strategies frequently in her seventh-grade advanced class: lecture-discussion, notetaking, hands-on activities, reading comprehension, guided practice, scaffolding, drawing diagrams, building models, review, open-ended questions, and videos. She believed that the teaching strategies that have a positive impact on African American science learning "vary from student to student depending on the way they learn best." She stated that she attempts to present the information to "appeal to a variety of learning styles so that every kid has the opportunity to get it [content] no matter what their learning style is."

When questioned about the formal assessments that have a positive influence on African Americans, Mrs. Leigh explained the formal and informal assessments she administers. She stated that her tests include multiple choice, matching, short answer, and sometimes include categories, such as labeling a drawing, or drawing and explaining a process. She also shared that a variety of informal assessments should be conducted daily as the teacher is teaching. She added that these assessments should be for all students, not just African American students. She commented that, "The more times you can repeat it and drill it, the better it seems to be." Mrs. Leigh believed all of her African American students do well on her tests and at least make a grade of C. Her belief is that it is not the form of assessment or teaching practice that makes a difference with her African American students, but "their participation in class, their own motivation, and their own study habits."

She referenced Marie, who made an A on one test this year thus far. She provided the following example of another African American student who chose not to participate in the interviews:

[The student] has the ability to do well but lacks the motivation. Based on participation in class and level of performance on assignments, a B is expected. [The students'] parents have to stay on top of things or [their child(ren)] probably would not do as well, not because they can't, but because [the individual] does not put forth the effort without their [parents] support/push. You take a test to get into Pre-AP and the test asks questions that are higher-order, similar to ASA, and [the student] scored well enough to qualify.

Mrs. Leigh provided more insight into another African American student participant informing me how this individual is outgoing and can do the work but would rather be in regular seventh-grade classes instead of advanced classes. She believed that this individual would not be enrolled in Pre-AP courses and perform as well without the parents' influence and high expectations.

When asked if there are any teaching strategies utilized that she feels have a negative impact on African American students, Mrs. Leigh replied, "I think it varies from kid to kid based on their learning style." She gave an example of two African American students, one that participated in the individual interviews and one that did not, and how they may enjoy laboratory experiences but they were not going to get much learning out of the activity because they usually play. She then continued with how another African American student was more interested in the activity; therefore, it is helpful towards science learning. For instance, a laboratory exercise was assigned where protists were examined through a microscope and two of the African American students played and never actually viewed the specimen, while another African American student was more serious and examined the specimen under the microscope. Mrs. Leigh pointed out that it is hard for her to see a disconnect between the performance of African American students in comparison to other ethnic groups in her classroom because the majority of her African American students are doing well on tests and their overall grade in the class. She elaborated how some students understand concepts in class and perform well in class, but do not do well on their tests.

When Mrs. Leigh was asked what is needed to better assist her with closing the Black-White achievement gap in her classroom, she responded,

I don't necessarily see that there is a learning gap in Pre-AP. The gap in my class is no different than the gap that may be observed in another seventh-grade teacher's class. I have white kids that score 100s and others that have Cs. I wish that we had a more representative population of races in our school. I have maybe 15-20% African American students versus our school wide percentages, which I believe is 30%. This year is better than last year. Last year, I had 50 kids and maybe two Black kids, so I don't know what it is that will make them be more likely to test in Pre-AP classes. I don't know if it is being exposed to science earlier or more higher-order thinking earlier.

Mrs. Leigh explained the teaching strategies that she utilizes in her advanced seventh-grade classes are derived from years of practice and figuring out what works best. She noted that she loves lesson-planning. She said,

I enjoy the process of sitting down and figuring out what I can integrate and how I can break it down and how I can do it on different days. I enjoy seeing what the students can get and how I can reinforce it. Lesson planning is one of my strengths.

Mrs. Leigh believes that greater emphasis should be placed on science at an earlier age and more exposure to science careers is needed. She pinpointed that most students say they would like to be a doctor or lawyer when you poll them; therefore, she believes more exposure is definitely needed. She exclaimed that "someone needs a magic potion to motivate kids that are otherwise unmotivated." When asked if there were any other comments that would provide more insight into my study, Mrs. Leigh provided several points:

- The students taught tend to show a pattern of achievement based on their parents' educational level or how they did in school.
- Most Pre-AP students have parents that graduated from college.
- There is a need for more tangible role models because many students in this area do not have them at home.
- It is not fair to generalize and say that African Americans do better only with hands-on activities because everybody learns differently and it is unfair to "pigeon-hole." She explained how not having background information about a topic does nothing for science learning. It ends up being a "bunch of magic tricks and fun but no learning."
- Learning is maximized when a variety of activities are implemented because the students see the topic(s) different ways.

- 99% of the teaching strategies used are borrowed from other educators, no idea belongs to one teacher because educators have been great teachers for decades; they just did not know the fancy names for them until now. She acknowledged that two teachers can do the same thing and one set of students may do well and another may not because one may integrate humor and extra effort while the other may not.

"Teachers must realize that if they are trying something developed by someone else, they will have to adapt it to fit their teaching style."

The teachers were enthusiastic about teaching seventh-grade science curriculum. Mrs. Mary has taught middle school 23 years out of 29 years of service in the education profession. All ten years of Mrs. Leigh's experience are at the middle school level. Both teachers voluntarily attended the AMSTI professional development opportunity that required their attendance for two weeks (eight hours each day) during the summer months to learn how to integrate more hands-on activities into the curriculum and receive free equipment to carry out the activities learned. Both teachers were elated to explain the flow of their class and the dynamics of their audience. They were proud of the hands-on activities that they incorporated with each lesson to ensure the students could visualize the concepts, manipulate the content for better understanding, and apply the skills/content learned. Using strategies that motivated students was one way the teachers became more aware of students' attitudes about learning and their learning environment. Mrs. Mary emphasized that middle school teachers must have "patience and understanding but with firm discipline." The teaching strategies Mrs. Mary and Mrs. Leigh employed were excellent in teaching across the curriculum—connecting science to other subject areas, such as math.

The teachers used African Americans' academic performance in seventh-grade science to form their perceptions about the science learning of their African American students. They praised and encouraged the students throughout the learning process. Mrs. Mary would say "Good job" often when the students responded to a question accurately. Mrs. Leigh would say "Good [student name]." The high response and participation rate assisted the teachers in believing that their instruction was having a positive outcome on their science learning experience. The teaching strategies they employed concentrated on students' attitudes and beliefs by reinforcing effort and recognizing students for their efforts. Mrs. Leigh and Mrs. Mary kept a record of the students' efforts through a participation grade and participation activities recognizing the students' correct responses. All students had a chance to participate.

Teachers' physical and non-verbal behaviors assisted the impact that their teaching strategies had on African American learning and gave me insight on how their teaching style impacted learning and participation in class. The way the curriculum was designed, the teachers were involved with the students from the time the class bell rang, signaling the beginning of class, and the time at the end of period when the bell rang. If either teacher was teaching, she was walking around the room or centered where all students could be engaged. When students worked in groups, both teachers always walked around assisting groups. When students were working independently, both teachers assisted students or circulated to make sure the students were on task. They believed in modeling the activities. Mrs. Mary and Mrs. Leigh always had an example or sample of student work to show and modeled how to do activities by demonstrating the steps, which means they had four or five examples by the end of the day due to the number of classes they taught per day.

Thompson (2004) suggests that certain culturally responsive strategies, such as being fair, positive, explicit, consistent, sensible, and patience, encourage, stimulate, and produce good behavior. The participating teachers possessed these characteristics in their daily lessons. For example, the participating teachers stared at a student or stood in a student's space instead of drawing attention to a student being off-task. Mrs. Mary assigned cooperative groups strategically placing students that could potentially get off-task with certain teammates away from one another. This maximized the learning experience because discipline problems were not an issue and no particular student felt isolated or embarrassed if any off-task action was committed. The teachers utilized cooperative groups often. By using physical and non-verbal cues, they avoided drawing attention to students and controlled discipline issues indirectly rather than confrontationally. Also, the teachers built a relationship of mutual respect with students by using physical and non-verbal cues to reinforce behavior.

The seventh-grade science teachers were detailed in their individual interviews. They discussed how they planned and developed the teaching strategies they decided to implement in their classrooms. They placed emphasis on the students' interest in the subject and how they learn to determine the types of activities to implement for certain content. Their goal was to make learning fun and engaging to motivate the students to learn, rather than bore the students and lose their attention. Although they used the same teaching model or flow of the lesson daily, they differentiated the types of activities based on the best way to teach that concept or skill with

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the learning styles of the students in their classrooms. For example, Mrs. Mary preferred to use "Magic School Bus" video clips and Mrs. Leigh preferred to use Bill Nye science video clips to reiterate concepts because her students were more receptive to them. Both expressed that they do not plan differently for the African American population because they possessed the same learning styles, attitudes toward science, and motivation toward science as the other ethnic populations and many performed just as well or better than other ethnic populations.

Racism is Normal

Although I observed some extraordinary and positive results from this study, there were some tenets of Critical Race Theory present. The first theme of Critical Race Theory that emerged from the data was racism is normal. Because of social order in the United States, racism appears natural or is unrecognized by Whites unless it is obvious. For example, there was an incident in Mrs. Mary's class where the students were lining up to go to a counseling session with the school counselor and a group of students (two White males and one African American male) were talking. Mrs. Mary informed the group they were the last individuals to line up because they were off-task. She specifically told one of the students, an African American male, to be the last one to line up. The student mumbled under his breath but loud enough for her to hear: "Is it because I'm Black?" Mrs. Mary was furious and immediately escalated her voice and asked him to repeat himself. The student humbled himself and held his head down. She told the student to remain in his seat until she returned from taking the other students to class. Mrs. Mary was offended; however, the student also was offended. The student felt like they all were talking, but he, the only African American in the group, had to be the last to line up.

This example reveals behaviors by teachers that have an effect on the learning of African American students. Some students are not resilient and an incident will allow him or her to withdraw putting him or her in a position to be at-risk of failing or wear the statistics of being an underachiever, when he or she could actually do the work. Because Mrs. Mary immediately entertained the comment directed towards her and her behaviors, that it was addressed was positive; however, this may have been an attempt to bring the issue to the forefront and nullify any racial connotations rather than rectify the situation. The student apologized upon my request; however, I knew that he did not want to and only did it out of respect for an adult and to preserve his educational experience in science. Wildman and Davis (1997) stated that, "Whites know they do not want to be labeled racist; they become concerned with how to avoid the label, rather than

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worrying about systemic racism and how to change it" (p. 315). While both teachers consistently stated their African American students were outperforming some of the White students and that all of the participating students made As and Bs in their seventh-grade science class, the formative assessment results of the content observed showed science learning took place, but it did not totally support the teachers' statements about the African American students' academic abilities on formal assessments. The students' overall average may reflect As and Bs, but the majority of their formative assessments did not exemplify As and Bs. The Black-White achievement gap is usually measured by formative assessments, not all the other activities or alternative assessments that may be averaged into the overall grade. That the African American students made an A or B in the science course but did not make As and Bs on formal assessments proves that formal assessments alone are not good indicators of a student's academic potential or abilities. I was, and still am, an example of this occurrence. I do well in my coursework, but my standardized test results are not indicative of all the knowledge I possess or my academic abilities. Mrs. Leigh stated,

> It is not just African American students, I see it [trend with formal assessments] with other students as well. My husband is one of them, understand it [the content], and do well in class, but do not do well on tests. And I do not know what makes that the case.

Sometimes, racism is unconscious; therefore, it becomes a challenge to talk about the subtle micro-aggressions that are present every day. "Because whiteness is considered the norm of the dominant culture, it remains mostly invisible, taken as a given. Whiteness is rarely named in conversations about race, except when it is discussed opposite of black" (Wildman & Davis, 1997, p. 324). The actions by Mrs. Mary in the example above may be a result of the educator being born and raised in a Eurocentric environment, attending a predominantly White university where there was no preparation for diversity (Ferri & Connor, 2005; Gay 2000; Howard, 2007), and genuinely not understanding the undertones projected from that occurrence.

Racism is normal is reflected among Success Middle School as the population continues to become more diverse each year, although the faculty at Success Middle School are predominantly White and middle to upper class (Banks 2006, 2009; Gandara, 2010; Sprott, 2009). Kuykendall (2004) states that perceptions are made of people based on their limited cultural knowledge. It is apparent that the administrators at the school and central office level do not see the need to diversify their staff with qualified individuals of other ethnic groups. The

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hidden message central office and school administration represent is that there are no educators of other ethnicities qualified because it was brought to my attention by other faculty at Success Middle School that as one educator resigns, retires, or is fired, they are replaced with an individual of the majority.

It is puzzling how a candidate of color can possess the same credentials (academic and experience), if not a more advanced degree, but he or she is never interviewed for employment or is not selected over someone White with lesser credentials. Although it is difficult to prove, it is common and occurs in the education profession on a daily basis. Examining statistics on Alabama's State Department of Education website reveals that the high-performing schools have less than a 20% African American faculty population and the poor-performing schools have at least an 80% African American population—Racism is Normal. It is noted commonly by education stakeholders (e.g., educators, politicians, parents, community organizations) across the United States that students that come from low socioeconomic backgrounds tend to perform below grade level. All of these individuals were meeting and/or exceeding state standards according to the Alabama Science Assessment. Also, it was noted that none of the three seventh-grade advanced science students received free-reduced priced meals; therefore, this implies that a student that does not receive free-reduced meals will more likely take advanced-level courses. It is stated commonly that socioeconomic issues are a key contributor to low academic performance; however, the majority of the seventh-grade African American science students were out-performing the remaining ethnic groups, although they receive free-reduced meals. It is difficult for White people to realize subtle acts of everyday racism because they never experience it.

Based on Mrs. Leigh and Mrs. Mary's experiences, they made stereotypical statements that were offensive to an individual of color, thus indicating racism is normal. The following narratives from Mrs. Mary's interviews are examples of how racism is normal:

The school system I left for the current system was half the distance from my house, different environment, 100% African American population, and low socioeconomic environment. If we [current school system] had them [former African American students] now, they would all be in those special classes. Being a dedicated mother to them while trying to teach them, I find I am more than a mother to them than some of them have.

When Mrs. Mary was asked about other professional development opportunities, such as workshops to assist culturally and linguistically diverse populations, Mrs. Mary replied, "I don't know of any that has been offered in the county. My county offers enough professional development to obtain the 50 hours necessary to renew teacher certifications, so I have not gone outside of the county to look for other opportunities." She noted that she did not think it would help. She said,

> I don't know what they [professional development] could teach me that I don't already know. I guess it would though, but have not researched it. I only have one African American student not passing, and I believe it is because of her home situation. You can look at her and tell she needs help; nobody to encourage and help at home. You can tell how by how they dress, hygiene, and supplies.

While Mrs. Mary has her reasons for making the statements she shared with me, these statements were offensive to me, an African American. When Mrs. Mary referenced her former employer's population and conditions, she implied that a 100% African American school with low socioeconomic factors would constitute a school full of special education students. Mrs. Mary believed that she was more of a mother to some of her students than they have. She did not expound on this statement to help me understand why she felt so strongly about the students' home environment; nevertheless, this implies that because some African American parents are not active participants at Success Middle School, they must be negligent in their responsibilities. Using myself as an example, I am a school teacher with the same work hours as my children with no breaks throughout the day where I can leave the workplace to run errands; therefore, it may appear as if I am not an involved or caring parent. I am responsible for several other children during the times I would love to visit my own children's school or attend a school-related function during school hours. This is a stereotypical and unfair assessment of a parent's dedication to his/her child. I agree that there are other ways to show involvement; however, on what basis was this thought conceived?

Mrs. Mary indicated that she does not look for extra professional development opportunities outside what the school or school system requires, which implies that she is not willing to educate herself about other ways to improve science achievement of other populations. When Mrs. Mary described an African American student that did not participate in the study, she referenced this student's home life and physical appearance affecting her academic progress.

With the fashion trends in today's society, Mrs. Mary's norm could have caused distorted views about an individual's capabilities. The narratives provided represent the normalcy of racism.

The following narratives from Mrs. Leigh's interviews are examples of how racism is normal:

> African American students around here [Success Middle School district] performance in school tend to be similar to their parents or slightly better. I will guarantee without knowing, the students that have Pre-AP, their parents are college graduates . . . So with that, I wish there were ways we could motivate those that come from crappy homes . . . better role models are needed because they don't have them at home.

Mrs. Leigh made a generalized statement about African American students at Success Middle School based on general assumptions. I am unsure about the basis from which Mrs. Leigh made this statement; however, there were several African American student participants that were doing well and all their parents did not have a college education. Is it correct to say A-B honor roll is slightly better than a high school education or that the student participants would only complete some college? Mrs. Leigh also stated that she "guarantee[d] without knowing" that "students that take Pre-AP classes have parents that are college graduates." From analyzing the advanced seventh-grade students' individual interviews, all of the advanced student participants' mothers are college graduates but two of the students' fathers have only a high school education and the other student's father's information was unknown. Both of these instances do not display accurate representations of the African American students or their parents, yet these statements were made—racism is normal.

While these comments by the participating teachers likely were innocent, they were offensive to me, not completely true, stereotypical, and racist. I ignored the statements made by the teachers and similar occurrences that may have occurred to me in my educational experiences because I have been advised indirectly by my elders and college faculty/staff along the way to accept "racism is normal." While some may refer to me as an "Uncle Tom" because of that statement; nevertheless, I have learned by trial and error that until it becomes a systemic effort to end racism—racism is normal—"One will get more flies with honey." Many African American individuals may have made it difficult for themselves by confronting these comments but it was the expectation that I be resilient and move forward. While there is research that links underachievement of African Americans with socioeconomic factors (Rothstein, 2004);

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nevertheless, to look at one's outside appearance and make a judgment about his or her aptitude or character is stereotypical. For example, I braided my hair in cornrows when I was admitted into the hospital to deliver my oldest child because my mother did not want me to wash my hair for at least two weeks due to an old myth that one's pores were open from childbirth and I could get very ill. Because I had cornrows, the nurses treated me like they treated the other patients without medical insurance. When I questioned their actions and practices, the first questions they asked were if I had medical insurance and what kind did I possess. After informing them that I was a public school teacher with Blue Cross Blue Shield insurance as primary and TriCare Prime (military) medical insurance as secondary, the nurses' actions towards me and their practices of care with my child changed from negative to positive.

Colorblindness

A second tenet of Critical Race Theory that emerged from the data focused on one of the teachers being colorblind and its effects on the student participants' science learning and identity. Mrs. Mary commented how she does not see color or race when teaching:

> To me, they are all seventh-grade children. I don't think they have any more needs that any other race, deaf and blind students, or students in wheelchairs. I may have to change a little bit for those [students with disabilities], but I don't do anything special for those people than I have to do for any others. I don't think African Americans learn any differently than the rest. I don't do anything differently than any other child. To me, I don't see any areas as a challenge for African Americans because I see them all the same. African Americans are no different to me than Indians, Caucasians, or Asians. I don't think their [African American] grades would be lower.

This represents colorblindness, the idea that all individuals, regardless of the color of their skin, are the same (Delgado & Stefancic, 2001). This is not to say that teachers must teach one ethnic group a Eurocentric curriculum and other ethnic groups a curriculum designed specifically for their culture. To disregard one's culture and what it brings to the learning experience denies the reality and implies that culture is "noticed" but not "considered" (Gotanda, 2000, p. 35). Culturally relevant means applying teaching strategies that draw from an individual's experiences. Critical Race theorists view colorblindness as a way to conserve domination over minorities (Bell, 1992; Delgado & Stefancic, 2001; Gotanda, 2000). When an individual does not see race, it "fosters a systemic denial of racial subordination and the psychological repression of

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an individual's recognition of that subordination, thereby allowing it to continue" (Gotanda, 2000, p. 35). This frame of thinking—colorblindness—supports the interests of Whites and supports oppression for African Americans. As it relates to teaching practices, Mrs. Leigh emphasized continuously how teaching practices used with any student varies based on their learning style. She stated,

> I think teaching practices, including formal assessments, varies from student to student based on their learning style. It is hard for me to see African Americans differently than any other ethnic group in the classroom because the majority of them don't have a disconnect. If you look at my African American students, they are going to do just as well on their assessments as my White students.

In reference to being colorblind when dealing with learning of African American students, the mentioning of culture or the idea of using culturally responsive teaching does not imply that one must incorporate African Americans, underrepresented individuals, or a historical activity, but to "use knowledge of student cultures and modalities to select and apply strategies and resources for instruction, while engaging in self-reflection" (Wisniewski et al., 2012, p. 3). This style of teaching is applied with best teaching practices translating into the enhancement of students' academic knowledge, academic proficiency, development of self-esteem, ability to want to try, and the will to try (Gay, 2000). Culturally responsive teaching makes it easier to conceptualize content and structure and organize social interactions (Ladson-Billings, 1994). It inspires African American students, as well as others, to become better by developing critical thinking skills (Thompson, 2004).

When interviewed about the professional development opportunities for teaching culturally and linguistically diverse populations, both participating teachers agreed that they had not received specialized training in teaching diverse populations. Mrs. Mary said that she does not see color and treats all her students the same:

> The county offers enough professional development to get 50 hours of continuing education units to renew teacher certification, so I have not gone outside looking. I don't know if it would help or not. I don't know what they could teach me I don't already know. I guess it would though, but I have not researched it.

Mrs. Leigh said that she has not attended professional development specifically geared toward African Americans but she has received professional development in reading and strategic lesson

planning, which incorporates the use of more graphic organizers with a beginning, middle, and ending activity to promote student learning. Mrs. Leigh stated,

> With the Alabama Reading and Math Test (ARMT), we find that African American students and socioeconomic groups don't do as well and so we have had some training not trying to help those [African American] learners, but all learners. We did some training with Alabama Reading Initiative in strategic lesson planning.

Being colorblind may contribute to the low performance on the standardized tests.

On the other hand, being colorblind should not affect being fair but it affects how individuals are stereotyped, how they are viewed, and how they should be treated. Most of the students were self-identified as African American but four of my student participants were biracial or multiracial. Two of the seventh-grade student participants (one regular and one advanced) did not initially self-identify as African American because they identify more with their parent of other ethnicity. For example, Tiana (regular science) and Marie (advanced science) are around their White families more and do not see themselves differently from their White peers because they are involved in the same academic programs, eat the same foods, participate in the same extracurricular activities (e.g., gymnastics, cheerleading, soccer, softball, piano), exposed to the same opportunities as their White peers, and are not categorized as economically disadvantaged. The extracurricular activities mentioned above do not apply only to Whites and do not make an individual White. Although there are many factors, including legal, that embrace identity of an individual or self-identity, the label of African American from Success Middle School either excludes or marginalizes each as an individual (Crenshaw, 2009; Fernandez-Bergensen, 2011). These students always will be associated as being African American by society because they possess an ounce of minority in their genetic makeup, excluding their other ethnic composition, and will probably never be considered White. The school benefits in the area of accountability for adequate yearly progress: (a) if the high-performing biracial or multiracial students are categorized as African Americans to improve that category; (b) to not lower the White category if low-performing biracial or multiracial students are categorized as White; and (c) to increase the diversity or underrepresented population in the school.

Interest-Convergence

Interest-convergence posits that any type of advancement towards improvements for minorities will be made only if it directly benefits the white population, often to a greater degree, and/or the dominant group not changing unless it benefits them as well (Delgado & Stefancic, 2001). The style of teaching or flow of daily activities that the entire science department implemented may be geared toward improving science learning but it includes documented research-based strategies as methods to improve academic achievement for all ethnic groups as a result of the Black-White achievement gap. For example, the entire flow of each day is taught using reading strategies and strategies geared toward reluctant learners. If the data show that the White population outperforms the underrepresented populations during the last decade, before the implementation of the current curriculum, why would Success Middle School change their curriculum for the entire population, rather than come up with a program, besides tracking, that can reinforce the particular students that are having difficulties, such as differentiated instruction or intensive reading during a before and after-school program? If it did not assist the White population, the parents never would have agreed with or allowed its implementation into the daily learning process on a middle-school level. One may argue and say that the change of curriculum to be taught using reading strategies was more economical and made more sense to maximize the use of money, teachers' time, and time within a school day; however, it is clear that the implementation of this new curriculum is because it will benefit ALL students or it would not be implemented.

Success Middle School provides all students with a dictionary every year, regardless if they attended the school the previous year and still have the old dictionary. The original purpose may have been to ensure that students from low socioeconomic backgrounds have the necessary supplies to achieve; but in essence, providing a dictionary to all will ensure that all students have the necessary supplies just in case they are in a situation where they may need the resources but do not qualify as economically disadvantaged. This is another example of choices made to benefit the majority because a large percentage of the students are middle-class and ineligible for free-reduced meals but are struggling due to the state of the economy in the United States in 2012.

Tracking has many interpretations and the result is grouping like ability students together. The existence of courses, such as regular and advanced, is a form of tracking, especially when

the only way to become enrolled in an advanced class is by a specific test score. Mrs. Leigh explained the process of becoming a student in her Pre-AP seventh-grade science class by stating:

> Fewer African Americans qualify; we don't pick, we have scores. I have no idea on the first day who (black, white, purple) [was accepted into the program]. When the students' test scores are analyzed, those that are naturally gifted with intelligence and those that have been fortunate to be in the better teachers' classes [are accepted]. I can go through the test we get from sixth grade and three teachers may have three students that qualify and another teacher may only have one child that qualifies.

This example represents interest-convergence in two ways. First, students with parents that are involved actively in the school have access to the information of the best teachers versus the worst teachers and can make a request for their children's class schedules. Success Middle School allows any parent to request their child's teacher and class schedule with the understanding that their request may not be honored due to class ratios. Many students from economically disadvantaged homes will not have parents who know this information and will not know which teachers are "best" or "worst." Because of this, African American students are at a disadvantage and may result in being enrolled in a class with a teacher that has poor teaching skills and abilities. Second, Success Middle School has required test scores on the Pre-AP entrance exam with no exceptions; therefore, this eliminates a large population of underrepresented students. Consequently, the Pre-AP classes end up being all or majority White. The example of parents being able to select their child's teachers represents interest-convergence because most of the African American parents work and cannot come and volunteer; therefore, they make the opportunity available to all (benefiting the Whites) because many African Americans will be unable to take advantage of this privilege due to not knowing. The example about entrance exam requirements represents interest-convergence because Pre-AP classes entrance is based on test scores in which African Americans, as a race, are not good test takers and their standardized scores are not indicative of their aptitude. In this case, there will be more representation of Whites in the Pre-AP program than African Americans. Success Middle School made the opportunity to pick teachers and take Pre-AP classes available to African Americans so they cannot say they were discriminated against; however, the privilege mainly benefits Whites.

Contexual-Historical Analysis

A third theme of Critical Race Theory that emerged from the teacher's views on the teaching strategies that impacts African American students was contextual-historical analysis. Critical Race Theory suggests taking historical accounts and grasping the opportunity to include or celebrate marginalized groups. Success Middle School took time in February to honor Black History with freedom quilts representing crossroads—a turning point in African Americans' lives where choices were made and then carried on. This activity involved each class taking a symbol that Harriet Tubman and other runaway slaves used on their journey to freedom. All students were a given a photocopy of graph paper where the squares were large. Each class took a symbol from the list and had to color the symbol the same. The students could then color the remaining squares any way they chose. After all pictures were completed, the students glued them on a poster board neatly and each were arranged into one large quilt and displayed as a mural in the hallway for the month of February. Each teacher explained what the symbols represented. For example, Mrs. Mary's class took the symbol the slaves used to represent Cleveland, Ohio, the main crossroad with several routes to freedom. Another class took the monkey wrench symbol representing the need to gather all the tools required on a slave's journey, flying geese to inform directions to go north for food, water, and shelter, and a bow-tie informing the slaves to travel in disguise or change to clothing of a person of higher status. All the seventh-grade science classes participated in this except for advanced science classes. They decorated their classroom door about Neil deGrasse Tyson, an astrophysicist and his discoveries, which included the discovery that Pluto was no longer a planet, but a dwarf planet. The advanced teacher stated that she incorporates Neil Tyson's videos and discoveries into her lessons throughout the year.

Black History Month is a product of society, a "category that society invented, manipulates, or retires when convenient" (Delgado & Stefancic, 2001, p. 7). There are significant discoveries and contributions in science from other ethnic groups that could be implemented with the units or chapter information, so is only one month out of the year chosen to celebrate marginalized individuals? Critical Race theorists "seek to illuminate untold stories about marginalization and oppression in an effort to liberate the oppressed and dismantle the racist status quo" (Munoz, 2009, p. 58). Therefore, efforts were made to integrate culturally relevant content by both participating teachers; however, there was no intent to incorporate culturally

responsive teaching into the curriculum. It was positive that the regular science teacher decided to participate in the Black History Month activity in February and the advanced teacher used Neil Tyson's science-related videos in her science classes but are there not more opportunities to include history and the great works of others from all ethnic groups into the lesson? To some, only celebrating the contributions to society of African Americans during February or including one of the advanced science teacher's favorite scientists, Neil Tyson who is an astrophysicist, not biologist, was tokenism. Tokenism is "the policy or practice of making only a symbolic effort" (Merriam-Webster, 2013, para. 1).

Both teachers acknowledged that all students learn differently but the strategies implemented focused on teaching that may impact the auditory, visual, or kinesthetic learner rather than including efforts to see how they could reach different audiences. In order to plan culturally responsive lessons, the teachers have to recognize that there are differences among the student populations. Recognizing the differences among student populations presents opportunities to grasp the attention and provide a learning experience for all the students in the classes. For example, Mrs. Mary was teaching the parts of the body and she made a reference to remembering the pelvis as "Elvis the Pelvis" based on him always swinging his hips when he danced while singing. Chris, an African American student participant, raised his hand and said, "Isn't he the King of Country?" Mrs. Mary responded, "Elvis is not a country singer." Chris said, "Oh, I don't know, I thought . . . " Mrs. Mary then said, "Well don't say things not related to science." I saw this a teachable moment—a chance to shed light briefly on the impact that Elvis Presley made on society, express how he was influenced heavily by African American music, correct Chris with the correct title given to Elvis during his time, the King of Rock and Roll, and move on with the science lesson. This would have addressed culturally responsive teaching by connecting the students that are fans of Elvis Presley, enjoy rock and roll, lived in places he grew up in, visited Graceland, sang, or played an instrument. Culturally responsive teaching is not about catering to people of color but the real-world application of content that connects the lives of learners and draws them into the learning experience. This example addresses the historical-contextual tenet by including Chris in a discussion where he learned about a historical figure whose earliest musical influence came from gospel, rhythm and blues (R&B), and country.

Theme 2: The participating teachers taught the state content standards simultaneously using the same instructional model daily, incorporating other content areas when possible.

The seventh-grade science department is headed by Mrs. Leigh, the advanced science teacher. All Success Middle School teachers have common planning among their disciplines. Science has sixth period planning and all grade-level teachers plan together one set day a week. They teach a common curriculum that was derived mainly from Mrs. Leigh over the years, but all science teachers contributed activities that have been effective with seventh-grade science students from prior years. When asked if there is a specific model that the department follows, both Mrs. Leigh and Mrs. Mary responded *"NO"* and that they just teach the best way they know how from experience and what they think may work.

The teachers implemented a variety of teaching strategies that were reading-centered before, during, and after reading activities. Mrs. Leigh and Mrs. Mary taught the seventh-grade science concepts often using lecture-discussion with the use of graphic organizers and other instructional tools to assist in explaining concepts, such as the LCD projector and laptop computer. Using graphic organizers assisted students in making sense of the concepts and details in science. Mrs. Leigh and Mrs. Mary provided the students with a graphic organizer with each lesson to assist the seventh-grade students with notetaking, while they modeled what the students should write. Examples of the graphic organizers used were spider charts, flow charts, Venn Diagrams, and comparison matrix charts. They did not lecture traditionally with notetaking for a long period of time. Notetaking was a continuous reflection of the content adding material as needed and having the ability to go back to review for tests. The teachers rarely went over five to ten minutes at a time with their lectures or explanations of the content. They used other methods of instruction, such as question/answer technique and visual aids (e.g., demonstrations, video clips, visual aids).

Mrs. Leigh and Mrs. Mary incorporated hands-on activities with almost every standard taught. Some of the activities were completed independently and some were accomplished in groups with two to four members. If the teachers thought an activity would be most beneficial if the students could manipulate the content and learn more for better understanding, then the activity was completed independently. If the teacher thought the activity would provide better understanding in groups, then the activity was engaged cooperatively. In cooperative groups, the students worked together to achieve a goal with each group member playing a role in the group's

success. Groups were never larger than four members. Mrs. Mary preferred the students to work in pairs and Mrs. Leigh preferred groups of three with a few activities completed in pairs. The teachers believed that the students should practice independently or in groups as a way of reinforcing the content taught and helping all students apply their understanding to conceptualize and apply the content.

A variety of techniques to teach science topics were used and the flow of the lesson remained the same. Technology was integrated by the teachers each day by using a computer, LCD projector, down-streamed videos, DVDs, and laboratory equipment. The students utilized technology in science laboratories and computer laboratories, if needed. During each observation of seventh-grade science, I observed the following format daily.

1. Bellwork (5 minutes): Consisted of reading strategies involving reading passages that sometimes included charts or graphs on the current topics/standards covered to increase reading comprehension skills and processing skills that are an area of weakness on the Alabama Science Assessment. The materials were selected strategically from supplementary workbooks designed to prepare for the Alabama Science Assessment. During the first semester, the teacher went over each question and discussed how the correct answer was derived but these were repeated at the end of the week during the second semester to begin practice for the ASA and to see the areas of difficulty. Administrative tasks, such as submitting attendance electronically, were completed during this time.

2. Review or Engaging Activity (5 minutes): Review of the content already covered, an engaging question, or exercise to promote students' thinking about what is covered that day.

3. Mode of Instruction (15-45 minutes) in one of the following formats:

   (a) Lecture-Discussion: The teacher lectures while engaging the students actively in a lesson that explains content. Traditionally this means lecturing a few minutes, pausing to ask questions, and repeating until all content is covered. However, their form of lecture-discussion uses technology to present a few sentences of notetaking using a graphic organizer, stopping to talk about what the content means or looks like, providing examples, or demonstrating what the notes are trying to convey, and repeating those steps until complete.

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For example, if the science teachers were teaching the bones of the body and their functions, they did not have the students write only the name of the bones and their functions, like defining vocabulary words. Instead, they: (a) projected a picture of the bones of the body unlabeled; (b) provided the students with a handout of the same picture; (c) obtained a model of a human's bones going over each bone identified, labeling it on the screen using technology; (d) stopped to make sure all students attempted to locate the bone on themselves; (e) labeled the bone on a handout; (f) reviewed its function; (g) displayed its function on the screen; (h) allowed the students time to write it down; (i) discussed its functions and how it assists in performing every day activities; (j) showed a video clip of their bone in action or on another animal; and (k) continued until all bones were discussed. The teachers engaged the students actively throughout the entire instructional period without moments of non-instruction.

> (b) Mini-Lesson/Work Period: The teacher may explain a concept more in-depth, allow the students to take notes, show a video or demonstration of a concept, then have an independent or group activity to practice the skill or reinforce the concept taught.

For example, in the unit on plants, the regular and advanced teachers introduced the flower and went over the parts of the flower. They projected a picture of a flower on the screen, provided the students with a handout of the same picture, and went over each part, while having an actual plant on the lab tables to share between student pairs. While the teacher went over the flower part, the students labeled it on their diagram, found it on the actual flower, then did a dissection exercise with the flower after each flower part was covered. While the students were dissecting the flower, the teachers had the students draw and label what they saw. Clement, Lockhead, and Mink (1979) made the association that students must learn a skill as it is being taught. The teachers allowing a work period daily gave the students an opportunity to "refine and extend their knowledge" (Marzano, Pickering, & Pollock, 2005, p. 71).

> (c) Laboratory Experience: After the concept was taught, the entire work period was used to complete a lab on the content covered. This reinforced the skill or concept covered.

4. Closing & Review (5-10 minutes): The teachers reviewed the skill(s) or concept(s) covered each day with some type of activity that prompted the students' thinking

about what was learned or a question-answer session to embed the concept in the students' minds for better understanding and learning for mastery through repetition. The teachers always made sure they stopped the class in time to review the concepts already covered and the new concepts learned that day. Mrs. Leigh used a timer to assist keeping track of time so she could pace herself to ensure each part of the lesson was given its appropriate amount of time. Both teachers believed the closing played a key part in learning because they believed that research supports that students remember the things they hear the first five minutes and last five minutes of class. Their teaching pattern resembles a widely used teaching model called "Workshop Model," which is an adaptation of a teaching model developed for reading and writing.

Their teaching strategies had a positive impact on all the seventh-grade science students' learning experiences, not just African American students, because their practices included a variety of teaching strategies, classroom management strategies, and some components of culturally responsive teaching. However, they were not aware what they presented was considered culturally responsive teaching. Both participating teachers in this study: (a) confirmed their views of African American students' academic abilities in their seventh-grade science class, (b) realized their responsibility in teaching so all students, including African American students, can meet or exceed the content standards, and (c) created lessons that build upon the students' prior knowledge. Both teachers were optimistic, consistent, clear with expectations, firm but not mean, patient, had high expectations, and believed that all students can learn, which are behaviors that promote a culturally responsive environment. Both participating teachers had a collection of strategies, which is a characteristic of culturally responsive teaching. The participating teachers: (a) implemented activities that required more open-ended responses, (b) positively reinforced academic accomplishments and promoted extra content to be added if a topic arose from the discussion in a teachable moment, and (c) maintained a positive relationship with the students, including African Americans, to create an environment of respect for both parties, the student and teacher.

The teachers' attitudes towards their students and their teaching strategies revealed confidence in their subject area and the teaching strategies they employed in their classes. They expressed how teaching strategies vary depending on the way the students learn best. Mrs. Leigh stated, "I just try to present the information to appeal to a variety of learning styles so that every

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kid has the opportunity to get it [the content] no matter what their learning style is." They were proud of the performance and interactions of their African American students. They believed that the Black-White achievement gap did not exist in their classes because African American students' class averages had been maintained throughout the year.

Research Question 2: What do African American students think about the teaching strategies that are used by their science teachers?

Theme 3: The participating African American students believed their seventh-grade science teachers used a variety of teaching strategies to ensure science learning took place, that science learning was fun, and that science learning was engaging.

Table 4.5 depicts the teaching strategies the African American students' believed impacted their science learning positively.

Table 4.5. Student Responses of Teaching Strategies that Improve Science Learning

Student	Level	Positive Impact on Science Learning
Ashley	Regular	Notetaking, Graphic organizers
Mekka	Regular	Lecture-Discussion, Notetaking, Graphic organizers
Bubbles	Regular	Bellwork, Notetaking, Group organizers, Hands-on activities
Chris	Regular	Notetaking, Bellwork, Graphic organizers
Alexis	Regular	Notetaking, Graphic organizers
Tra'Von	Regular	Hands-on activities, Notetaking, Graphic organizers
Marie	Advanced	Notetaking, Laboratory experiences, Graphic organizers
Tyrell	Advanced	Hands-on activities, Notetaking, Graphic organizers
Elizabeth	Advanced	Bellwork, Notetaking, Graphic organizers, Hands-on activities, Laboratory experiences

Ashley (regular) stated that "the notes helped and Mrs. Mary presents the information over and over again and answers questions." She explained that Mrs. Mary often explained how concepts are similar and different. She described one of the ways the class learns from Mrs. Mary by stating that they [the students] have to "draw concepts and label them," which assisted her with conceptually understanding seventh-grade science concepts. Mekka (regular) said, "The notes that we take in class help me to get better grades on test because I look over them. Without the notes, I would not understand some of the stuff." She added "the notes gives me a chance to review over and over again to prepare for tests." Bubbles (regular) related how the Bellwork

reinforced what was taught and helped her understand the content they were teaching currently. She said, "Bellwork makes it easy for me to learn what we have learned the past couple of days. Bellwork is related to what we are doing at the time in class." Chris (regular) explained how the notes helped him because he understands them better when he writes them and he can go back and review them before a test:

> The Bellwork helps me get ready for the Alabama Science Assessment, and I know the information because we actually go over the answers. I look over the Bellwork and my notes before a test, and I remember it. I like doing labs because they are fun, but they really don't help me learn. I still have to go back and review my notes.

Alexis (regular) stated that notes really helped her the most, although she is a slow writer and dislikes writing notes. Because the teacher goes over the information first, she is able to see what the teacher did, ask questions, and then write them down. She said,

> She [Mrs. Mary] makes us draw the pictures on the board, and write the notes next to it, then show us a video to help us better understand it ourselves. For example, she showed us a video of bacteria and how it can come to you. You don't realize it, then you start getting sick, others around you get sick, people around you getting better, then it shows you how you can get better.

Tiana (regular) described how Mrs. Mary writes or posts a sentence of notes, reads it aloud, explains it further on the board, has them write it, then requires them to draw and label the concept. "This helps me remember the parts and where it is located." Tra'Von also preferred notetaking as evidenced by his comments:

> I learn best by writing because if I write it more than once, I am reading it and writing it. If I keep on writing it, then it is easier to remember. The diagrams we do, like the plant and animal cell diagram, wasn't hard to remember because she discussed it, made us trace or draw it, labeled and went over it with us, and then made us color it.

Marie (advanced) commented on how she likes notes because she can go back and review them instead of just listening to a lecture and having to remember it. She indicated that she learns a lot from hands-on activities because she is the type of student that has to "see it before it happens."

Tyrell (advanced) explained how notetaking helps him go back and review and depend on his memory from a lecture, but he is a kinesthetic learner, so he must use his hands.

I actually get to feel and see what's going on instead of just talking about it. We have diagrams that we have to draw and label so we can look at and study off to know each part, which part is which, and examples and stuff of which kind were in certain groups.

Elizabeth (regular) explained how the notes are not usually long because they use graphic organizers most of the time to take notes, but she prefers notes because

The teacher breaks stuff down for me. The spider charts show us where stuff start from and where it ends. We actually go to the lab and view specimens. We have to do lab reports and drawings to show what it looks like and what we saw when viewed under microscope.

The students believed unanimously their teacher makes sure all students were comfortable with the material because she asked questions, answered questions, provided one-on-one assistance, provided extra credit, re-stated/re-phrased content, and re-taught content if several students had similar questions or concerns.

Several thoughts emerged initially from analyzing the transcripts regarding the perceptions of the teaching strategies that had a positive impact on the students' performance in seventh-grade science. The students had:

- Positive attitudes about notetaking and viewed taking notes as boring, but the most important strategy for learning science.
- Positive attitudes about the use of reading strategies to increase reading comprehension and science conceptual understanding.
- Perceptions that reflected resilience, self-confidence, high self-esteem, and developed interest in science.
- Positive perceptions that their teacher ensures that all students understand and learn.

Overall, the African American student participants enjoyed Mrs. Mary as a teacher and her class, although science may not have been the favorite subject for every one of them. The students believed Mrs. Mary was nice, cared about them, and made science fun and enjoyable. The African American students did not feel discriminated against. At times, I believed Chris's (regular) learning experience in science was diminished because of his curiosity (many questions), which were interpreted as attention-seeking by Mrs. Mary; nevertheless, he did not express any negative feelings about her. He focused continuously on his missed opportunities to be educated from his sixth-grade science teacher at the elementary school. All of the African

American student participants appeared comfortable with being observed and interviewed; therefore, I am unsure if the students told me all positive things for fear their seventh-grade science teacher would find out. The students shared freely any uncomfortable situation that bothered them, but none of them related to Mrs. Mary or Mrs. Leigh's seventh-grade science classes.

Overall, the seventh-grade students genuinely liked their teacher, thought their teacher employed a variety of strategies to ensure they learned, assisted them in every way possible, and realized that notetaking using graphic organizers, lecture-discussion, and hands-on activities were the best strategies that helped them learn. The data also revealed that the teachers practiced effective classroom management with the teaching strategies implemented because all students made comments referencing the teachers "did not play." They indicated that their teachers were fun and included real-life experiences that pertained to the content covered. Although many of the students shared that they did not like writing notes, they unanimously stated that the notes were the best way for them to learn because they were written using graphic organizers and they could go back and review those notes for understanding to prepare for tests. This finding contradicts how many researchers state that African American students learn. Many researchers state that African American students are kinesthetic learners and learn best when they are highly engaged doing hands-on activities (Armento, 2001; Banks, 2009; Cartledge & Lo, 2006; Chartock, 2010; Davis, 2006; Dewey, 1934, 1938; Diller & Moule, 2005; Gay, 2000; Grumbine & Alden, 2006; Hale, 2001; Irvine et al., 2001; King, 2007; Ladson-Billings & Tate, 1992a, 1995a, 1995b; Lee, 2001; McKinley, 2010; McREL, 2000; Thompson, 2004; Villegas, 1991; Vygotsky, 1978). A majority of the students expressed no interest in science until this current year in seventh-grade science. They all commented on the variety of techniques their teacher used in class, such as the video clips and hands-on activities. Many expressed how they had so much fun in science that the class period was over before they thought about it. The students expressed positive responses by the feedback and participation they provided in class.

The students were always engaged in the science learning process. I found myself writing that the students were actively involved, engaged, or working diligently every day that I began to record field notes from classroom observations. The students did not appear afraid to share their experiences with me. Many of them were quiet in class, but were open when interviewed individually. I do not believe this was because they could identify with me as an

African American but because they really enjoyed their seventh-grade learning experience and were excited to have someone interested in their learning experiences. Many of the students commented that they have a hands-on activity to do with each lesson, whether it was independent or cooperatively. This was an indicator that the students were enjoying their seventh-grade science learning experience, learning science, and becoming more interested in science.

In regards to the African American students' attitudes towards science and their science learning experiences, analysis of the classroom observations and individual interview responses revealed a combination of low and high interest in seventh-grade science but they were all confident in their ability to pass the class successfully with a grade of A or B because of the teaching strategies that were employed by their teachers. The attitudes of students referred to their dispositions toward science, student-teacher interaction, and interaction with peers in the science classroom. The students that expressed a high interest in science were because they truly enjoyed the hands-on activities and believed they learned from them. The students that expressed a low interest in science were because they have never really studied science in elementary school until seventh-grade (middle school) or they believed it was boring, even though they seemed to do well in the class. A few expressed frustration when they thought of the science terms that did not come to them easily. For instance, Bubbles stated that she really understands the content and can explain it when preparing for a test, but forgets the content the day of the test, indicating test anxiety.

Almost all the students explained their elementary science experience as "horrible" because they either did not have science instruction or the teacher may only have gotten around to teaching it one or two times the entire year due to the intensity and time commitments to reading and mathematics. In recalling previous years' experiences in science, the analyses of the individual interviews revealed that the curriculum and current year's teachers, Mrs. Mary and Mrs. Leigh, contributed to the positive results of African American students' science learning. Mrs. Mary made the decision not to assign homework beyond completing an incomplete assignment or reviewing notes because the previous years' statistics showed little return, which affected the students' overall grade. Mrs. Mary believed socioeconomic factors in the rural area may have contributed to the lack of homework participation by students. The students elaborated on how the hands-on activities after the lecture-discussions using graphic organizers helped them to understand the content conceptually and apply it to real-life examples. When the students were

asked what they disliked about science, they unanimously responded that they dislike writing notes. However, they added that the notes are what helped them pass the test because they could go back and review the notes for understanding.

Based on the experiences shared by the students in their individual interviews, three CRT tenets were revealed: (a) racism is normal, (b) storytelling-counterstorytelling, and (c) social transformation. In the following, examples are provided for each tenet and their occurrences related to Mrs. Mary and Mrs. Leigh.

Racism is Normal

Racism is Normal is one of the tenets revealed from the data of this research. Many of the student participants shared how they moved from one neighboring state or city to Success Middle School for better educational opportunities. To them, attending Success Middle School offered better teachers, resources, facilities, and also was perceived as a privilege, rather than a requirement. Many of the students shared personal experiences of racism at Success Middle School with me during their individual interviews but all said that they had not experienced any with their seventh-grade science teacher and that they did not entertain the few issues of racism. Many of the African American student participants expressed how the few incidents of racism motivated them to be a better person and student—resilient. Critical Race Theory acknowledges that racism is "deeply ingrained legally, culturally, and psychologically" (Tate, 1997, p. 234) in everything that we do in society; therefore, racism appears normal.

Storytelling-Counterstorytelling

The African American students' voices helped describe their experiences with racism and can be used to communicate issues that "whites are unlikely to know" (Delgado & Stefancic, 2001, p. 9). The following are counterstories the student participants shared:

- Mekka (regular)—She talked about an experience on the school bus where an African American boy touched her inappropriately daily on the bus in the afternoons. She stated how she was scared to ride the bus or come to school because of this individual. She informed her parents, school teacher, and school administrator. She informed me that the school officials took a report but said that they could not do anything about it because it was on the bus. The bus driver informed the parent that they would pay close to attention to this issue but never moved her or him when he

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sat near her or walked on the bus. The parent then proceeded with the local police and filed a complaint, but the police did not do anything but tell them to call if this student [molester] comes on their property or is caught in the act. Eventually, the student dropped out of elementary school, which is an indication of how old the individual may have been. The question remains if the same outcome would have occurred if the student was White.

- Tiana (regular)—She expounded on an incident that occurred at Success Middle School but not in science where she (biracial) was participating in class and shared an experience about her family. A White classmate commented on how it was nasty that an African American female and a White male married and had a child. Tiana expressed how it made her angry and the teacher addressed the issue asking them both to refrain from talking about it. The White student that made the comment later wrote a paragraph that was shared with the class about how he disliked mixed marriages, especially when they bring a mutant into the world. Tiana said the parents of both individuals had to come to the school and talked with the teacher because the teacher requested and reported the incident to administration. The parents of the White classmate defended their child, agreed with their child, and explained how the student was exercising his constitutional right of freedom of speech and expression. From this point, Tiana explained the teacher and her parents took this issue to the administration but the issue was not addressed by the end of my observation period.

- Chris (regular)—He talked about his experience in elementary school where the teacher did not like him, did not answer his questions, and always put him in the hallway because she believed that he would commit a discipline act, even if he had not committed it yet. He believed he missed a lot of classroom instruction that could have impacted his educational experience. Chris described how he was offended when he discussed in one of his classes that he wanted to own a business one day but was going to go to the military initially so the armed services could pay for college. The teacher's comment was based on the ideal that this goal was embedded in his head from an adult versus his own personal choice. Chris explained to me that it was a personal goal he made on his own because he did not want to be in debt in the future or have to struggle. Chris admitted he is talkative and explained that his

confidence came from being active in church activities; however, he explained how many of his teachers ignore his questions or responses because they view him as talkative, rather than his conversation one of substance or a teachable moment. Many complain because they cannot get an African American male to open up, talk, and participate, but then they complain when they do.

The tenet of storytelling or counterstorytelling helps others to understand the experiences these African American student participants endured. This tenet is important because the White students, teachers, or administrators may be unaware or do not see the issues as important because they may not have experienced them and they are not informed about White privilege. Storytelling in Critical Race Theory "makes use of the experiences of people negatively affected by racism as a primary means to confront the beliefs held about them by whites" (Taylor, 1998, p. 122). This is the only way that Whites can "acquire the ability to see the world through others' eyes" (Delgado, 1989, p. 2439).

Theme 4: The participating African American students genuinely liked their teacher.

A fourth theme that emerged from the data focused on the African American students' feelings about their science teacher and how those feelings impacted a positive learning experience. Thompson (2004) believes that students' attitude toward learning and how they may view their teacher impact their academic achievement. The following addresses what the regular seventh-grade African American student participants shared about their perceptions of Mrs. Mary:

- Ashley describes Mrs. Mary as a "good teacher that is intelligent and courageous."
- Mekka described Mrs. Mary as "helpful and nice."
- Bubbles described Mrs. Mary as "nice, sweet, intellectual, and stylish."
- Chris described Mrs. Mary as "nice and helpful."
- Alexis described Mrs. Mary teacher as "fun and nice."
- Tiana described Mrs. Mary as "smart."
- Tra'Von described Mrs. Mary as "nice."

The following describes what the seventh-grade advanced African American students shared about their perceptions of Mrs. Leigh:

- Marie describes Mrs. Leigh as a "great teacher."

- Tyrell described Mrs. Leigh as 'intelligent and smart."
- Elizabeth described Mrs. Leigh as "nice, smart, and pretty."

These comments about the seventh-grade science teachers were shared to express their sincere feelings about their science teacher. The adjectives these student participants used to describe their science teacher displayed that they genuinely liked their science teacher and were confident in their abilities to teach them.

Theme 5: The participating African American students revealed high self-efficacy.

A fifth theme that emerged from the data focused on students' self-efficacy. Robbins, Lauver, Le, Davis, Langley, and Carlstrom's (2004) research states that the greatest way to predict academic achievement of any ethnicity is self-efficacy and motivation on achievement. Self-efficacy refers to the "belief in one's capabilities to organize and execute the courses of action required to manage prospective situations" (Bandura, 1995, p. 2). The following statements express how the student participants revealed high self-efficacy:

- Ashley (regular) expressed in her interview how she aspires to be a veterinarian. She stated:

  I want to be a veterinarian because I like playing with little kittens and taking care of them. I like all kinds of animals. I have three dogs and six fish. I don't remember how many fish. I have one Shih Tzu, one Chiwawa, and one chocolate Labrador Retriever mixed with Bulldog. The chocolate lab belongs to my dad and brother and is an outdoor dog. The two inside dogs are me and my mom's dogs.

Ashley expressed that there is nothing that she dislikes about science and she was able to describe comfortably her preferred learning style. She said, "Mrs. Mary goes over it and keeps going over it until you get it. And then she will go over it and answer questions. I need the notes but Mrs. Mary going over it helps." She stated in her individual interview that she studies but she would make a good grade even if she did not study:

  I study hard, but even when I don't study I usually make a good grade. My parents tell me to study sometimes, but they usually don't have to. I study when I remember and then sometimes I forget. I think I am just as smart as my peers and not because my parents help me.

- Mekka (regular) desires to be a nurse. She described how she pretends to be a nurse all the time. She stated, "Me and my sister play doctor at home all the time. She likes to be the person I doctor on [the patient] because most of the time I won't let her be the doctor." She shared that she believes she outperforms some of her peers and the only reason it is not all is because she knows that she does not take the time to study like other students in her class:

  > Some of my classmates' scores are higher and some of them are lower. The students' scores that are higher are probably because they are interested in science. I do not think African Americans learn any differently than Whites. We [African Americans] don't take time out to study school work like other people do.

  She stated that the African Americans that do not study because they "probably may not be interested in school."

- Bubbles (regular) loves reading and is not sure what she wants to major in college but knows that she wants to attend college. She expressed that her career of choice will be a "hard" field. She stated that she was "very excited" to major in a science-related field in college. She said, "I like to show how smart I am and do other things that other people did not think I could do. I like to show them what I know."

- Chris (regular) desires to be a chief executive officer of his own business. He described scenarios where he was not chosen to be the speaker in his group activities but did not allow that to stop him from taking part in the activity. Chris' words concerning the negligence of his peers choosing him to be an active participate in group activities were, "I still won't just sit there and watch them get the problem." In reference to his future goals, Chris said,

  > I am not planning on majoring in a science-related field. I am actually planning on going to the Air Force so they can pay for my college. After I get out of college, I plan to be the CEO of my own business. I might own a shoe business. I am not sure yet. It just depends on what I want to do then.

- Alexis (regular) aspires to be a fashion designer and trusts that she will outperform her peers in science when tested. She said, "I want to be a fashion designer because I like to draw and I'm good at matching things together." In reference to her learning in

comparison to her peers, Alexis stated, "I believe that when I take the Alabama Science Assessment this year, I will score just as high as everybody else."

- Tiana (regular) aims to become a Federal Bureau Investigator (FBI) Agent. She said, "I want to be a FBI agent. I want to be a detective because I watch this one show, Criminal Minds, and it just seems so exciting to me. I think it would be fun to do." She stated that her grades are just as good as her peers. She shared,

    My White friend does not have a really good grade in science. I don't think she really cares about her grades. She acts up a lot. I don't think I will make no less than a B in this course. The lowest grade I made on my exams all year was a 85/B.

- Tra'Von (regular) does not know what he wants to become after high school graduation, but emphasized that he loves math and desires to go to college and play football. He stated, "If that dream does not come into fruition, then I may consider a science profession." When asked about his learning ability in comparison to his peers, Tra'Von stated, " it may take him longer to do his assignments but I am just as smart as my peers"

- Marie (advanced) aspires to be a science teacher. She explained how science may be hard for others but not for her. She said, "I think it would be really really cool to major in a science-related field because science is hard, but fun and not as hard to me." She was confident that she outperforms her peers, to include all ethnic groups. She stated, "My brain works a lot faster than other students."

- Tyrell (advanced) wants to become a science or math teacher and coach sports at the school where he is employed. His words were, "While playing sports in college, I plan to major in one of my core subjects and be a teacher and coach if any one of my sports don't work out professionally." He indicated that he desires to play professional football, basketball, baseball, track, and/or wrestling initially and teach when he retires. Tyrell is confident that he is a "fast-learner" and learns faster than his peers. He said,

    I think I have the ability to learn quicker. I am a quick learner and some people do not learn as fast as me. They are still trying to get one part and I probably have it and ready to move on. That is one of the reasons I got into Pre-AP. I'm not

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saying they [classmates] are smarter than me or me smarter than they are, I'm just saying that I may learn quicker than others. I am not a shy guy. I am not afraid to get up and do stuff so my abilities have nothing to do with my parents. I just have always been the type of guy that if you ask me to do something, I will go and do it. If I did not know how to do something, I would ask questions on how to do it and still give it my best shot.

- Elizabeth (advanced) was unsure of what she wanted to major in career-wise but knows that she "wants to help the little babies." She expressed her interest in science and how much she enjoys attending museums, exhibits, aquariums, and theme parks. She shared,

    I used to go to science museums, like once a year, when my mom takes me. We have not been in the past two years. My mom's been busy because she got a new job and usually works on Saturdays. In summertime, she works a lot and she only gets like two weeks off and we usually go to Florida, Orlando, for Disney. We see different stuff every year.

    She mentioned that others in the class may be smarter than she is, but she will "know the content by the end of the chapter."

The students were confident in their subject area. They were proud of their performance in the class overall. Each one of them believed that his/her performance met or exceeded that of their classmates. Many of the students referenced their grade of A or B, which is an indicator of their science self-efficacy. They believed that the Black-White achievement gap did not exist in their class because African American students were doing just as well as Whites and other ethnic groups. Many of them said they believed they would score higher than most of their classmates of other ethnic groups on the upcoming spring Alabama Science Assessment.

I observed the students' physical and non-verbal behaviors to assist in interpreting the impact that their teacher and her teaching strategies had on their science learning. I watched for how the students were engaged in class, their enthusiasm, and their body language when working with classmates, answering questions, and asking questions. I also paid attention to their facial expressions to see if they encountered any difficult concepts. As I mentioned with the teachers' analysis, the curriculum was designed where the teachers were involved with the students from bell to bell. Every time I observed the class, I commented on how actively engaged the students

were and how diligently the students worked. When students worked in groups, African American students were not shy or quiet and always contributed to the learning experience. Chris informed me that he requested to be the speaker every time he is in a group and they have to present because he enjoyed letting others see how much he knew. I watched non-verbal behaviors and body language because they gave me insight on how those actions impacted the students' responses (i.e., on-task, discipline). The African American students were not students with discipline problems and they always raised their hands to comment on or answer questions. The White students were reprimanded verbally more due to being off-task, talking excessively, or being disrespectful to their teacher. The results from observing these characteristics were positive. The overall themes that emerged from the student individual interviews on the teaching strategies that impact their science learning was that they were confident about the content because of the teacher, the teaching strategies that were employed, and their academic ability.

The African American student participants' accounts show how each took an interest in a field and already had a plan for the future at the middle-school level. It is stated commonly that African Americans: (a) are not interested in science-related fields, (b) score lower than any other ethnic group, and (c) have low self-efficacy. The student participants in this research revealed high self-efficacy.

Theme 6: African American student participants' parents value education and moved to Success Middle School district for better educational opportunities.

Seven out of ten African American student participants expressed how they and their parent(s) were unhappy in their previous school; therefore, their families moved to Success Middle School district to receive a better education. Economic and social factors, as well as stakeholders' attitudes in the community have an influence on the improvements of education (Paige & Witty, 2010); therefore, the parents of these seven African American student participants saw the need to move their child(ren) to a school system where the aforementioned factors would have a positive impact on the learning experience of their child(ren). The following comments shared by the seven African American student participants display how they were treated at their previous school and are receiving a better educational opportunity by the change in environment:

- Mekka (regular)—moved from another city in Alabama. She stated,

This is my first year at Success Middle School. All of my teachers are nice and my grades are higher here. I like being a student here because there is a difference in behavior. Last year, they did not handle situations like this school does. This school handles situations good. Last year, a boy had touched me and my cousin in the wrong spot and they did not do anything about it. I told the principal and my aunt called the police for her daughter. The police just filed a report and that was it.

- Bubbles (regular)—moved from a city in Georgia. She stated Success Middle School does not treat the students like "babies." In describing the difference between her old school and Success Middle, Bubbles said,

    I don't think some of the teachers wanted to teach. They just tell us [the students] to do something. I do not see this as a problem here [Success Middle School]. Success Middle School needs to make the school lunch better with more variety. It is sad when you can remember the menu. We don't want to eat the same things every day.

- Chris (regular)—moved from another city in Alabama. Chris stated,

    We [his family] moved to Success Middle School because my mom did not want me to go to that school, especially middle school, because they were so violent and used to fight a lot. I have more freedom here and can walk around to go to different classes. All my subjects were in one class with one teacher at my previous school. I feel I learn more at Success Middle School because my teacher last year did not help me with any of my subjects. I do not know why but she used to scream at me. She did not like me and I don't know why. And I did not like her either. She thought every time that somebody did something, it was me. She would send me in the hall. It got to a point where I marked my own spot in the hall. My mom actually sat in the classroom with me sometimes. My sixth grade teacher was acting nicer when my mom came up there but returned to her normal ways when she is not there. This is why I was glad to get out of her class.

- Alexis (regular)—family moved from Alaska to be closer to her grandmother. She stated that Success Middle School has been good and different because the middle

school is separated from the elementary school and it is a better environment to mature. She shared her previous educational experience in Alaska by stating:

> The school I went to before was an elementary and middle school combined. Like my old school, I was around kids that were older and younger than me. At this school, it is just kids my age. It's a better experience because of the maturity level. At the other school, they were not as mature as the kids here.

- Tra'Von (regular)—moved from Georgia. Tra'Von expressed how he believed he was a good student. He said,

> I don't get in too much trouble at school. I play football for the school. I mostly play games at home when I don't have to do nothing. I turn my stuff in on time. I make As and Bs and mostly just one C in English.

He elaborated on how middle school teachers are strict, like his mom. He said,

> In elementary school, the teacher let you get away with a lot of stuff. They give you a lot of chances to do your work, but middle school teachers don't give you longer than two days extra to do it, maybe one. Middle school teachers actually teach better because they are not going to do like elementary, they will just wait on the slow person to get done. At Success Middle School, if you are taking too long, they will go ahead and skip through. You will just miss what you did not do.

- Tyrell (advanced)—moved from Georgia. Tyrell said,

> I think this is a good school. It has enough room for all the students. It is a good and safe environment for us. They offer all your core classes and a good physical education program that keeps everyone in shape. We are doing something every day and not just sitting down, exercising, or talking. I like Success Middle School better because they spend all their time in class on the subjects that they teach so they do not have to worry about fitting in time to go over every subject, like in sixth grade. The teachers only have to worry about their one subject.

- Elizabeth (advanced)—moved from another city in Alabama. She described her experience in comparison to her previous school. She said,

> We do a lot of fun activities here. We go to the science laboratory every two weeks. In language, we go to the computer lab to do our projects. In geography,

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we always have video clips on to show us pictures of all the different places we learn about. In science, we have slides and articles to tell us about what we are learning. In physical education (PE), we exercise and go outside. In band, we learn new music for band every day. Next year, I am going to try out for honor band. We have a lot of school activities for clubs. They [Success Middle School teachers] take us places [fieldtrips]. We went to Auburn University this year for a breakfast for Fellow Christian Athletes (FCA). It's fun here. We have a lot of classes. In every class, I learn something new every day. They break stuff down for us. I did not even learn how to do division in fourth grade at my other school, another student in the class taught me during class. My science and math teacher did not do too well at my previous school but my English and reading teacher did. In fifth grade, we really did not learn too much new because we went back over all the stuff we were supposed to learn in fourth grade. Everything we did not know, the fifth grade teacher would reteach. He was an old Caucasian teacher that truly cared about if we learned or not.

These seven students recognized that their previous school situation was not producing an achievement level to prepare them to be competitive among their peers, college ready, or safe; therefore, their parents moved them and their families to Success Middle School for better educational opportunities. They understood that their parents moved to provide a better way of life for them, both physically and educationally.

The remaining three African American student participants were already zoned in the Success Middle School district because that area is where they were born and raised. Each African American student participant, both regular and advanced, shared how their educational experience was better at Success Middle School.

Research Question 3: To what extent do seventh-grade science teachers' teaching strategies reflect culturally responsive teaching?

Culturally responsive teaching is not new to education. Culturally responsive teaching is "using the cultural knowledge, prior experiences, frames of reference, and performance styles of ethnically diverse students to make learning encounters more relevant and effective" (Gay, 2000, p. 29). It also is defined as "using knowledge of student cultures and modalities to select and apply strategies and resources for instruction, while engaging in self-reflection" (Wisniewski et

al., 2012, p. 3). It means matching school culture to students' culture, using students' culture to help them understand who they and others are, and being able to conceptualize content and structure and organize social interactions (Ladson-Billings, 1994). Culturally responsive teaching is a means to empower and educate the whole child (Gay, 2000; Ladson-Billings, 2002; Thompson, 2004). Research states that culturally responsive teaching strategies applied with research-based teaching strategies, commonly referred to as "best practices," have proven to improve academic achievement of African Americans and any other ethnic group.

With this research case study, the seventh-grade science teaching strategies used at Success Middle School by the participating teachers indicated that science learning took place; therefore, the extension of my case study was to see if the teaching strategies used incorporated culturally responsive teaching. From observing two regular seventh-grade science classes for six weeks and one seventh-grade advanced class for four and one-half weeks, I witnessed the use of culturally responsive teaching, which supports research that culturally responsive teaching incorporated with research-based teaching strategies, such as lecture-discussion, graphic organizers, hands-on activities, and cooperative learning, contribute to making learning more understandable and meaningful, thus increasing learning (Gay, 2000; Ladson-Billings, 2002; McKinley, 2010; Thompson, 2004; Wisniewski et al., 2012).

Theme 7: Teachers were not familiar with the term "culturally responsive teaching," but there was evidence that several aspects of it were present in the seventh-grade science classroom environment.

While Mrs. Leigh and Mrs. Mary could not explain what culturally responsive teaching means and had no knowledge that they were implementing some of these strategies, I found evidence from my classroom observations that both incorporated several aspects of culturally responsive teaching in their classrooms. They both indicated that they were not changing any routines or techniques for me, which allowed me to see the normal teaching strategies they both use in the classroom, whether I was present or not. Using the research-based *Assessment of Effective and Culturally Responsive Strategies* (AECRS) (McKinley, 2010) as a checklist for examining the extent of culturally responsive teaching used by the teacher participants, Table 4.6 depicts the evidence I observed of culturally responsive teaching strategies.

Analysis of the data collected revealed that the seventh-grade teachers employed several aspects of culturally responsive teaching strategies to maximize each student's academic

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potential in science; however, culturally responsive teaching was not implemented fully in the seventh-grade science classrooms (See Table 4.6). I recognized that they knew what the previous year's data represented for their students, incorporated necessary steps to address the needs of all their students, respected the research that supported the data (e.g., the need to use reading strategies and graphic organizers for struggling readers and low performers); however, research was not conducted or professional development received to understand how "race, ethnicity, language, socioeconomic factors, gender, and cultural experience would influence behavior, performance, and climate" (McKinley, 2010, p. 137). The teachers stated continuously that they teach the way that they do because of experience and because they feel it is the best way to teach a particular concept or skill. The evidence of culturally responsive teaching in the classroom that was present demonstrates that the teachers have self-reflected on the teaching strategies in the past in order to develop a more effective science curriculum and environment. From my observations, it also was apparent that the teachers recognized the need to incorporate different learning strategies to address the needs of all learners, other than high-performing students, because of the educational options they made available to the students when they presented class assignments. For example, they incorporated different types of reading strategies, graphic organizers, hands-on activities, projects, and presentations to ensure that the activity aligned with the best way to meet mastery of the state standard(s) in science. Mrs. Leigh and Mrs. Mary realized that all students learn differently, regardless of ethnicity; therefore, the activities that they displayed daily reflected their attempt to explain concepts in a manner in which all learning styles could be addressed.

Racism is Normal and Colorblindness

Critical Race Theory argues that race continues to be an issue in today's educational system where laws and decisions are made on property rights (Ladson-Billings & Tate, 1995; Tate, 1997). Connecting property rights with race or human rights is influential in explaining social and education inequities. Educators are uncomfortable identifying and acknowledging student differences thus, Critical Race Theory helps educators understand the racial inequalities present (Rolon-Fow, 2005). Researchers identify that Whites believe race is not an factor in education (Tate, 1997; Valdivia, 2002). Thus, this case study findings support this because both participating teachers kept reiterating that they do not see color when they teach or plan lessons.

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Social Transformation

Analyzing the culturally responsive teaching strategies that the participating teachers incorporated in their daily activities, another tenet of Critical Race Theory emerged—social transformation. The teachers stated that they select their teaching techniques and activities based on their experiences over the years and the needs of their students. While the teachers did not know that they were implementing culturally responsive teaching, there was evidence of aspects of culturally responsive teaching. One tenet of Critical Race Theory deals with the elimination of oppression (Munoz, 2009). This tenet works towards social transformation removing "all forms of racial, gender, language, generation status, and class subordination" (Solorzano et al., 2005, p. 275).

Using culturally responsive teaching as an effort towards social transformation empowers all students, advocates for all students, and provides equal opportunities for all students (Fernandez-Bergensen, 2011). It is hard for the oppressor to understand the feelings of the oppressed because he or she has never experienced those feelings (Freire, 1970). The experiences and feelings shared by the student participants can never be interpreted without taking race into account and/or reflecting on the tenets—Racism is Normal or Colorblindness. I associate culturally responsive teaching with social transformation because it "attempts to link theory with practice, scholarship with teaching, and the academy with the community" (Solorzano & Yosso, 2001b, p. 3).

Table 4.6. Effective and Culturally Responsive Teaching Strategies (McKinley, 2010)

Culturally Responsive Teaching Strategy	Evidence Observed
I. Setting and Maintaining Clear Expectations for Content Mastery • Belief in self-efficacy by believing in the capacity to make a difference in student learning • Role and mastery expectations by holding high academic and personal expectations for every child • Equitable access to resources and opportunities to learn by providing students with equitable access to learning opportunities and resources regardless of academic gaps or needs	Although neither of the teachers focused on race, they set high and clear expectations with which all students had to comply. They made them accountable for their learning experiences by making them keep a notebook with a table of contents and helping them understand and perform their roles in independent and group activities. All teachers received the same assignments, instructions, and participated independently, if enough supplies, or in groups with three to four members, to maximize the learning experience.
II. Student-Teacher Social Interactions • Creating inviting environments that reflect personal caring • Developing positive, personal relationships with students • Stressing collectiveness and collaboration, rather than individuality, in interactions • Listening to and encouraging mutual sharing of personal experiences related to curriculum • Basing interactions on human dignity principles, respect for each person, and an attitude of hope and optimism • Ensuring that students and teachers treat each other with civility, gentleness, and support	Both teachers made sure their classrooms were clean, organized, and arranged strategically to achieve the best learning experience from their style of teaching and characteristics of their audience. They both had seating arrangements that changed every nine-week period or as needed. They both encouraged 100% participation by using different techniques to involve all the students. It was a practice to ensure each student participated in discussions either by asking and/or answering a question. The teachers grouped the students strategically to maintain classroom management and to be sure the groups were composed of individuals that would ensure each role was carried out in activities. If the content presented itself for a teachable moment, the teacher shared stories and allowed the students to share stories. Both teachers had excellent classroom management. There was never a day that either had to address misbehavior. The students seemed eager to learn and realized that talking or misbehavior would get them behind. Along with the science standards, both teachers were responsible for the bulletin board outside of their classroom. They took turns decorating the board, but they chose to decorate it each month as a character education bulletin board because their objective was to teach skills of character that were visible to the entire seventh-grade and would transcend those characteristics into the classroom settings and behaviors outside of the classroom.

Culturally Responsive Teaching Strategy	Evidence Observed
IV. Classroom Management • Using appropriate language • Disciplining using an adult voice • Preventing situations where students lose peer respect • Responding to misbehavior on an individual basis	Both teachers were intelligent, respectable individuals that were well-liked by all their students. The African American student participants spoke highly of their seventh-grade science teachers and thought this was one of the best science experiences they have ever had. Some even stated that they did not like science until seventh-grade science. I rarely heard either teacher raise her voice; however, they made good use of tone changes to distinguish the difference between a time to play and a time to be serious. The level of classroom management prevented any opportunities for violence and misbehavior to go unnoticed. They were good at dealing with any issues one-on-one without interrupting the learning experience.
V. Curriculum and Instructional Design • Developing clear goals and standards • Aligning assessments to the content, format, and complexity or level of difficulty of teaching and learning activities • Structuring lessons to include review of mastered material • Carefully planning the day and lessons to include active engagement • Designing structured classes and daily routines • Balancing facilitation of student learning with teacher-centered presentations to the whole class • Structuring environments for cooperative learning and group activities. • Ensuring that group goals are attainable	The seventh-grade science curriculum was created by the department with each applying their experiences with the type of students served and the methods that were effective and non-effective. Each teacher posted and reviewed standards that were to be covered. They ensured the activity created for particular standards included necessary activities to ensure mastery learning. They included an array of visual aids (e.g., diagrams, videos, presentations, graphic organizers, pictures, manipulatives) to ensure the students understood the concepts taught. The teachers rearranged their furniture, as necessary, to accommodate certain activities.
VII. Cultural Competence • Demonstrating knowledge of students' backgrounds	While these strategies were not mastered, there was evidence that several aspects were present that showed the teachers were trying to implement these strategies into their classroom. Both teachers knew their students by name, their ethnic compositions, their previous year's standardized scores, and communicated with their parents (one-parent or two-parent home) via email and letters sent home; however, it was not apparent if they knew whether their students came from a one parent or two-parent home, if the students' parent(s) were educated, or exact home state of the students.

Culturally Responsive Teaching Strategy	Evidence Observed
      • Encouraging mutual sharing of personal and expressive stories related to content • Providing students with experiences making decisions and taking action about real-world problems	The teachers had basic knowledge of how race, language, gender, and socioeconomic status affect students and their learning experience; therefore, they applied strategies they thought would cater to all of their students' needs (e.g., reading strategies, graphic organizers, and hands-on activities). They admitted to not having any specific professional development in developing cultural competence; therefore, the teachers did not have a full "understanding of how race, ethnicity, language, socioeconomic status, gender, history, residential status, and cultural experience influence behavior, performance, and climate" (McKinley, 2010, p. 137). The students often were given literature on their grade-level about real world situations that pertained to the content so they could become more aware of what was going on, how to understand and apply the science concepts, and/or how to exist in the current world under the conditions that are present. For example, the science classes covered material on the Gulf of Mexico oil spill that affected the United States, its land, and its economy.
VIII. Cultural Congruence in Instruction • Engaging all students using meaningful, relevant, and challenging curriculum, content, and instructional activities • Scaffolding and engaging students' learning using visual images and familiar vocabulary to connect prior knowledge and new learning • Selecting and using a variety of instructional methods and interactive strategies • Limiting lectures to 5-10 minutes and augment with visuals and examples • Using manipulatives, models, artifacts, and concrete representations of concepts	The curriculum that was enacted commonly by the seventh-grade teachers was encompassing and engaging. The teachers taught and facilitated from bell to bell and the class period appeared to speed by according to the student participants. The student participants shared how they could not wait until the following day for class because they looked forward to science class. Both teachers used different teaching strategies within one 60 minute period (e.g., technology, graphic organizers, Bellwork, lecture-discussion, hands-on activities). If the teachers used lecture-discussion format, they never lectured longer than five minutes before they incorporated other teaching strategies and discussions to keep students from being boring and losing the students' interest-level. I witnessed a performance-based activity on the content standard on a daily basis over the six-week period, which contributed to a conceptual understanding for the students. A laboratory experience or hands-on practice activity always followed a skill or concept to apply the skills and concepts learned.
IX. Cooperative Group Instruction • Structuring environments to allow for cooperative learning and group activities • Creating flexible student groupings • Balancing familiar and unfamiliar group members when structuring groups • Regularly placing students in groups mixed	Both teachers grouped the students strategically where the groups were heterogeneous. There was never a time where there were all African American students in one group. Whereas, I do not believe the teachers paid as much attention to what race or gender a student was when forming groups, I also believe they took into consideration the task and the students' academic and social skills when forming groups. They were cognizant of students that did not get along, talkative, or non-talkative, so they could put the appropriate blend of students together. They informed me that it took planning beforehand, rather than

Culturally Responsive Teaching Strategy	Evidence Observed
by race, gender, and ability • Providing instruction and practice in comprehension strategies, such as predicting, generating questions, clarifying, and summarizing using authentic texts	trying to form groups on the spot. They informed me that by using strategic grouping techniques, it created no classroom management issues and they had less remediation because the students maximized the use of the time and learning experience.
X. Procedures for Rehearsal, Processing, and Transfer of Learning • Using a variety of modes of representing information and ideas: graphic organizers, advance organizers, overviews, lesson outlines • Engaging student in multiple ways • Calling on student regularly • Maintaining active learning by using questions and recitation and encouraging student-developed questions • Maintaining active participation by randomly calling on students • Maintaining kinesthetic participation • Actively engaging students in tasks a great deal of time • Allowing students extended learning time as needed • Using current learning materials and technology	Both teachers incorporated the same curriculum and used technology daily; however, their teaching styles varied and they adjusted their activities based on their style, such as showing a different video to achieve the same goal. They involved each type of learner in each experience daily. Both teachers made sure they explained the content thoroughly to address the auditory learners. Both teachers provided examples and found as many visual aids and representations as possible, which engaged the visual learners. Both teachers had some type of performance-based activity to demonstrate understanding of the content. Both teachers incorporated the use of current computer software and hardware, state of the art classroom laboratory equipment, presentation media, and supplies.

Effective and Culturally Responsive Teaching Strategies Form. Adapted from McKinley, J. (2010). *Raising black students' achievement through culturally responsive teaching*. Alexandria, Virginia: ASCD, pp. 133-142.

Summary

Chapter Four presented the results from this case study regarding what is taking place in regular and advanced seventh-grade science classrooms of one Alabama school (Success Middle School). The findings presented in this chapter required me, as researcher, to review the data collected over six weeks, make sense of the data, and present it based on my analysis through the lens of Critical Race Theory. The case study involved observations of three seventh-grade classrooms (two regular and one advanced) at Success Middle School. One two-hour class was observed of Mrs. Leigh's advanced seventh-grade classroom daily for four and one-half weeks. They both followed the same curriculum and implemented the same strategies and activities in their classes, but Mrs. Leigh discussed the content more in-depth with her seventh-grade advanced students. The analyses of the data collected from classroom observations and individual interviews of African American students and seventh-grade regular and advanced teachers began with the personal narratives of all participants and the three research questions. The personal narrative section introduced each participant in this case study and assisted the reader in becoming familiar with each individual. Background information was collected for each participant to assist in understanding and interpreting the findings.

The data uncovered the findings from teacher and student participants' interpretations of the teaching strategies that impact African Americans' science learning in comparison to the data collected from classroom observations. The data also revealed the extent of culturally responsive teaching used by the seventh-grade science teachers. The findings support some of the tenets of Critical Race Theory, which indicate that racial inequalities are still an issue in the underachievement of African Americans and may be the solution to improving science learning of African Americans. Both the teacher and student individual interviews confirmed that race will always be an indirect issue in education (Bell, 1992).

Table 4.1 provided descriptive demographics for seven regular seventh-grade student participants, and Table 4.2 provided descriptive demographics for three advanced seventh-grade student participants. These descriptive demographics included: (a) pseudonym, (b) school labeled identification, (c) birthplace, (d) age (e) parents at home, (f) highest education level of parents, (g) siblings, (h) birth order, (i) free-reduced meal status, and (j) pre- and post-test averages. Table 4.3 provided demographic characteristics for the seventh-grade science regular

and advanced teacher participants. These descriptive demographics included: (a) pseudonym, (b) self-identification, (c) degree level(s), (d) endorsements on teaching certificate, and (e) years of teaching experience.

The findings and emerging themes were summarized and presented as they related to the three research questions. The seven themes were:

Research Question One: What do teachers think about the teaching strategies they employ to teach African American students?

(a) The participating teachers' research-based teaching strategies used in the classroom addressed all of the students' learning styles, abilities, attitudes towards science, and motivational levels about learning science, with no emphasis on the African American student population.

(b) The participating teachers taught the state content standards simultaneously using the same instructional model daily, incorporating other content areas when possible.

Research Question Two: What do African American students think about the teaching strategies that are used by their science teachers?

(c) The participating African American students believed their seventh-grade science teachers used a variety of teaching strategies to ensure science learning took place, that science learning was fun, and that science learning was engaging.

(d) The participating African American students genuinely liked their teacher.

(e) The participating African American students revealed high self-efficacy.

(f) African American student participants' parents value education and moved to Success Middle School district for better educational opportunities.

Research Question Three: To what extent do seventh-grade science teachers' teaching strategies reflect culturally responsive teaching?

(g) Teachers were not familiar with the term "culturally responsive teaching," but there was evidence that several aspects of it were present in the seventh-grade science classroom environment.

Several culturally responsive teaching strategies were observed from the teachers, but full implementation of culturally responsive teaching was not observed. The data was analyzed and interpreted via the tenets of Critical Race Theory. Both of the science teacher participants conveyed positive attitudes and self-efficacy about their students' abilities, including the African

American participants, to pass seventh-grade science successfully and the teaching strategies they employed. The teaching strategies they employed was in the best interest of all of their students and not just the African American students. As required, the teachers taught the state standards but used the same instructional model daily to implement the lesson, incorporating other content areas (e.g., math and English/Language arts) when possible. The Critical Race Theory tenets present with the first research question were: (a) racism is normal, (b) colorblindness, (c) interest-convergence, and (d) contextual-historical analysis.

The seventh-grade middle school science student participants in this research study conveyed positive attitudes about their abilities to pass science successfully and the teaching strategies employed in seventh-grade science. Some of the students expressed a disinterest in majoring in science but all were confident that they would do well in the course in comparison to their peers of other ethnic groups. The students expressed the influence their teacher, teaching strategies, and their grade of A or B had on their science self-efficacy. This study revealed that the African American student participants genuinely liked their teacher and that the participants' parent(s) valued education with seven families moving to Success Middle School district for better educational opportunities. The Critical Race Theory tenets present with the second research question were: (a) racism is normal, (b) storytelling-counterstorytelling, and (c) social transformation.

The seventh-grade science teachers employed several teaching strategies to ensure science learning took place, that science learning was fun, and that science learning was engaging; therefore, the extent to which these reflected culturally responsive teaching was analyzed. This study revealed that teachers were not familiar with the term "culturally responsive teaching," but there was evidence that several aspects of it were present in the classroom environment. The Critical Race Theory tenets present with the third research question were: (a) racism is normal, (b) colorblindness, and (c) social transformation.

This case study sought to determine what is taking place in seventh-grade science classrooms of a school that is showing science improvement for African Americans as an attempt to identify culturally responsive teaching strategies that work so they can be shared and made available to other educators. Success Middle School and other schools around the country are taking initiatives to improve academic achievement of African Americans; however, the Black-White achievement gap still exists. The Black-White achievement gap in science is widening

within the United States; therefore, outcomes from this case study will contribute to the improvements in African American student learning.

Beyond the composition of how research-based strategies, such as reading strategies, graphic organizers, cooperative learning, lecture-discussion, were combined, Success Middle School did not implement a new teaching method, philosophy, or curriculum. This research supports current research for some of the culturally responsive teaching strategies that impact African American science learning. Chapter Five discusses: (a) Summary of the Study, (b) Interpretation of the Findings, (c) Conclusions, (d) Implications for Practice, and (e) Recommendations for Future Research.

Chapter 5—Discussion

This chapter provides my interpretation and discussion of the findings presented in Chapter Four. Chapter Five features: (a) Summary of the Study, (b) Interpretation of the Findings, (c) Conclusions, (d) Implications for Practice, and (e) Recommendations for Future Research and concludes with my final thoughts.

Summary of the Study

Since the implementation of the No Child Left Behind (NCLB) Act in 2004, the Black-White achievement gap in science persists. Research-based teaching strategies have been proposed, prescriptive programs have been suggested, and the use of culturally responsive teaching strategies incorporated with best teaching strategies also have been considered by Success Middle School and the school district. The purpose of this study was to discover the teaching strategies used in seventh-grade regular and advanced science classrooms of one Alabama school that impacted African American student learning and the extent these practices reflected culturally responsive teaching. Educators and stakeholders interested in strategies that work or individuals that are in positions to make decisions about teaching strategies that positively and negatively impact African American students must be informed about the effects of teaching best practices incorporated with culturally responsive teaching. Research on teaching strategies and culturally responsive teaching exists, but research is lacking about the incorporation of both in improving African American achievement to capture mainstream America's attention. This study seeks to inform educators and stakeholders of the teaching strategies observed that had a positive impact on science learning for African Americans and the perceptions of the two participating teachers and ten students about the teaching strategies that impacted science learning.

This qualitative case study was conducted during the Spring semester of 2012 of the 2011-2012 school year from January through March. This case study allowed me to investigate a topic and subjects more in-depth using individual interviews and observations (Creswell, 2007; Yin, 2003). The one school, two classrooms, ten student participants, and two teacher participants strengthened the results from this study and enhance the confidence for educators to use best teaching strategies with the incorporation of culturally responsive teaching strategies to

improve science learning for African American students. The main focus of this study was to investigate teaching strategies that show improvement in science learning because statistics indicate African Americans continue to experience a gap in science academic achievement in comparison to Whites (Lindsey et al., 2008; McREL, 2000; Paige & Witty, 2010; Poliakoff, 2006; Rothstein, 2004).

The introductions of the participants were presented in narratives in Chapter Four. The findings were aligned by research questions and the emerging themes followed by analysis via Critical Race Theory. Classroom observations occurred over a six-week period and two individual semi-structured individual interviews with two teachers and ten student participants. The semi-structured individual interviews allowed me to become familiar with each teacher and the student participants so I could understand better their interactions in the classroom and the learning process. The observations allowed me the opportunity to observe the students, teachers, and student-teacher interactions. I used qualitative methods to analyze my data including both classroom observations and individual interviews with the teacher and student participants. These two sources, along with field notes, teaching strategies analysis chart, guided student conversations, and documents collected were compared and analyzed to provide understanding and identify teaching strategies that improved science learning for seventh-grade African American students and whether or not they represented culturally responsive teaching. Critical Race Theory afforded me a lens to identify the positive and negative aspects of the classroom environment that may hinder or promote African American students' science learning.

The selections of the research site, teacher participants, and student participants were based on a purposive and convenience criterion sampling. These were purposive because they provided me with the opportunity to learn more about an issue that is important to me. Polkinghorne (2005) states that purposive sampling generates "refinement and clarity to understanding an experience" (p. 140). The selections were convenient because I conducted my individual interviews and observations over a six-week period and the research site was within a 30 mile radius from my home. The research site was a criterion sample because it must have at least a 20% African American population that passed the Alabama Science Assessment over at least the past three years to participate. The teacher participant selections were a criterion sample because their selection was based on their teaching experience, previous years' passing rate of African Americans on the Alabama Science Assessment, at least 20% African American

population in their classes, and if they taught regular or advanced seventh-grade science. The student selections were a criterion sample because the participants must be African American to participate in the two semi-structured individual interviews.

Two teachers were selected to participate in this qualitative case study. One of the teachers teaches regular seventh-grade science and the other teaches advanced (Pre-AP) seventh-grade science. There were ten student participants in this study. Seven of them were enrolled in regular seventh-grade science and the other three were enrolled in advanced seventh-grade science. I approached the administration with my study and the Assistant Principal selected the advanced teacher, who also was the science department chairperson, to participate. The advanced teacher/science department chairperson selected the regular teacher participant based on the aforementioned criterion. Administration and teacher participants were informed about the purpose of the research and methodology. All consented to participate in this study and then the teacher participants recommended all of their African American students to participate, since they each had approximately a 20% African American student population in each class. This was to ensure I received consent forms from a representative sample of African Americans from each class. I observed two regular science classrooms for 60 minutes daily for six weeks and one advanced class for approximately two hours daily for four and one-half weeks. I received consent forms from eleven African American students (eight regular students and three advanced students), but one of the regular science students decided not to participate in the individual interviews. The administration provided permission for all student participants to miss their physical education period during their scheduled time for an individual interview because they depended on bus transportation to get to and from school.

The purpose of this study was explained to each class and the individual interview protocol was explained to all teacher and student participants. The individual interview questionnaires were provided to teacher and student participants 48 hours before their individual interview. The first individual interview lasted approximately two hours with the teachers and one hour with the students. The second individual interview lasted approximately two hours with the teachers and 45 minutes to one hour with the students. The individual interviews were held in Mrs. Leigh's administrative office located in the seventh-grade building two classrooms down the hall from her classroom. The room was comfortable with a teacher's desk and two student chairs. The individual interviews were not audiotaped at the request of the administration and

teachers; however, they consented for me to utilize a laptop computer to record data for accuracy. This method was not a distraction because I typed and maintained eye contact throughout the individual interview with a pause in between questions. The individual interview transcripts were printed for all participants to check for accuracy (member checks). I informed participants that they could add or delete any information as they proofread their interview transcripts. All of the student participants were identified by the school as African American, even if they were biracial or multiracial. Half of the students were identified as economically disadvantaged based on their qualification for free-reduced meals. None of the participants qualified for special education services.

I used data analysis spiraling to analyze my data. I collected all my data and organized my observations and interviews into manageable folders on my computer and in a five-inch binder. I read each transcript from the interviews several times to make sense of the data collected. After an initial understanding, I began to code the data by categories. I then took the initial categories assigned and placed them in sub-categories. The final step was presenting the data in text form. The following sections of this chapter discuss the interpretation of the findings, conclusions, implications and recommendations for practice, and recommendations for future research.

Interpretation of the Findings

There has been research conducted on Black-White achievement gaps and strategies effective for learning; however, little research has been successful in eliminating the Black-White science achievement gap. After teaching for thirteen years and witnessing the Black-White science achievement gap widening in others' classes and closing in mine, I wondered what teaching strategies were taking place in others' classes that were causing African American students to fail in some science classes and improve in others. After all the research initiatives and reforms (i.e., No Child Left Behind) to close the Black-White science achievement gap, but with no success, my research explored teaching strategies that may assist with these efforts.

Critical Race Theory was introduced in education to analyze and interpret the impact that racism has in the education of students of color (Ladson-Billings & Tate, 1995; Tate, 1997). Critical Race Theory was the lens to analyze my data to determine which of its tenets were present or absent that might enhance or be a potential barrier in the improvement of science

learning for African Americans. Because the Black-White achievement gap in science continues to widen, it indicates that educators are continuing to marginalize African Americans' educational experiences because they do not incorporate different cultures into the curriculum. The word "culture" often is perceived to mean and include historic aspects of a culture, whereas, it actually means to "use knowledge of student cultures and modalities to select and apply strategies and resources for instruction, while engaging in self-reflection" (Wisniewski et al., 2012, p. 3).

The data collection included classroom observations and student and teacher semi-structured individual interviews. These data sources were used to determine if teaching strategies that improved science learning for seventh-grade African American students were present and the extent that these teaching strategies did or did not reflect culturally responsive teaching. The perceptions of the teacher and participants were compared to student-teacher interactions, interviews, and results on pre- and post-tests to identify teaching strategies. The data analysis of teacher interviews, student and teacher perceptions of teacher strategies, and culturally responsive teaching strategies implemented in the instructional process helped identify the teaching strategies that improved science learning for the participating seventh-grade African American students.

I believe the of teaching strategies incorporated in the teachers' daily classes increased science learning and merits potential for consideration to improve science learning for ALL students, with an emphasis on African Americans because they were the focus of this research study. This research confirmed the use of research-based strategies, along with most aspects of culturally responsive teaching, to enhance learning of African American students. The interpretations of the findings are presented aligned with the overall research question and the three research questions.

Overarching Question: What teaching strategies are being used in seventh-grade regular and advanced science classrooms that impact African American student learning?

Two major strategies impacted my study for improving science learning of seventh-grade African American students: science teaching strategies and culturally responsive teaching. One theory supported my research and served as the framework for analyzing and interpreting the data—Critical Race Theory (Chapman, 2007; Delgado & Stefancic, 2001; Dixson & Rousseau, 2006; Gotanda, 2000; Ladson-Billings & Tate, 1995; Matsuda, Lawrence, Delgado, &

Crenshaw, 1993; Solorzano, 1997; Tate, 1997; Taylor, 1998). Education and culture both have an influence on the cognitive and social development of a child (Dewey, 1938; Vygotsky, 1978). The teaching strategies utilized for the students were effective in improving science learning; however, this research also provides evidence that components of culturally responsive teaching strategies were incorporated, which contributed to the improved learning in science for African American students. Culturally responsive teaching and Critical Race Theory support high expectations, engaging instruction, and culturally relevant curriculum for the success of all students (Taylor, 2009).

There are not many studies on culturally responsive teaching and culturally responsive teaching strategies in the classroom (Armento, 2001; Banks, 2009; Cartledge & Lo, 2006; Chartock, 2010; Davis, 2006; Diller & Moule, 2005; Gay, 2000; Hale, 2001; Irvine et al., 2001; King, 2007; Ladson-Billings & Tate, 1992a, 1995a, 1995b; Lee, 2001; McKinley, 2010; Thompson, 2004; Villegas, 1991). I found only a few studies demonstrating the use of both in science and their effectiveness (Aremnto, 2001; Irvine et al., 2001; Johnson & Kean, 1992; Lee, 2001; McElroy & Hollins, 1999). Classroom populations are becoming more diverse, which means teaching strategies must address the needs of all students. The findings showed that science learning took place for the African American students by their teachers utilizing: (a) lecture-discussion, (b) notetaking, (c) reading strategies, (d) graphic organizers, (e) hands-on activities, (f) laboratory experiences, and (g) cooperative learning (Dewey, 1938; Grumbine & Alden, 2006; Hale, 2001; McREL, 2000, 2001; Thompson, 2004).

Based on research on best teaching strategies and culturally responsive teaching, all students, especially the African American population, can achieve in science (Armento, 2001; Banks, 2009; Cartledge & Lo, 2006; Chartock, 2010; Davis, 2006; Diller & Moule, 2005; Gay, 2000; Hale, 2001; Irvine et al., 2001; King, 2007; Ladson-Billings & Tate, 1992a, 1995a, 1995b; Lee, 2001; McKinley, 2010; Thompson, 2004; Villegas, 1991). While these efforts improve science learning, school districts must provide adequate professional development opportunities to receive maximum benefits. It must also be noted that all students can learn; nevertheless, the students must put forth the effort once these strategies are implemented. These strategies enhance students' motivational levels so they can look beyond their circumstances and put forth the effort necessary for learning. Best teaching strategies incorporated with culturally responsive teaching are effective learning strategies that translate into the enhancement of students' academic

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knowledge, academic proficiency, development of self-esteem, ability to want to try, and the will to try (Gay, 2000, Ladson-Billings, 1995a; Thompson, 2004; McKinley, 2010).

Research Question 1: What do teachers think about the teaching strategies they employ to teach African American students?

The teaching strategies observed in both teachers' classrooms were supported by teaching strategies that improve academic achievement. The teachers used reading strategies and graphic organizers to drive the instructional process along with the use of technology and hands-on activities that contribute to the academic success of all students, not just African Americans (Allen, 2000; Banks, 2006; Grumbine & Alden, 2006; McREL, 2001). Using reading strategies to activate students' prior knowledge assists them in making connections between what they already know and what they will learn (Allen, 2000, 2004; Grumbine & Alden, 2006; McREL, 2000, 2001). Grumbine and Alden (2006) state six research-based strategies described below that are necessary to reach students with learning disabilities. Because there is an overrepresentation of African Americans labeled as special education or students with disabilities (Grumbine and Alden, 2006; United States Department of Education, 2004), these six principles agree with my research on culturally responsive teaching:

- Principle One: Learning is enhanced when teachers recognize and teach to diverse learning styles and strengths.
- Principle Two: Content learning is supported by explicit instruction in skills and strategies.
- Principle Three: Learning is facilitated when instruction and assessment are clearly organized.
- Principle Four: Learning is maximized when instruction and assessment are based on explicit objectives.
- Principle Five: Learning is improved when teachers provide consistent feedback.
- Principle Six: Learning is sustained when students develop self-knowledge. (pp. 26-31)

Principle One supports this research because the teachers utilized teaching strategies that reached all learners, not just African American students. The teachers alternated the type of activities and assessments used in the classroom. They modeled the different reading and

teaching strategies they used in the classroom, which supports Principle Two. Principle Three supports this research because the teachers established rituals and routines that guided the instructional process daily. They provided the students with daily reviews, study guides for test preparation, review of completed study guides, and instructed them on how to use rubrics with hands-on activities and projects displaying the use of Principle Four. Principle Five was practiced by the teachers by administering different and frequent forms of assessments, such as hands-on activities, laboratory reports, projects, section quizzes, chapter tests, and unit tests. This principle also was exhibited by providing the students with weekly progress reports and daily online access to the teacher participants' electronic gradebook. Every week the teachers provided the students with weekly progress reports on a one-on-one basis where discussions helped them understand what standards they failed, met, and/or exceeded that week and what activities they could do to help improve their grade and mastery of the standard. This exemplified that students developed self-knowledge of how they learned specific content and what they could do to enhance their learning further, Principle Six.

Both teachers stated that they do not see race when they teach or allow race to drive their instruction, which supports the colorblindness tenet of Critical Race Theory (Delgado & Stefancic, 2001; Gotanda, 2000; Matsuda, Lawrence, Delgado, & Crenshaw, 1993; Solorzano & Yosso, 2001a). Mrs. Mary and Mrs. Leigh did not know what culturally responsive teaching was, although they were implementing facets of it. The entire science department utilizes the same curriculum with the understanding that the activities must be adapted to their teaching style. The teachers reviewed the students' standardized test scores from previous years to identify their strengths and weaknesses and used that data to drive their lesson planning (Grumbine & Alden, 2006; Lindsey et al., 2008; Thernstrom & Thernstrom, 2003). The teachers understood that although they did not see race, there was a need to form heterogeneous groups, establish rituals and routines, assign seats, and use independent practice and cooperative activities to master objectives in science (Banks, 2006, 2009; Hale, 2001; McKinley, 2010; Thompson, 2004).

The teachers had similar perceptions of the teaching strategies that impact seventh-grade African American students. Mrs. Mary indicated that "lecture-discussion, notetaking, hands-on activities, and cooperative group activities" were the teaching strategies that impacted science learning for her regular science African American students. Mrs. Leigh stated that the following

teaching strategies impacted science learning for her advanced African American students: "lecture-discussion, notetaking, hands-on activities, reading comprehension strategies, guided practice, scaffolding, drawing diagrams, building models, review, open-ended questions, and videos." While they both may have stated some of the same teaching strategies and Mrs. Mary may not have included as many strategies as Mrs. Leigh, both implemented the same strategies and curriculum when they taught the same science content-area standard(s). Mrs. Leigh taught more in-depth with content knowledge because she had advanced (Pre-AP) students; however, science learning took place in both regular and advanced seventh-grade science classes. The post-test scores improved compared to the pre-test results. They both believed that classroom management was the key to an effective learning environment (Banks, 2006; Diller & Moule, 2005; McKinley, 2010; Thompson, 2004).

Both teachers employed a variety of teaching strategies to meet the needs of their students. The teaching strategies implemented addressed all types of learners: (a) they addressed the auditory learners by explaining the content in scientific language that was broken down into simpler terms that all students could follow; (b) the teachers accommodated the visual learners by having them take notes using graphic organizers, showing media clips, videos that catered to the lesson, and showing them pictures; and (c) kinesthetic learners maximized their learning potential by using the skills that they had heard and seen and applying them through hands-on and laboratory activities (Banks, 2006, 2009; Dewey, 1938; Diller & Moule, 2005; Gay, 2000; Hale, 2001; Marzano, Marzano, & Pickering, 2009; Thompson, 2004). While the teachers differentiated instruction based on different learning styles (Dewey, 1916; Hale, 2001; Marzano, Marzano, & Pickering, 2009; Thompson, 2004), they did not base their teaching strategies by subgroups. They believed that there was no difference from one student to the next— colorblindness, which diminished the African American student participants' opportunities to draw from their culture or individual experiences in the learning process (Delgado & Stefancic, 2001; Ladson-Billings & Tate, 1995).

Interest-convergence played a role in the opportunities available to the African American students (Delgado & Stefancic, 2001; Ladson-Billings & Tate, 1995). All of the decisions that were made considered that the teachers must not discriminate against underrepresented students; however, the way the opportunities were presented, they appeared equal and fair, but likely

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would not have been offered if Whites were not going to benefit from them (Lopez, 2003). Three examples are:

- The implementation of reading strategies daily in the classroom setting as a way to close the gap between reading scores of minorities and Whites, which are reflected in science because reading comprehension is critical in order to understand the science content in writing or textbooks (Allen, 2000, 2004; McREL, 2001; Tatum, 2005; Tovani, 2004). The teachers used these daily not because they were beneficial to the African American population but because they benefited all students (Grumbine & Alden, 2006). If they would not have benefited all populations, would they have been implemented?

- The use of an entrance exam for Pre-AP classes. This opportunity was available for all students indicating that all students were given a chance to take the classes. Statistics across the United States show that African Americans score lower on standardized tests/formative assessments than Whites (Lindsey et al., 2008; McREL, 2001; U.S. Department of Education, 2004) so this entrance requirement may eliminate some African Americans from the opportunity to take Pre-AP courses. Although some African American students may not be able to pass the standardized entrance exam, this factor is generally not indicative of the capabilities of African American students completing the Pre-AP coursework successfully.

- The school distributed dictionaries to all students in the school versus only students that did not have one or who were considered economically disadvantaged (Bell, 1980). This ensured all students had the necessary supplies, yet White privileged students also benefitted from the resources (Lopez, 2003).

Both teacher participants implemented components of culturally responsive teaching without realizing it because culturally responsive teaching parallels best teaching practices that draw from an individual's experiences and maximizes their learning potential by relating content to their everyday lives (Banks, 2006, 2009; Diller & Moule, 2005; Gay, 2000; Hale, 2001). However, the teachers missed out on teachable moments because they did not realize the impact that drawing from students' experiences would have on learning science (Gay, 2000; Hale, 2001; Thompson, 2004).

Because the teachers are not using a prescriptive program and do not teach directly from the textbook, they implement a variety of teaching strategies to approach an objective. Grumbine and Alden (2006) state,

> Learners have diverse ways of making meaning, constructing knowledge, and expressing understanding. Teachers interested in reaching the broadest range of students can offer multiple means of representing the content in their classroom and provide students with multiple means of expressing their mastery of that content. (p. 26)

Regardless of the mode of instruction, the teachers included reading strategies and graphic organizers into each lesson. The rationale is to increase reading comprehension skills, which ensures students conceptually understand the content instead of relying on memory and not being able to transfer or apply the content learned on the Alabama Science Assessment or standardized assessments. In order to comprehend content area literature, such as science, students must be able to construct meaning to organize their thoughts and explain what they have read or learned (Vacca, 2000). Using reading strategies and a graphic organizer is a school-wide initiative based on professional development from the Alabama Reading Initiative (Alabama State Department of Education, n.d.). While both teachers have never received any professional development in diversity, the use of these teaching strategies was a united effort to make learning fun, engaging, and easier to understand and remember. Although African American students in the teachers' classes learned science, the findings indicate that both teachers could benefit from professional development on diversity or culturally responsive teaching to improve science learning of all students, and African American students specifically.

The two themes that emerged from Research Question One: *What do teachers think about the teaching strategies they employ to teach African American students*? were:

(a) The participating teachers based their teaching strategies used in the classroom on all of the students' learning styles, abilities, attitudes towards science, and motivational levels about learning science with no emphasis on African American student population.

(b) The participating teachers taught the state content standards simultaneously using the same instructional model daily, incorporating other content areas when possible.

The teachers believed the teaching strategies they implemented in their seventh-grade classrooms addressed the needs of all of their students based on the school's standardized data and reflecting

on what worked and did not work with their seventh-grade science students in previous years. They expressed that they do not do anything differently for African American students in particular but they address the needs of students individually as they see needs arise. I do not think that a separate curriculum should be created for African Americans; however, teachers should take the time to know their students and make the content relevant to the lives of the students (King, 2007; Ladson-Billings, 1995a; McKinley, 2010; McREL, 2000; Thomspon, 2004). Gay (2000) emphasizes that culturally responsive teaching is "validating, comprehensive, multidimensional, empowering, transformative, and emancipatory" (pp. 29-36). The teachers taught the state content standards, which is a standard practice in public school settings, while using the same instructional model daily to promote consistency in the learning process. Many school districts have adopted a teaching model that they implement; nevertheless, Mrs. Mary and Mrs. Leigh believe that using the same daily instructional model provides the students with a routine and pattern for their learning process so it will be easier for them to follow the flow of learning science.

Research Question 2: What do African American students think about the teaching strategies that are used by their science teachers?

The teaching strategies both teachers utilized in their classrooms are supported by research-based teaching strategies that show improvement in academic achievement for African American students and the students stated help increase their science learning (Dewey, 1938; Hale, 2001; Ladson-Billings, 1995a; McREL, 2000; Thompson, 2004). The African American student participants had similar perceptions of the teaching strategies that impacted their seventh-grade science learning experience. They all commented on the various activities implemented in their daily learning process and attributed the following teaching strategies as helping improve their science learning: Bellwork, note-taking, graphic organizers, hands-on activities, draw, label and color, lecture-discussion, and laboratory experiences. From analyzing the individual interview transcripts and field notes from observations, the students had:

- Positive attitudes about notetaking, although they viewed taking notes as boring, but the most important strategy for learning science;
- Positive attitudes about the use of reading strategies, such as graphic organizers, to increase science conceptual understanding and reading comprehension;

- Perceptions that reflected resilience, self-confidence, high self-esteem, and developed interest in science;

- Positive perceptions that their teacher ensures that all students understand and learn.

Positive attitudes, perceptions, and the ability to be resilient are characteristics that contribute to learning (Thompson, 2004).

My interpretation of the above findings led the following four themes to emerge from Research Question Two: *What do African American students think about the teaching strategies that are used by their science teachers to impact their science learning?*:

(a) The participating African American students believed their seventh-grade science teachers used a variety of teaching strategies to ensure science learning took place, that science learning was fun, and that science learning was engaging.

(b) They genuinely liked their teacher.

(c) They revealed high self-efficacy.

(d) African American student participants' parents value education and moved to Success Middle School district for better educational opportunities.

The student participants were all confident in their ability to pass science successfully. They were not afraid to participate in class and their attitudes about learning and being successful as individuals in secondary education and post-secondary education revealed high self-efficacy. They had positive comments about their teachers as people and what they brought to the classroom environment, which indicated that they genuinely liked their seventh-grade science teachers. The respect students had for their teachers was a result of how their teachers made them feel about learning science and the strategies they used. Socio-economic factors usually hinder a student's learning ability (Rothstein, 2004; Thernstrom & Thernstrom, 2003; United States Department of Education, 2004); however, the ten African American student participants did not let their socio-economic status or being African American rob them of their destiny. Mrs. Mary (regular) and Mrs. Leigh (advanced) both commented on how some of the African American student participants outperformed the White students in their classes. They also commented on how the African American students behaved better than the White students. By the students and their parents making the conscious decision to move to a better, safe environment for education, the African American students were appreciative and took advantage of the opportunity in comparison to the education they received in their previous schools. Payne

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(2008) states that "every child has the right to be safe and reside in a violence-free environment . . . and have an education" (p. vii).

Research Question 3: To what extent do seventh-grade science teachers' teaching strategies reflect culturally responsive teaching?

Culture or culturally responsive teaching does not imply an African American activity or historical African American activity must be incorporated but rather "use knowledge of student cultures and modalities to select and apply strategies and resources for instruction, while engaging in self-reflection" (Wisniewski et al., 2012, p. 3). This translates into the enhancement of students' academic knowledge, academic proficiency, development of self-esteem, ability to want to try, and the will to try (Gay, 2000). Culturally responsive teaching makes it easier to conceptualize content and structure and organize social interactions (Ladson-Billings, 1994). Culturally responsive teaching inspires African American students, as well as others, to become better by developing critical thinking skills (Thompson, 2004).

The one theme that emerged from Research Question Three: *To what extent do seventh-grade science teachers' teaching strategies reflect culturally responsive teaching? was*:

(a) Teachers were not familiar with the term "culturally responsive teaching" but there was evidence that several aspects of it were present in their seventh-grade science classrooms.

Teacher individual interviews indicated they were not aware of the term "culturally responsive teaching"; however, they implemented facets of culturally responsive teaching in their daily teaching. The actual strategies were presented in Chapter Four, but Mrs. Mary and Mrs. Leigh incorporated components of culturally responsive teaching strategies represented on the cultural responsive teaching observation checklist (Refer to Table 4.6).

Using culturally responsive teaching improves academic learning because it embodies social transformation through empowering all students, advocating for all students, and providing equal opportunities for all students (Diller & Moule, 2005; Gay, 2000; Ladson-Billings & Tate, 1995). To empower all students means that educators have to unmask any prejudiced thoughts, behaviors, and actions to be an ally against racial inequalities (Gay, 2000; Hale, 2001; Ladson-Billings & Tate, 1995; Tate, 1997; Thompson, 2004). For example, an educator can empower all students by helping all students, rather than helping only the students they perceive to be motivated or academically successfully. To be an advocate for all students, educators have

to be influential in the lives of all their students through leading by example and providing opportunities and mentors who support this purpose (Gay, 2000; Hale, 2001; Ladson-Billings & Tate, 1995; Tate, 1997; Thompson, 2004). For example, an educator can be an advocate for all students by serving as a role model to all students or connecting a student with a mentor who can be an advocate for them. Providing equal opportunities for all students means that educators have to recognize situations of inequality and take a stand in ensuring these practices are not allowed (Banks, 2009; Hale, 2001; Ladson-Billings & Tate, 1995; Thompson, 2004). For instance, if there was a situation where an educator knows a situation did not present an equal opportunity, such as using standardized test scores as a mandatory requirement for entrance into advanced courses, then the educators must make the inequity known and continue to be an advocate to ensure all students have an equal opportunity to enhance their educational experience.

There were several facets of effective culturally responsive teaching present in the teacher participants' teaching strategies (McKinley, 2010); however, culturally responsive teaching was not implemented fully. The teachers expressed that their curriculum and teaching strategies were based on experiences and what did or did not work. This suggests that the implementation of culturally responsive teaching would increase science learning of all students, including African American students (Armento, 2001; Banks, 2009; Gay, 2000; Hale, 2001; King, 2007; Ladson-Billings & Tate, 1995; Thompson, 2004; Villegas, 1991). It is easy for me to implement culturally responsive teaching in my daily teaching practices because: (a) I am an African American that was raised and attended school in a majority setting with middle-class views while being exposed to environments where middle-class views were not the norm and socio-economic factors played a key role in how underrepresented individuals behaved and learned, (b) being an African American that attended majority schools (K-12) where I had to work hard to achieve academically because my former teachers did not use culturally responsive teaching or make the content culturally relevant, and (c) teaching in public schools where underrepresented students were the majority. While this may be an easy task for me as African American, it may not be true for all African American teachers because they may be assimilated to the dominant view and are unaware of culturally responsive teaching. Being an underrepresented individual does not guarantee a culturally responsive teacher. Often, the oppressed becomes the oppressor (Freire, 1970). Ladson-Billings and Tate (1995) claim that it is

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impractical to acquire "justice for the oppressed while simultaneously permitting the hegemonic rule of the oppressor" (p. 62). It is often misinterpreted that culturally responsive teaching means the content must relate to a historical figure or image or to discuss the lesson in reference to a particular subgroup; culturally responsive teaching draws from one's experience(s) to impact the learning environment (Banks, 2009; Gay, 2000; Hale, 2001; Ladson-Billings, 1995a, 1995b; Ladson-Billings & Tate, 1995; Thompson, 2004; Villegas, 1991). Culturally responsive teaching is not a new concept and reflects what all teachers should implement in their classes, regardless of the ethnicity of the student population (Armento, 2001; Banks, 2009; Cartledge & Lo, 2006; Chartock, 2010; Davis, 2006; Diller & Moule, 2005; Gay, 2000; Hale, 2001; Irvine et al., 2001; King, 2007; Ladson-Billings & Tate, 1992a, 1995a, 1995b; Lee, 2001; McKinley, 2010; Thompson, 2004; Villegas, 1991).

Conclusions

The findings from this research indicate that there is a connection between teaching strategies and culturally responsive teaching to improve science learning of African American students (Armento, 2001; Banks, 2009; Cartledge & Lo, 2006; Chartock, 2010; Davis, 2006; Diller & Moule, 2005; Gay, 2000; Hale, 2001; Irvine et al., 2001; King, 2007; Ladson-Billings & Tate, 1992a, 1995a, 1995b; Lee, 2001; McKinley, 2010; Thompson, 2004; Villegas, 1991). For decades, there has been a Black-White achievement gap in science (Lindsey et al., 2008; Rothstein, 2004; Thernstrom & Thernstrom, 2003; United States Department of Education, 2000, 2004), which peaked my interest in researching how to improve African American students' science learning because there have been several initiatives made to eliminate the gap, but the gap continues to widen. There is research on culturally responsive teaching, but little on its impact in improving academic achievement in science (Aremnto, 2001; Irvine et al., 2001; Johnson & Kean, 1992; Lee, 2001; McElroy & Hollins, 1999). Culturally responsive teaching is not a widely used practice because most educators are unaware of what it is. Culturally responsive teaching is an internalized way of life, thinking, and being. Many White educators misunderstand its meaning because they do not understand culture fully.

Culturally responsive teaching may have different names but they all have the same basic conceptual meaning: culturally relevant pedagogy, culturally congruent, multicultural, culturally responsive instruction, and culturally proficient teaching (Gay, 2001; Irvine et al., 2001; Lindsey

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et al., 2008; Wisniewski et al., 20121). Many educators have been exposed to the concepts and some school districts have made initiatives toward its implementation; however, there are still some teachers who are unaware of its meaning, its effects to increase student learning for all students, and how to incorporate it with their teaching strategies. Therefore, school districts and schools must provide the professional development necessary to implement teaching strategies that are proven to increase student academic achievement of ALL constituents.

First, knowledge of teaching strategies that enhanced African American students' achievement must be identified, such as notetaking using graphic organizers, Bellwork, hands-on activities, laboratory experiences, lecture-discussion, and activities involving drawing, labeling, and coloring (Dewey, 1938; Grumbine & Alden, 2006; Hale, 2001; McREL, 2000, 2001; Thompson, 2004). Secondly, knowledge about culturally responsive teaching, its strategies, and its implementation must be addressed and professional development provided. Incorporating both of these strategies yields positive results and enhances science learning of African American students (Armento, 2001; Banks, 2009; Cartledge & Lo, 2006; Chartock, 2010; Davis, 2006; Diller & Moule, 2005; Gay, 2000; Hale, 2001; Irvine et al., 2001; King, 2007; Ladson-Billings & Tate, 1992a, 1995a, 1995b; Lee, 2001; McKinley, 2010; Thompson, 2004; Villegas, 1991). My research revealed that incorporating these two practices together produced an enjoyable and engaging learning experience that provided opportunities for African American students to become successful academically, increased their science interest-level, and implemented motivation for all their academics.

While I witnessed positive results from the teaching strategies observed compared to the teachers' perceptions of the strategies that improved science learning for seventh-grade African Americans, there were some tenets of Critical Race Theory (CRT) present. I did not observe blatant racism and I noted that the two teachers cared about their students and their learning experiences. Both teachers spent a large amount of time preparing their lessons. One of six tenets, Racism is Normal, was present because overall, the teachers and students recognized that racial issues played a part in the underachievement of African American students' science learning experience. The entrance process for advanced courses at Success Middle School can be categorized as a reflection of this tenet. The teachers indicated that they did not see race when they plan or teach, which implies another CRT tenet, Colorblindness. This sends a message that the factors that affect an individual because of his/her race is "no big deal," but then indicate that

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socioeconomic factors play a part in the African Americans scoring low on the standardized assessment and not White students.

Research shows that many African American students score low on standardized exams in comparison to their White peers (Lindsey et al., 2008; McREL, 2000; Poliakoff, 2006; Rothstein, 2004; Thernstrom & Thernstrom, 2003; United States Department of Education, 2000, 2004) and the participating teachers admitted their low performance on previous exams, although they may be doing well in their subjects. This represents lack of knowledge on the teachers' part, which is a form of oppression. If the students are doing well in the course and show mastery level learning on formative assessments produced by the teacher, then they should be allowed to enroll in advanced courses not based on an entrance exam. Because of the required entrance exam requirement, this eliminates several, if not all in some cases, of the African American population from the opportunity to take upper-level courses.

I probably would not have been in advanced classes in high school if there was a required entrance exam, although I did well and graduated a member of National Honor Society, Math Honor Society, and Spanish Honor Society. I would not have been accepted in a master's or doctoral program if there were not any exceptions to the GRE score (i.e., a semester probationary period) because my standardized scores (norm-referenced) were low. Nevertheless, I have performed well in each master's program attended and completed each with at least a 3.5 grade point average or higher. Instead of the teachers or administrators addressing the test biases and revising entrance qualifications for advanced programs and courses, they perpetuated a divided system of educational inequality. Although there are several definitions for tracking, in this case grouping students by their ability levels (Thompson, 2004), this entrance requirement at Success Middle School for advanced course placement is a form of tracking.

Mrs. Mary, the regular seventh-grade science teacher, passed judgment on an African American student when she attributed the individual's dress, hygiene, and lack of supplies as contributing factors to his or her low academic performance. I found this untrue. When I observed the African American student referenced by Mrs. Mary, the student had a unique style of dressing, which fit the new trends—skinny jeans, fitted top with graphics, converse tennis shoes, and natural hair texture braided in a Mohawk. The African American student had the majority of her hair braided upwards towards the temple of her head into a Mohawk and the rest was left loose. This style resembled a Mohawk if a White student wore it, except hair texture is

different for an African American; therefore, it appeared different or ungroomed. I agree that the lack of supplies, such as paper and pencil, may be a contributing factor to low achievement because lack of supplies equates to not being able to do an assignment, which constitutes a zero. However, not having supplies alone is not an indicator of a student's academic abilities. This is an economic issue, which also may not be true because the student could be lazy, rebellious, and/or have supplies and simply not bring them to school. This is another example of the Racism is Normal CRT tenet. Matsuda, Lawrence, Delgado, and Crenshaw (1993) explained the tenet best—racial issues in education have no true meaning until they are identified, recognized, and addressed. Until that point, the racist acts that go unnoticed are perceived as normal. An example of colorblindness was displayed when the teachers recognized that they have different races in their classes but denied that race played a factor in lesson planning and the teaching strategies used with their seventh-grade science classes. The teachers expressed that their teaching strategies were beneficial to all of their students because their needs were basically the same.

Several of the students indicated that they moved to Success Middle School because their parents desired a better educational experience than they received in other schools surrounding Success Middle School in Alabama or the neighboring schools in Georgia. That one school and/or school system had better teachers and resources indicated that low standards were acceptable for a particular population, but were not acceptable for populations of middle to upper-class status, which was the population composition of Success Middle School. Success Middle School was not categorized as a Title I school, which is determined by the number of students labeled economically disadvantaged based on free and reduced-priced meals. According to Aronson (2004), all students are exposed to the reality that there are cultural stereotypes in elementary school. Student participants shared their experiences from elementary school where they may have encountered a racial issue with another student of another ethnicity or their teacher of another ethnicity. Nevertheless, White teachers and students may not have recognized that they were racist or offended the African American student(s), which dismisses the impact that racism played in the social and academic experience of the African American student. Tatum (2009) states that bringing this issue to the forefront with Whites leads to resistance. This resistant behavior often causes Whites to become cautious about recognizing the role they may have played in the racist act (Tatum, 1997).

Whether we are White or of color, we need to know the stories of change agents. They are a renewable source of energy and courage for the long haul of interrupting oppression. In them we find the turning points, the critical incidents, the ordinary moments that have an extraordinary impact. (Tatum, 1999, p. 63)

Contextual-Historical Analysis, another tenet of CRT, was revealed from student individual interviews. Information about African American students' learning experiences in the past, their individual past experiences, and how those previous experiences impacted their future were all important in improving science learning. This tenet implies that these findings from the past are instrumental in making choices for the future; however, these opportunities should be used to "illuminate untold stories about marginalization and oppression in an effort to liberate the oppressed and dismantle the racist status quo" (Munoz, 2009, p. 58). A particular activity, the freedom quilts, assigned to celebrate Black History month, was a good gesture; nevertheless, the hidden message is that contextual-historical experiences are "categories that society invents, manipulates, or retires when convenient" (Delgado & Stefancic, 2001, p. 7). This effort was not initiated until February, which is Black History Month, and this was the only activity the entire month. If Success Middle School teachers wanted to celebrate a marginalized group or Black History Month, then how is teaching all students the symbols that slaves used to gain freedom important or celebratory? I saw the exercise useless as a way for students to learn about Black History and offensive because I could not understand the purpose for students to learn most or all of the symbols slaves used to gain freedom. The school where I teach currently implemented this activity school-wide during Black History Month. The teachers did not receive explicit instructions of how the school wanted to proceed with the project and many of the teachers did not participate. Success Middle School explained the activity thoroughly, initiated the project during the same week, took the time to display the quilts and explanations of their meanings in the hallways of each building, and was creative in connecting the activity with their subject area. However, my school displayed the different patterns in the hallways around the school with no explanations; therefore, this effort was meaningless to most and wasted instructional time.

Beyond the social studies classroom covering the widely known token figures of Black History (e.g., Martin Luther King Jr., Malcolm X, Rosa Parks, Frederick Douglass, Harriet Tubman), an excellent interdisciplinary activity to celebrate Black History would be for each

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subject area to share facts each day about an African American (Black History) that has made major contributions to their field of study. For example:

- Science – George Washington Carver, the inventor of peanut butter and 400 other uses for peanuts, soybeans, sweet potatoes, and pecans; Dr. Charles Richard Drew, the inventor of blood banking and Red Cross Blood Bank; Madam C. J. Walker, developed beauty and hair products for black women; David Crosthwait, patent holder of 39 patents for heating systems and temperature regulating devices; Otis Boykin, inventor of pacemaker and 28 different electronic devices; Henry Sampson Jr., the inventor of gamma-electric cell which is used in cellular phones.

- Music – Louis "Satchmo" Armstrong, the transformer of jazz into art form.

- Physical Education – Jackie Robinson, the first African American in Major League Baseball.

- Business –Madam C. J. Walker, entrepreneur and philanthropist considered to be the wealthiest African American woman in the early 1900s and first female self-made millionaire with her company, Madam C. J. Walker Manufacturing Company.

Other subjects can make their content culturally relevant by connecting the content with the students' cultures and cultural interests. For example, math classes can use the freedom quilt exercise to learn the symbols slaves used to gain freedom while learning about polygons simultaneously. This activity can be done any month that polygons are studied, which makes it culturally responsive, rather than waiting until Black History Month in February each year. Math also can also make a timeline, a type of assortment of data or graphing, using historical facts through the present about African Americans that contributed to society. Language Arts classes, including reading, can read biographies about African Americans that have made major contributions to society, write an essay, perform skits or plays, and conduct presentations. This addresses literacy and reading standards as well as experience with public speaking. This activity applies to all ethnic groups and cultural opportunities. European American is the standard for education; therefore, it is studied on a daily basis. Educators would not have to feel pressured to celebrate marginalized groups during different months if they incorporated it into their daily lessons through culturally responsive teaching (Armento, 2001; Banks, 2009; Cartledge & Lo, 2006; Chartock, 2010; Davis, 2006; Diller & Moule, 2005; Gay, 2000; Hale, 2001; Irvine et al., 2001; King, 2007; Ladson-Billings & Tate, 1992a, 1995a, 1995b; Lee, 2001;

McKinley, 2010; Thompson, 2004; Villegas, 1991). For example, if my science class is learning about cells, it is helpful to talk about the inventor of the term cell and any contributors at that time, such as Dr. Charles Richard Drew, the African American that created blood banking and the Red Cross Blood Bank. African American examples are used because that is the focus of this research.

The CRT tenet, storytelling and counterstorytelling, grants some Whites who cannot see inside underrepresented people's experiences a view to understand the individual and what he or she has endured. It "creates its own bonds and represents cohesion, shared understandings, and meanings" (Delgado, 2000, p. 60). It is not easy to change some White individuals' way of thinking, but this tenet provides the platform to change beliefs about racial issues (Ladson-Billings, & Tate, 1995) and "acquire the ability to see the world through others' eyes" (Delgado, 1989, p. 2439). This tenet was important in analyzing the student participants' perceptions of the teaching strategies that impacted their learning experience because often the dominant group is unaware of racist incidents because they have never endured the experience due to their White privilege. Storytelling or counterstorytelling is a way to "make use of the experiences of people negatively affected by racism as a primary means to confront the beliefs held about them by Whites" (Taylor, 1998, p. 122).

It is imperative that Critical Race Theory be utilized more in the education field. It is not meant to cause division or classify individuals as racist. It presents an opportunity for White educators to step outside of themselves to see how underrepresented people are affected by their actions and decisions. Racism is Normal was one CRT tenet that was revealed in this research. In many of my educational experiences, I have been made to accept that life will never be fair and that I need to learn how to play the game the Eurocentric way. These African American student participants were so happy to be learning and be at a school with adequate resources; they were willing to conform and put forth extra effort to compete with their White peers. While efforts were made to include African American culture during February (Black History Month) at Success Middle School, it was evident culturally responsive teaching was lacking. The African American student participants were not afraid to share their experiences through their storytelling; however, the incidences made known to the teachers by these students were downplayed and, in some cases, ignored. For example, the regular science student's incident in her English class where a White student stated that it was nasty for a White person to conceive a

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child with an African American person and was adamant that he was exercising his freedom of speech rights. This research seeks to inform educators about the urgency to view every student in the class as a unique being and for whom they are (i.e., race) in order to eliminate racial oppression. Critical Race Theory provides an in-depth examination of what is taking place in schools and school districts, both positively and negatively, in the goal to close the Black-White academic achievement gap.

Research was conducted on culturally responsive teaching and this study examined the extent that culturally responsive teaching was or was not observed fully in the seventh-grade science classrooms. Table 5.1 displays research on culturally responsive teaching, what the seventh-grade science participating teachers should do/know, and it indicates if the elements of culturally responsive teaching were or were not observed in their classrooms. Table 5.2 depicts research on culturally responsive teaching strategies and if the strategies listed were or were not observed in the classrooms. Tables 5.1 and 5.2 do not indicate that all elements of culturally responsive teaching were implemented fully but some were observed during the six-week observation period.

Table 5.1. What the research indicates culturally responsive teachers do/know and if observed in the seventh-grade science teachers' classrooms (Mrs. Mary and Mrs. Leigh).

Research	What Teachers Should Do/Know	Mrs. Mary	Mrs. Leigh
Ladson-Billings (1995a)	Make students choose academic success by finding ways to challenge their abilities and value the skills they possess	YES	YES
Thompson (2004)	Not be afraid to discuss sensitive issues, such as race	NO	NO
	Believe that inequities exist among African American students	YES	YES
	Learn about African American culture	NO	NO
	Use the African American community as a resource to help African American students achieve	NO	NO
Lee (2001)	Be knowledgeable of content	YES	YES
	Integrate students' cultures and languages in a meaningful way	NO	NO
Irvin & Fraser (1998)	Teach with authority where they are still warm, but demanding	YES	YES
Villegas & Lucas (2002)	Be socioculturally conscious;	YES	YES
	Have affirming views of students from diverse backgrounds;	YES	YES
	See themselves as responsible for and capable of bringing about change to make schools more equitable;	YES	YES
	Understand how learners construct knowledge and are capable of promoting knowledge construction;	YES	YES
	Know about the lives of their students; and	NO	NO
	Design instruction that builds on what their students already know while stretching them beyond the familiar (p. 20).	YES	YES
Hale (2001)	Future success requires that children be connected to academic achievement;	YES	YES
	It takes a whole village to raise a child;	NO	NO
	Children learn what they are taught;	YES	YES
	School is interesting; and	YES	YES
	Learning is fun (p. 112).	YES	YES
	Understand the social context for misbehavior	NO	NO
Chartock (2010)	Model behaviors that can be duplicated by their students	YES	YES
	Examine why a student is hesitant about learning so they can assist with this behavior	NO	NO
	Be conscientious of the obstacles that they may face on the journey to diversity	NO	NO
Osborne (1996)	Culturally relevant teachers need not come from the same minority group as the students they teach;	NO	NO

Research	What Teachers Should Do/Know	Mrs. Mary	Mrs. Leigh
	Socio-historical-political realities beyond the school constrain much of what happens in classrooms and must be understood well by the culturally relevant teacher;	NO	NO
	It is desirable to teach content that is culturally relevant to students' previous experiences, that fosters their natural cultural identity, and that empowers them with knowledge and practices to operate successfully in mainstream society;	NO	NO
	It is desirable to involve the parents and families of children from marginalized and normalized groups;	NO	NO
	It is desirable to include students' first languages in the school program and in classroom interactions;	YES	YES
	Culturally responsive teachers are personally warm toward and respectful of, as well as academically demanding of, all students;	YES	YES
	Teachers who teach in culturally relevant ways spell out the cultural assumptions on which the classroom (and schooling) operates;	NO	NO
	There are five components of culturally relevant classroom management: using groups, controlling indirectly rather than confrontationally, avoiding "spotlighting," using an unhurried pace, using the home participation structures of the children; and	NO	NO
	Racism is prevalent in schools and needs to be addressed (pp. 289-304).	NO	NO
McKinley (2010)	Have constructive teacher attitudes and beliefs that nurture student motivation;	YES	YES
	Build positive interpersonal relationships that draw on the social constructivist aspects of teaching;	YES	YES
	Establish a cultural context for learning based on students' backgrounds;	NO	NO
	Incorporate social activist approaches that address racism, social injustices, and disparate expectations, conditions, and opportunities to learn; and	NO	NO
	Use effective and culturally responsive instruction and assessment (p. 2).	NO	NO

Table 5.2. Research identified culturally responsive teaching strategies and if they were observed in the seventh-grade science teachers' classrooms (Mrs. Mary and Mrs. Leigh).

Research	Teaching Strategies	Mrs. Mary	Mrs. Leigh
Thompson (2004)	Be fair	YES	YES
	Be explicit, consistent, and sensible	YES	YES
	Curriculum should be comprehensive, challenging, and culturally responsive	NO	NO
	Be focused on the act of teaching and not discipline by incorporating social skills and problem-solving in instructional style	YES	YES
	Be firm, yet not mean	YES	YES
	Be patient and willing to address the needs of the "at-risk" or struggling students	YES	YES
	Offer alternative seating arrangements, a more challenging curriculum, enrichment activities, extra credit assignments, and peer-tutoring opportunities as a way to decrease boredom and reduce misbehavior	YES	YES
	Earn respect and not allow students to intimidate the teacher	YES	YES
	Possess classroom management and attend professional development	YES	YES
	Stay current with research.	NO	NO
Thompson (2004) White teachers need to recognize that they must possess certain beliefs and attitudes to elicit specific outcomes from African Americans, such as:	All children can learn;	YES	YES
	African American children are not tabula rasa (blank slates); they arrive at school with cultural capital and talents that should be built upon;	YES	YES
	African American students do have parents that care about their children and often assist them academically in ways that are invisible to teachers;	NO	NO
	Teachers must do their best with all students; it is not their job to judge students' culture, family, and so forth;	YES	YES
	It is wrong to recognize racial and cultural differences among individuals; when it comes to viewing people, colorblindness does exist (teachers who claim they are colorblind are merely in denial); and	YES	YES
	African American children do want to learn and when teachers seek the best in them that is usually what they find (p. 37).	YES	YES
Hale (2001) & Simmons (2002)	Conflict resolution	YES	YES
Hale (2001)	Understand the social context for misbehavior	NO	NO
Collins (1992)	Raise student expectations and use effective instructional and behavioral	YES	YES

Research	Teaching Strategies	Mrs. Mary	Mrs. Leigh
	strategies that do not deprive students of the skills, abilities, and knowledge required to compete for employment and entrance to college		
Bonner (2009)	Know the content	YES	YES
	Convey the content in a familiar language based on cultural knowledge	NO	NO
	Building relationships with the students	YES	YES
	Building trust with the students	YES	YES
Hollins & Oliver (1999)	Use of warmth, control, and high expectations; and	YES	YES
	Use of kinship terms and cultural connectedness (p. 31).	NO	NO
Johnson & Kean (1992)	Promote cultural awareness	NO	NO
	Confront belief systems by sharing stories about culturally responsive experiences to show relationships between learning and self-esteem	NO	NO
	Change the norms of schooling by designing culturally responsive lessons in their particular content area	NO	NO
Jackson (1993/1994)	Build trust	YES	YES
	Become culturally literate	NO	NO
	Build a repertoire of teaching strategies	YES	YES
	Use effective questioning techniques	YES	YES
	Provide effective feedback	YES	YES
	Analyze instructional materials	YES	YES
	Establish positive home-school relations	NO	NO
Lindsey, Graham, Westphal, & Jew (2008)	Put achievement first;	YES	YES
	Increase teaching and learning expectations;	YES	YES
	Participate in opportunities for professional development and collaboration;	YES	YES
	Involve parents in academics;	NO	NO
	Be accountable;	YES	YES
	Use data-driven instruction practices;	YES	YES
	Keep schools safe;	YES	YES
	Keep running records;	YES	YES
	Keep teaching even when disappointments occur; and Increase teacher-student time (p. 15).	NO	NO
Thompson (2004)	Let students know you care;	YES	YES
	Share the real you, by letting them see you are a real human being—	YES	YES

Research	Teaching Strategies	Mrs. Mary	Mrs. Leigh
	Share your hopes, dreams, and background with students;		
	Have high expectations;	YES	YES
	Keep reminding them of the big picture and why what they are doing in class is important—Tell them constantly what the short-term and long-term benefits are;	YES	YES
	Get to know students on a personal level;	NO	YES
	Make the classroom experience relevant to the real world—In particular, emphasize relevance to their communities;	NO	NO
	Use schema theory—Find out what they already know about the topics that will be covered and help students link their prior knowledge to the new information;	YES	YES
	Use storytelling to arouse their interest;	YES	YES
	Showcase their talent;	YES	YES
	Give students multiple ways to succeed academically;	YES	YES
	Encourage them to synthesize;	YES	YES
	Use questioning to spark discussion;	YES	YES
	Encourage students to write letters to authors of books they have read;	NO	NO
	Stress core vocabulary;	YES	YES
	Use the old and the new—Make use of the postmodern literature, multicultural literature, and the classics;	NO	NO
	Assign regular, beneficial homework—Assign worthwhile homework regularly (a minimum of three nights per week) to teach discipline and responsibility, as well as to reinforce classwork and improve skills. However, be aware that for elementary students too much homework can be counterproductive;	YES	YES
	Offer multiple extra-credit opportunities; and	YES	YES
	Assess their skills and knowledge in advance—It is your responsibility to fill in as many gaps in their education as you can (pp. 65-68).	YES	YES
King (2007)	Use the data to close the gap—use data to drive planning and instruction;	YES	YES
	Become more aware of the role of prejudice, bias, and stereotyping in students' lives—use strategies that will determine student attitudes of his or her environment or real-life experiences;	NO	NO

Research	Teaching Strategies	Mrs. Mary	Mrs. Leigh
	Become aware of students' attitudes about their learning environment—use strategies that will motivate the students to reveal his or her feelings about their environment;	YES	YES
	Change students' attitudes about learning or their environment—praise any accomplishment and not just academic achievement;	YES	YES
	Incorporate examples of distinguished minorities and their contributions—include racial/ethnic background and culture of the school into classroom lessons;	NO	YES
	Ensure equitable academic attention—differentiate instruction to increase participation in daily activities;	YES	YES
	Incorporate student background and culture into instruction—make connections and build backgrounds using multiculturalism;	NO	NO
	Raise own awareness of African American culture—survey your students and parents to find out more about your students;	NO	NO
	Increase parent involvement within the classroom—this will increase communication toward ensuring the child reach expectations and standards;	NO	NO
	Invite input from African American groups—initiate mentor programs; and	NO	NO
	Build relationships of mutual respect with students—create a positive learning environment and find a way to reach them and assure them that you care (pp. 1-4).	YES	YES
Armento (2001)	Hold high academic and personal expectation;	YES	YES
	Provide for each child equitable access to the necessary learning resources and sufficient opportunities to learn;	YES	YES
Armento (2001)	Ensure the learning outcomes are meaningful, relevant, useful, and important to each child;	YES	YES
	Nurture learning-support communities for each child (families, peers, homework hotlines, community centers);	NO	NO
	Facilitate the maximum growth of each learner by making informed academic adaptations that match and build upon the learner's prior knowledge, experiences, skills, and beliefs;	YES	YES
	Build positive and supportive school and classroom learning	NO	NO

Research	Teaching Strategies	Mrs. Mary	Mrs. Leigh
	environments that are grounded in mutual and genuine respect for cultural diversity;		
	Promote classroom climates built on social justice, democracy, and equity. Promote individual empowerment, self-efficacy, positive self-regard, and a belief in societal reform;	NO	NO
	Value diversity as well as human commonalities; and	NO	NO
	Believe that it is their role and responsibility to provide effective and empowering instruction for each child (p. 23).	YES	YES

Implications and Recommendations for Practice

My classroom observations compared to the students' and teachers' perceptions of teaching strategies that impact science learning for African American students support research to improve student achievement for eliminating the Black-White achievement gaps (Hale, 2001; Ladson-Billings & Tate, 1992a, 1995a, 1995b; Lindsey et al., 2008; McKinley, 2010; Poliakoff, 2006; Rothstein, 2004; Thernstrom & Thernstrom, 2003; Thompson, 2004; United States Department of Education, 2000, 2004). The study found that teaching strategies incorporated with some components of culturally responsive teaching presented a positive learning experience with outcomes of improved science learning and increased interest in science (Armento, 2001; Banks, 2009; Cartledge & Lo, 2006; Chartock, 2010; Davis, 2006; Diller & Moule, 2005; Gay, 2000; Hale, 2001; Irvine et al., 2001; King, 2007; Ladson-Billings & Tate, 1992a, 1995a, 1995b; Lee, 2001; McKinley, 2010; Thompson, 2004; Villegas, 1991). These same findings revealed that racial issues continue to impact science learning for African Americans. Where many of the African American students that participated in this study were resilient and appeared to recover psychologically from their racist experiences with their teachers, other students do not. Thus, underachievement and the Black-White achievement gap persists.

Many initiatives have been proposed and passed into law to improve academic achievement of ALL students, with the latest No Child Left Behind (NCLB) Act (McREL, 2000; United Stated Department of Education, 2000, 2004). Similarly, programs have been implemented, some with improvement, others showing no improvement, while the Black-White achievement gap continues to widen. The student and teacher participants shared their thoughts about the teaching strategies that improved science learning at Success Middle School. The findings revealed that the seventh-grade science teachers at Success Middle School used teaching strategies incorporating reading as the basis to drive instruction because reading seemed to be the area that all students needed reinforcement, which reflects in the other content areas.

African American students across the United States are not receiving these same instructional experiences or the same quality of instructional experiences (Kozol, 1991, 2005; Rothstein, 2004). Effective teaching strategies, including classroom management, are important in student learning (Marzano, Marzano, & Pickering, 2009). While educators cannot control students' home life, they can control teaching and learning. All students learn differently

(Banks, 2006; Dewey, 1938; Gay, 2000; Vygotsky, 1978), therefore, the curriculum implemented in schools today must cater to the needs of different learning styles. The goal of my research was to determine what was taking place in seventh-grade regular and advanced classrooms of one Alabama middle school that showed continued success with African American students. The outcome of this research study revealed some positive findings using teaching strategies incorporating reading while revealing racial issues that persist and affect African American students. As a result, I present recommendations for practice.

Recommendations for Practice

The first recommendation for practice is *to adopt and continue developing curricula and/or programs that have proven positive results for all students for at least five years or until positive results are produced*. From my experience and the comments shared in the teacher individual interviews, schools adopt one program after another stressing the teachers with more tasks that do not work and stressing the students who try to keep up with the changes. When the curricula or program is changed year after year, there is no opportunity for improvement or development of practices that may not have implemented well. It takes at least two years to see the effectiveness of a curriculum or program because both teachers and students are adapting to the program Many school systems attend a conference or training where a new program is presented then try it, thus, changing the flow of operation immediately or the following year. Constantly changing academic programs overwhelms teachers and they are more susceptible to burn-out. When burn-out occurs, teachers feel unappreciated and unsupported, which causes teacher morale to diminish and creates a ripple effect on student morale (Thompson, 2004). A majority of the time, a curriculum or program does not yield positive results because the teachers did not receive the appropriate professional development for the curriculum or program. Giving academic programs a chance allows time for teachers implementing the academic program.

The second recommendation for practice is *to provide ongoing district professional development opportunities on reading strategies in the content area*. Reading is the number one subject in which underrepresented students score low on standardized scores (Lindsey et al., 2008; Thernstrom & Thernstrom, 2003; United States Department of Education, 2000). While rigor and critical thinking are important, neither can be accomplished if a student cannot read. It is taken for granted that each student should be able to read or comprehend what he or she reads

by the time they reach middle school. In schools where reading is an indicator of low achievement, reading should be incorporated in the teaching strategies of all subject areas (Allen, 2000; Tovani, 2000, 2004). Each activity assigned in the middle school science classroom should be focused on reading to reinforce the content because students cannot learn science effectively without the necessary reading skills. Better readers are developed when the necessary reading skills, such as phonemic awareness, phonics, vocabulary, fluency, and reading comprehension are reinforced (Allen, 2000; Robb, 2000; Tatum, 2005; Tovani, 2000, 2004).

The third recommendation for practice is *to monitor the effectiveness of professional development by requiring follow-up activities*. Educators receive session after session of professional development but rarely can or would implement the practices learned unless there is mandatory accountability, such as performance pay or job security. With any content standards taught, teachers should assess their students, whether informally or formally, to see if learning took place. In terms of accountability, this should be the same for teachers. With professional development opportunities provided, the teacher should be required to produce a follow-up activity, such as show a student sample where the skill was implemented. Otherwise, training is usually not implemented and becomes part of the professional development content in a binder on a shelf.

The fourth recommendation for practice is *to provide ongoing professional development on cultural competence and culturally responsive teaching.* There is not a step-by-step manual for being culturally proficient. This step begins with an inside-out process (Robins, Lindsey, Lindsey, & Terrell, 2006), where the individual is self-reflecting on his or her teaching philosophy, teaching experiences, and teaching as it deals with culture and diversity. Then, the individual must participate in professional development opportunities to educate him/herself about other cultures and culturally responsive teaching. In order to do this, all teachers must know what culturally responsive teaching is, what it looks like, and how to incorporate it in their classrooms and integrate it in the curriculum (Armento, 2001; Banks, 2009; Cartledge & Lo, 2006; Chartock, 2010; Davis, 2006; Diller & Moule, 2005; Gay, 2000; Hale, 2001; Irvine et al., 2001; King, 2007; Ladson-Billings & Tate, 1992a, 1995a, 1995b; Lee, 2001; McKinley, 2010; Thompson, 2004; Villegas, 1991). Professional development opportunities help educators learn about other cultures, their similarities and differences, and provide educators the opportunity to

learn how to incorporate an individual's background into curricula that is drawn from the ethnic groups' experiences.

The fifth recommendation for practice is *to provide ongoing administrative and instructional support to teachers and the classroom environment to ensure learning takes place*. Due to low funding, administrators spend considerable time dealing with administrative issues and discipline, which keeps them out of classrooms. If teacher morale is down, then student morale reflects that. Some teachers lose their passion and/or motivation when they feel like they are not appreciated or supported. If a situation is hindering the learning process, such as discipline, little or no professional development, and/or limited resources, then the main concern of the administrator should ensure these issues are addressed so they do not contribute to underachievement of any student or the school.

The sixth recommendation for practice is *for educators to identify, recognize, and address the racial inequalities in the classroom*. There are some practices in education that reflect the CRT tenet—Racism is Normal (Chapman, 2007; Delgado & Stefancic, 2001; Dixson & Rousseau, 2006; Gotanda, 2000; Ladson-Billings & Tate, 1995; Matsuda, Lawrence, Delgado, & Crenshaw, 1993; Solorzano, 1997; Tate, 1997; Taylor, 1998). To enhance academic improvement in any subject, teachers must first see the incidents of racial offenses, recognize them, and then address the issues. This involves educators critiquing themselves about how they teach, the curriculum they use, and the culture of the school (Fernandez-Bergensen, 2011; Ladson-Billings & Tate, 1995; Tate, 1997). This also involves educators self-reflecting and changing their views on how they view African Americans and their abilities, regardless of socioeconomic status (Vang, 2005). Many White teachers are not aware that they display this attitude because of White privilege. According to Howard's (2006), *We Can't Teach What We Don't Know,* many White teachers would like to address racial inequities in the classroom with teaching strategies but do not know how. One way of becoming familiar with the cultures and backgrounds of the students is to allow them to tell their stories or counterstories to gain insight about them and their learning styles (Chapman, 2007; Delgado & Stefancic, 2001; Dixson & Rousseau, 2006; Gotanda, 2000; Ladson-Billings & Tate, 1995; Matsuda, Lawrence, Delgado, & Crenshaw, 1993; Solorzano, 1997; Tate, 1997). These stories also help educators see experiences that they would not have ever encountered or understood without the shared experiences from the students, or through knowing their students better. They may reveal

strategies about how to avoid those occurrences in the future. If the teachers' concern is the lack of class time, then this can be accomplished by the use of science journals.

The seventh recommendation for practice is *for schools and school systems to reach out more to families and community organizations so they can be an instrumental voice in the academic process*. An ancient proverb states, "It takes a village to raise a child." Educators and stakeholders must involve parents, family members, church organizations, and community organizations (i.e., partners in education) to become mentors to students providing them with role models they can see and who are accessible to share their experiences and provide guidance (Banks, 2006; Diller & Moule, 2005; Hale, 2001; Thompson, 2004). These individuals and organizations serve as positive role models for the students, since parental involvement is a factor that educators cannot control. If educators begin to utilize the voices that underrepresented students respect, then positive results are highly likely. Students identify with these individuals because they are present in the students' lives. Many students state that professional athletes and actors are their role models, but students may never have the opportunity to meet or communicate with these individuals. Tangible mentors provide support and the necessary guidance to keep students on the right track in becoming productive citizens and model their behaviors.

The eighth recommendation for practice is *for educators to work towards eliminating racial oppression by eliminating acts of colorblindness and providing equal access to resources to move toward social transformation*. It is common for teachers to dismiss being racist by saying they do not see color when they teach or plan instruction. The findings in this research study support this. Identifying and recognizing differences in the classroom environment enhances the learning experience because it helps teachers understand their audience and plan effective teaching strategies to maximize the learning experience for people of color. Across the country, many people choose the location of their home by the academic standing of the school system or school in a particular area. It is widely known that the middle to upper-class areas have the best facilities, quality of teachers, resources, and quality of students (Kozol, 1991, 2005; Rothstein, 2004). The students that are classified as economically disadvantaged have access to fewer resources. How will the underachievement of students, specifically the Black-White achievement gap, close if these conditions exist?

The ninth recommendation for practice is for teacher educator programs *to prepare future teachers thoroughly by integrating a diverse curriculum in all classes where the instructor/facilitator models the behaviors that are expected of the future teachers*. Many new teachers gain employment in areas that are considered economically disadvantaged. These populations consist mainly of underrepresented people. Most of the teachers in the schools today are White (Qureshi, 2012). Future teachers need to be more knowledgeable about the students they will service and the issues that may arise in the classroom environment, so they can plan to educate all students. This can be achieved by recruiting and retaining more qualified instructors from underrepresented populations into teacher education programs. The teacher education program also should require future educators take classes on equality or current trends in education (Qureshi, 2012). One course on multicultural education is not sufficient. Before a teacher education program can implement a diverse curriculum effectively, the faculty must receive professional development so they can become culturally proficient to advise and teach future teachers and leaders throughout the entirety of their preparation program.

The tenth recommendation for practice is *to initiate an extended learning program afterschool until six o'clock in the evenings where students' afterschool care could be utilized as a place where the child does his or her homework and a place where his or her academic skills are enhanced*. The program should provide a snack because some students lack the nutrition needed in order for the child's mind and body to function properly (Rothstein, 2004). Homework assistance is provided for approximately one hour. After homework is complete, the students should experience different learning opportunities in math, reading, science, social studies, and technology throughout the week. Based on the number of participants, the students are divided among the staff and select the activity centers that reflect their area where improvement is needed. For example, a child may find fractions, fluency in reading, nomenclature in science, and maps in social studies challenging. The parent(s)/guardian(s), along with teachers' recommendations, choose a center that addresses the child's needs and identify the child's preferences. Based on the selections and number of students, the centers are assigned and students follow that schedule for the semester with the option to change the next semester. This provides extra support to students for their skills that benefit from more experience. This extended-day program would enhance their academic skills and abilities and social skills while providing childcare while their parent(s)/guardian(s) are at work.

Further, this program should embed character education traits during the last hour of the extended day program when instructional activities cease and free-play is in session until the parents, guardians, or bus transportation pick up the child. A different character trait can be addressed and demonstrated each week or month. To ensure all students participated or had equal access to participate, the sponsoring organization should seek funding to cover the cost for supplies and charge a minimal fee with scholarship opportunities for those that qualify for free-reduced priced meals.

The eleventh and final recommendation for practice is *for schools and/or school districts to continue funding initiatives put in place to increase student academic performance instead of discontinuing these efforts immediately after results are achieved*. Why discontinue funding a program that has proven to impact student results positively? In many school districts, officials reduce or withhold funding the following year after academic improvement. This sets up the faculty/staff for failure because they cannot continue the same practices with limited or no resources. For example, if additional funding was used for security in an unsafe school due to violence, then why eliminate security that was obtained with funding if positive results are displayed? If the funding is withdrawn too soon, the school loses that security measure, which would cause the students to go back to doing the same things that caused a need for security.

All of my recommendations for practice were developed in that teachers should know and understand how to meet the needs of all of their students. Whether it is content knowledge or method of teaching the content, both should address the auditory, visual, and kinesthetic learner. There is a need to recognize individualities within the classroom to draw on those experiences; however, educators must be willing to step outside of themselves and learn about cultures other than their own. To become culturally responsive and close the Black-White Achievement gap, it is necessary that educators find a way to draw the parents, community, and stakeholders into the learning experience. By taking the time to delve deeper into understanding how to teach the whole child, it is necessary to recognize the need to eliminate racial oppression. I realize no one can change a person, but by storytelling-counterstorytelling, maybe we, as educators, can start by eliminating colorblindness and providing equal access to resources and a quality educational experience. All stakeholders (e.g., parents, students, politicians, church organizations, non-profit organizations, community organizations, college teacher education programs) play a part in closing the Black-White academic achievement gap.

Recommendations for Future Research

There is a growing trend in research on the Black-White achievement gap, underachievement in content areas, culturally responsive teaching, and Critical Race Theory in education (Armento, 2001; Banks, 2009; Cartledge & Lo, 2006; Chapman, 2007; Chartock, 2010; Davis, 2006; Delgado & Stefancic, 2001; Diller & Moule, 2005; Dixson & Rousseau, 2006; Gay, 2000; Gotanda, 2006; Hale, 2001; Irvine et al., 2001; King, 2007; Ladson-Billings & Tate, 1992a, 1995a, 1995b; Lee, 2001; Matsuda, Lawrence, Delgado, & Crenshaw, 1993; McKinley, 2010; Solorzano, 1997; Thompson, 2004; Villegas, 1991); however, not enough research is applied in the educational system to cause lasting change in educational practices. The goal of my research was to investigate teaching strategies that impact African American students' science learning positively and the extent those teaching strategies reflect culturally responsive teaching. These recommendations may be instrumental in encouraging a more culturally relevant educational experience for all students. Nevertheless, I propose five recommendations for future research.

The first recommendation is *to conduct more educational research on the Black-White achievement gap in science and the teaching strategies that impact achievement using mixed-methods.* This research study is a qualitative study on the teaching strategies that are utilized by two seventh-grade science teachers and the extent to which those strategies reflect culturally responsive teaching. If I would have done a mixed-method case study, the qualitative portion of my research would have described what the teaching strategies implemented and the extent to which they reflected culturally responsive teaching, while the quantitative portion of my research would have informed readers if the strategies implemented had or did not have a significant difference on science learning for all students, with an emphasis on African American students. There is a need for researchers and readers to know what the statistics show, why the issue exists, and what can be done to correct the concerns. In the schools that I have worked in Alabama, Florida, Georgia, Kansas, and Texas, the schools possessed the data and disseminated it to the teachers, but many teachers did not understand the data or how to use it to drive the instructional process. There were many times the data were not explained and they became an artifact in a notebook with no meaning. There are academic coaches and district employees to help teachers understand school data and model what is expected in the classroom but I have not

yet seen these individuals in the classroom, department meeting, or teacher in-services personally.

Quantitative research permits readers to understand what the numerical data means, and qualitative research provides readers with detailed descriptions of the data to help interpret what the numerical data is presenting (Gay, Mills, & Airasian, 2009). For example, quantitative research explains the Black-White achievement gap in numerical terms, whereas qualitative research gives context to that same information in words and experiences. It is time that funding and time quit being wasted on initiatives that appear to be a good idea instead of listening to the voices that are affected providing stakeholders with the ingredients to success. What works for one population in one setting may not always work in another setting. A familiar quote by Albert Einstein (n.d.) states, "We can't solve problems by using the same kind of thinking we used when we created them."

The second recommendation for future research is *to replicate this study in a high performing middle school with at least a 40% African American student population, with one regular seventh-grade White teacher, one regular seventh-grade African American teacher, one advanced seventh-grade White teacher, and one advanced seventh-grade African American teacher.* This will inform stakeholders of education if there are any differences in teaching and learning from teachers of different ethnic backgrounds. This also would allow all stakeholders of education to see if culturally responsive teaching is being implemented in each classroom and the impact that it has on science learning.

The third recommendation for future research is *to replicate this study in regular and advanced science classes in all the low and high socioeconomic school districts within the state.* This will allow all stakeholders of education to compare the science data from all the high and low socioeconomic school districts within the state to see if learning is taking place in science and what teaching strategies were implemented across the districts and state. Low and high socioeconomic school districts then may identify and analyze the teaching strategies that are effective and are not effective in producing science achievement. The teaching strategies identified as effective can be compared to my research and the effective teaching strategies can be replicated in schools of similar populations to produce more African American academic student achievement and hopefully, success for all students. I note similar populations because what works with one population may not work with another—context is important; I believe this

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has been a problem in today's schools. Once effective culturally responsive teaching strategies are identified, then professional development should be provided for all teachers, not just new teachers, to introduce or enhance the teachers' knowledge of these teaching strategies and their effects on their teaching skills and abilities.

The fourth recommendation for future research is *to replicate this study in regular and advanced classes of low and high socioeconomic school districts and across the state in other content areas.* This would allow all stakeholders in education to see what is taking place in other disciplines within low and high socioeconomic schools of one school district and across low and high socioeconomic school districts of the state. The stakeholders of education will also be able to determine if all the low and high socioeconomic schools are teaching the appropriate content, adjusting the curriculum to meet the needs of their students, receiving a different quality of educational experience as it relates to the resources available (e.g., facilities, curricula, supplies, funds), and the extent to which culturally responsive teaching is or is not present.

The fifth and final recommendation for future research is *to extend this research with other ethnic groups (e.g., Hispanics, Whites, Asians, Native Americans) in science and other content areas to see the impact that best teaching strategies incorporated with culturally responsive teaching have on student learning*. This research focused specifically on African American students in seventh-grade science classrooms of Success Middle School. This recommendation calls for this same study to be conducted focusing on other ethnic groups. The researcher would conduct classroom observations and student interviews, which would allow the researcher to compare the results from each ethnic group to see the extent of science learning and implementation of culturally responsive teaching. These results also would identify the teaching strategies that are effective, are not effective, or have no effect at all on student learning among each ethnic group. The teaching strategies identified as effective can be analyzed to see the extent they reflect culturally responsive teaching.

Final Thoughts

Best teaching strategies, such as lecture-discussion, hands-on activities, cooperative learning, and reading strategies are not new (Allen, 2000, 2004; Dewey, 1938; Grumbine & Alden, 2006; Hale, 2001; McREL, 2000, 2001; Thompson, 2004; Tovani, 2000, 2004). Culturally responsive teaching is not a new concept. Culturally responsive teaching is an

internalized behavior and part of a philosophy that educators incorporate to draw on students' experiences to ensure all students are learning (Armento, 2001; Banks, 2009; Cartledge & Lo, 2006; Chartock, 2010; Davis, 2006; Diller & Moule, 2005; Gay, 2000; Hale, 2001; Irvine et al., 2001; King, 2007; Ladson-Billings & Tate, 1992a, 1995a, 1995b; Lee, 2001; McKinley, 2010; Thompson, 2004; Villegas, 1991). All students learn differently and we as educators must ensure that we address each student's learning style (Dewey, 1938; Grumbine & Alden, 2006; Hale, 2001; McREL, 2000, 2001; Thompson, 2004). Culturally responsive teaching involves complementing school culture and students' cultures thereby integrating the students' culture to help understand and conceptualize content and structure and organize social interactions (Ladson-Billings, 1994). This means that educators use the same teaching strategies that teachers have been using for years (e.g., reading strategies, hands-on activities, lecture-discussion, cooperative learning) drawing on the "knowledge of student cultures and modalities to select and apply strategies and resources for instruction, while engaging in self-reflection" (Wisniewski et al., 2012, p. 3).

The attention to culturally responsive teaching generates from racial inequalities in the educational system. Much of this attention is revealed through Critical Race theorists, who argue that racism persists as an issue in today's society and specifically in education (Dixson & Rousseau, 2006; Ladson-Billings & Tate, 1995; Tate, 1997). While there have been attempts to resolve African Americans' access to an equal education (e.g., Civil Rights Act of 1964, 13th Amendment, 14th Amendment, integration, Affirmative Action, Goals 2000; No Child Left Behind Act), inequality still exists and underrepresented populations, African Americans in particular, remain enslaved by teaching strategies being implemented in the schools. Although Critical Race Theory is the framework through which I analyzed my research, the lens brings more in-depth understanding of what is taking place in educational systems with a commitment to social justice (Chapman, 2007). White educators will never understand other ethnic groups until they understand their cultures and their experiences. Consequently, this presents an obstacle for reaching and teaching all students. Critical Race Theory as a lens for understanding phenomenon and critical issues in education, as well as implementing culturally responsive teaching strategies with best teaching strategies, "challenges [educators] to look for the many strengths within students and communities of color in order to combat and eliminate negative racial stereotypes" (Solorzano & Yosso, 2001b, p. 7).

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The passion behind my research is not to bring racial inequalities to the forefront but to work towards eliminating the Black-White achievement gap. I have read the history, experienced the history, and my parents and I have worked hard to overcome the challenges of history but the Black-White achievement gap still exists, even with me, a highly intelligent African American with an undergraduate and graduate degree working towards her terminal degree—Doctor of Philosophy (Ph.D.) in Education. As a teacher in the public school system for over ten years and a part-time faculty member at the college level since 2004, I recognize that the Black-White achievement gap continues to widen. Many initiatives have been made but the results remain the same or continue to worsen. I chose an average school setting with a diverse population that was meeting or exceeding state content standards on standardized assessment because this composition presents a scenario that is more diverse and more likely to present socioeconomic challenges.

This research is important because the findings may assist other educators or educational systems in developing positive results that impact all students in seventh-grade science. From the three research questions, seven themes emerged:

Research Question One: What do teachers think about the teaching strategies they employ to teach African American students?

> (a) The participating teachers based their research-based teaching strategies used in the classroom on all of the students' learning styles, abilities, attitudes towards science, and motivational levels about learning science, with no emphasis on the African American student population.

> (b) The participating teachers taught the state content standards simultaneously using the same instructional model daily, incorporating other content areas when possible.

Research Question Two: What do African American students think about the teaching strategies that are used by their science teachers to impact their science learning?

> (c) The participating African American students believed their seventh-grade science teachers used a variety of teaching strategies to ensure science learning took place, that science learning was fun, and that science learning was engaging.

> (d) The participating African American students genuinely liked their teacher.

> (e) The participating African American students revealed high self-efficacy.

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(f) African American student participants' parents value education and moved to Success Middle School district for better educational opportunities.

Research Question Three: To what extent do seventh-grade teachers' teaching strategies reflect culturally responsive teaching?

(g) Teachers were not familiar with the term "culturally responsive teaching," but there was evidence that several aspects of it were present in the seventh-grade science classroom environment.

The most difficult concepts of this research and application to another school or school system is recognizing the need for cultural competence of all teachers and a culturally relevant curriculum. There is not a formula or prescription for culturally responsive teaching; it is about getting to know students and ensuring that every child's unique characteristics and culture is integrated holistically. Until these concepts are embraced, the Black-White achievement gap will persist. Once these concepts are realized and acknowledged, dedicated and focused effort must be put forth in professional development of educators and in teacher preparation programs in becoming culturally competent and implementing a culturally relevant curriculum. This means seeing the need for drawing on a student's background and experiences for each student to learn for understanding (Armento, 2001; Banks, 2009; Cartledge & Lo, 2006; Chartock, 2010; Davis, 2006; Diller & Moule, 2005; Gay, 2000; Hale, 2001; Irvine et al., 2001; King, 2007; Ladson-Billings & Tate, 1992a, 1995a, 1995b; Lee, 2001; McKinley, 2010; Thompson, 2004; Villegas, 1991.

I conclude this chapter with a poem to explain my oppressed journey in education and the education profession, as well as a way to represent the beginning of my new journey towards social justice, eliminating the Black-White achievement gap and racial inequities in education.

Our Deepest Fear

Our deepest fear is not that we are inadequate. Our deepest fear is that we are powerful beyond measure. It is our light, not our darkness that most frightens us. We ask ourselves, Who am I to be brilliant, gorgeous, talented, fabulous? Actually, who are you not to be? You are a child of God. Your playing small does not serve the world. There is nothing enlightened about shrinking so that other people won't feel insecure around you. We are all meant to shine, as children do. We were born to make manifest the glory of God that is within us. It's not just in some of us; it's in everyone. And as we let our own light shine,

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we unconsciously give other people permission to do the same. As we are liberated from our own fear, our presence automatically liberates others .

<div align="right">(Williamson, 1992, pp. 190-191)</div>

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Appendix A—Teaching Strategy Analysis Chart

School Pseudonym _____ **Level: Regular/Advanced Date: _____ Time:_____**

Teacher (Pseudonym): _____Topic/Concept:_____

Class Activity	CRT	NON-CRT	Classroom Observations	Researcher's Notes/Comments

CRT: Culturally Responsive Teaching

Appendix B—Interview Materials

B-1 Individual Interview Protocol

Prior to Individual Interview

Prior to the individual interviews, the participants will be briefed and informed through a letter of consent about:

1. The purpose of the research
   a. To see what is taking place in seventh-grade science classrooms to provide a context to address the theories proposed to explain the underachievement of African Americans and expand the teaching strategies used to improve African American achievement in science.
2. The procedures of the research
   a. Observe seventh-grade classroom
   b. Interview participants individually at research site twice
      i. Individual Teacher Interviews (Appendices B-2 and B-3)
      ii. Individual Student Interviews (Appendices B-4 and B-5)
   c. Member checks: Participants will have the opportunity to review transcripts and make modifications to ensure participants' individual interviews represent what they stated and meant to say.
3. The risks, if any, and benefits of the research
   a. Risk
      i. None to participants
   b. Benefits of research
   c. Opportunity to possibly expand the teaching strategies used to improve African American achievement in science.
      i. Opportunity to unblock the barriers that educators have about the notion that all children can learn.
      ii. Provide a context to address the theories proposed to explain the underachievement of African Americans.
      iii. Contribution to the body of knowledge on the implications that culture can have on science achievement.
4. The voluntary decision to withdraw from the research at any time

5. The procedures used to identify and protect confidentiality

    a. Pseudonyms will be provided to preserve confidentiality.

An opportunity will be provided for the research participants to ask questions and/or express their concerns. After all questions and/or concerns have been addressed, the researcher and participants will then sign two copies of the consent form so the participant can keep one and the researcher can have one on file. A copy of the questions that will be asked during the individual interview will be provided in advance so the teacher and student participants will have a chance to prepare thought-provoking responses. The student and teacher participants will be provided another copy of the interview questions for reference during the individual interview.

Conclusion of Each Individual Interview

At the conclusion of the individual interview, the researcher will:

1. Thank the participant

2. After each individual interview in a private place:

    a. Record reflective thoughts

    b. Journal in methodological log

3. Check with participants to discuss the progress of the research study

B-2 Individual Teacher Interview Questionnaire 1

Begin Time of Interview: _____   **Ending Time of Interview:** _____

Date_____   **Subject/Unit**_____

Pseudonym of Site:_____

Interviewee Pseudonym:_____

Individual Interview 1

1. Background Information: Please introduce yourself, as well as, provide me with a preference for a pseudonym for this research.

   Probing question if desired information not received: Educational level (B.S., M.S., or Ph.D.), teacher education program (if applicable), years of experience, and type of settings taught (inner-city, magnet setting, charter, etc.)?

2. What is it like to be a middle school science teacher?

   When you decided to become a teacher, did you intend to become a middle school teacher?

3. Do you believe your academic/content coursework in college adequately prepared you for your middle school science classes and the subject area(s) you currently teach?

   Did your college/university have a specialized middle-school level teacher preparation program available at the time you attended?

   If so, please describe. If not, how did you become certified to teach middle school?

4. What teaching strategies do you use in your seventh-grade science class?

   What teaching strategies do you believe have a positive impact on African American student science learning?

5. What areas of seventh-grade science do you see as a challenge for African Americans?

6. What forms of assessment have you used that have been most effective with African American students?

7. What professional development opportunities are or have been available to support teaching seventh-grade science?

a. Have you attended any professional development opportunities for teaching culturally and linguistically diverse populations?

    i. If so, please describe.

    ii. If not, would it be helpful? Why or why not?

8. What characteristics do you believe is important to possess or develop in order to be an effective middle school science teacher?

9. Do you have the resources you need to teach seventh-grade science effectively?

    a. If so, please describe them.

    b. If not, please describe the resources you need.

10. What kind of support is in place for you to teach seventh-grade science?

    a. Does it help or hinder you in becoming more effective as a teacher?

    b. What kind of support do you need to teach seventh-grade science effectively?

B-3 Individual Teacher Interview Questionnaire 2

Begin Time of Interview: _____ **Ending Time of Interview:** _____

Date_____ **Subject/Unit**_____

Pseudonym of Site:_____

Interviewee Pseudonym:_____

Individual Interview 2

1. Based on the performance of African American students on formal assessments, what teaching strategies do you think had a positive influence on their science learning?

2. Based on the performance of African American students on formal, what teaching strategies do you think had a negative influence or no influence at all on their science learning?

3. What do you see as the "disconnect" between the performance of seventh-grade science of African American students in comparison to other ethnic groups in the classroom, if you believe that there is one?

4. What do you think or see is needed to better assist you in closing and/or eliminating the Black-White learning gap in your seventh-grade science class?

5. Please share any other comments that you would like to share to better assist me with my research study on improving science learning of African American students?

B-4 Individual Student Interview Questionnaire 1

Begin Time of Interview: _____   **Ending Time of Interview:** _____

Date_____   **Subject/Unit**_____

Pseudonym of Site:_____

Interviewee Pseudonym:_____

Individual Interview 1:

1. Background Information: Will you please introduce yourself, as well as, provide me with a preference for a pseudonym or "make-believe name" for this research?

2. Tell me about your middle school.

   a.   What activities do you have here?

   b.   In what activities do you participate?

   c.   Are any of your teachers the coaches or club coordinators of these activities?

3. Tell me what it is like to be a middle school student here.

4. What is your favorite subject in school? Why?

5. What do you like the most about science? Why?

6. What do you like the least about science? Why?

7. How do you feel you learn best (learning style)? Why?

8. What is the most comfortable way for you to demonstrate your learning (projects, paper-and-pencil tests, group work, oral exams, other)?

9. Do you participate in any informal science activities (science clubs, out-door recreation activities, frequent visits to science centers – museums, disco zones, science television shows)?

   a. If so, what are they?

   b. If not, would you like to? Why or why not?

10. How interested are you in attending college and majoring in a science-related field or seeking employment in a science-related field upon high-school graduation?

B-5 Individual Student Interview Questionnaire 2

Begin Time of Interview: _____   **Ending Time of Interview:** _____

Date_____   **Subject/Unit**_____

Pseudonym of Site:_____

Interviewee Pseudonym:_____

Individual Interview 2:

1. What teaching strategies does your teacher use that match your preferred way of learning? What does your teacher do to help you learn difficult content?

2. What adjectives would you use to describe your teacher? What adjectives do you think your teacher would use to describe you?

3. Are middle school teachers different from elementary school teachers? How?
   a. Which level of teachers was more effective in helping you learn?
   b. What makes them more effective ("better")? Please give some examples?

4. Science interest: Since you are interested in science, what can your teacher and/or school do to better support your interest?
   Science Non-Interest: Since you are not interested in science, what could your teacher and/or school do to increase your interest?

5. How do you view your science learning in comparison to your peers?

6. What advice would you give a middle school teacher who wanted to improve as a teacher?

7. Please share any other comments that you would like to share to better assist me with my research study on improving science learning of African American students?

Appendix C—IRB Documents

C-1 IRB Approval Form

KANSAS STATE
U N I V E R S I T Y | University Research Compliance Office

TO: Kay Ann Taylor   Proposal Number: 6070
          Curriculum & Instruction
          211 Bluemont

FROM: Rick Scheidt, Chair
          Committee on Research Involving Human Subjects

DATE: December 19, 2011

RE: Approval of Proposal Entitled, " What is taking place in science classrooms? A case study analysis of teaching and learning in seventh-grade science of one Alabama School and the impact on African American Student learning.."

The Committee on Research Involving Human Subjects has reviewed your proposal and has granted full approval. This proposal is **approved for <u>one year</u> from the date of this correspondence, pending "continuing review."**

APPROVAL DATE: December 26, 2011

EXPIRATION DATE: December 26, 2012

Several months prior to the expiration date listed, the IRB will solicit information from you for federally mandated **"continuing review" of the research**. Based on the review, the IRB may approve the activity for another year. **If continuing IRB approval is <u>not</u> granted, or the IRB fails to perform the continuing review before the expiration date noted above, the project will expire and the activity involving human subjects must be terminated on that date. Consequently, it is critical that you are responsive to the IRB request for information for continuing review if you want your project to continue.**

In giving its approval, the Committee has determined that:

☒   There is no more than minimal risk to the subjects.
☐   There is greater than minimal risk to the subjects.

This approval applies only to the proposal currently on file as written. Any change or modification affecting human subjects must be approved by the IRB prior to implementation. All approved proposals are subject to continuing review at least annually, which may include the examination of records connected with the project. Announced post-approval monitoring may be performed during the course of this approval period by URCO staff. Injuries, unanticipated problems or adverse events involving risk to subjects or to others must be reported immediately to the Chair of the IRB and / or the URCO.

203 Fairchild Hall Lower Mezzanine, Manhattan, KS 66506-1103 | (785) 532-3224 | fax: (785) 532-3278 | k-state.edu/research/comply

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C-2 Teacher Informed Consent Form

PROJECT TITLE: WHAT IS TAKING PLACE IN SCIENCE CLASSROOMS? A CASE STUDY ANALYSIS OF TEACHING AND LEARNING IN SEVENTH-GRADE SCIENCE OF ONE ALABAMA SCHOOL AND THE IMPACT ON AFRICAN AMERICAN STUDENT LEARNING

PRINCIPAL INVESTIGATOR: Dr. Kay Ann Taylor
CO-INVESTIGATOR: Lashaunda R. Norman, lrnorman@ksu.edu

CONTACT NAME AND PHONE FOR ANY PROBLEMS/QUESTIONS: Dr. Kay Ann Taylor, 228 Bluemont Hall, Manhattan, KS. 66506, 785-532-6974, ktaylor@ksu.edu

IRB CHAIR CONTACT/PHONE INFORMATION: Dr. Rick Scheidt, IRB Committee Chair 783-532-1483, rscheidt@ksu.edu

PURPOSE OF THE RESEARCH: To investigate teaching strategies that impact science learning of seventh-grade African American students.

PROCEDURES OR METHODS TO BE USED: The researcher will observe a total of two seventh-grade classrooms (one regular and one advanced seventh-grade science) in one average performing Alabama school for four to six weeks. This four to six week period is estimated as the time it would take to complete a seventh-grade science unit. The researcher will observe each selected classroom daily. Field notes will be recorded and an observation instrument will be used to observe the teaching strategies utilized in the seventh-grade science classrooms. The two seventh-grade science teacher participants will be identified by the school's department chairperson/administration and the selected teachers will be asked to recommend three to six African American students from each class observed. Two teacher and student semi-structured individual interviews will be conducted with the teacher individual interviews estimated at 45 minutes to one hour and student individual interviews estimated at least 30 minutes. The teacher and student individual interviews will not be audio-taped, as requested. Interview protocol and interview questions will be provided to the participants in advance.

LENGTH OF STUDY: January 2012 – May 2012

There are no anticipated risks from this study. No intervention is to be implemented. This case study involves observations by the researcher and individual interviews with the participants.

TERMS OF PARTICIPATION: I understand this project is research, and that my participation is completely voluntary. I also understand that I may withdraw my consent at any time and stop participating at any time without explanation, penalty, loss of benefits, or academic standing to which I may otherwise be entitled. I understand there are no anticipated risks for participating in this research. I verify that my signature below indicates that I have read and understand this consent form, willingly agree to participate in this study under the terms described, and acknowledges that I will receive a signed and dated copy of this consent form.

Name of Participant:_____

Signature of Participant _____Date_____

C-3 Parent Information Letter

Dear Parent(s),

My name is Lashaunda Norman, a doctoral student in Education at Kansas State University that is conducting research for my dissertation at _____ in _____ classroom on seventh-grade science teaching strategies that improve science learning. I am an Alabama certified science teacher and administrator that has worked in the education profession for the past thirteen years. My dissertation is titled: *What Is Taking Place in Science Classrooms? A Case Study Analysis of Teaching and Learning in Seventh-Grade Science of One Alabama School and the Impact on African American Student Learning.* The purpose of this research is to explore teaching strategies that improve science learning, with a focus on African American students, as an attempt to assist with closing the achievement gap in science. I will be observing teaching strategies and student-teacher interactions in _____ classroom over a period of four to six weeks (January – February 2012); however, I will be more than happy to assist in the classroom upon the teacher's request.

My study calls for two semi-structured individual interviews with students to seek their views on teaching strategies that impact their learning experience. Semi-structured interviews are interviews where a set of open-ended questions are prepared to guide the interview, but opportunities may be presented for the participant to be more descriptive. Your child has been recommended by _____ to participate. The individual interview questions will be provided to your child in advance and each individual interview is estimated at least 30 minutes. The individual interviews will not be audio-taped, and they will not interrupt the daily learning process. There are no anticipated risks to your child's participation in this study and is at no cost to you or your family. Your child's name, school's name, and school's location will not be revealed in the dissertation. This information will also not be revealed if, in the future, a journal publication or conference presentation is given over what is learned from this study.

This letter comes to request your permission to allow your child, _____, to participate in two semi-structured individual interviews with me. Your child's participation is completely voluntary. If you give consent for your child to be individually interviewed, you may withdraw your consent at any time without explanation, penalty, or loss of academic standing your child may otherwise be entitled. Your signature on the attached consent form indicates that you have read and understand it, willingly agree for your child to participate in this study under the terms described, and acknowledges that you will receive a signed and dated copy of the parent and student consent form.

In order for these two semi-structured individual interviews to begin, I am requesting that you and your child sign the attached Parent and Student Informed Consent and return it by your child to me in the enclosed envelope. If you have any questions at any time during this project, please do not hesitate to contact me at (334) 657-8242 or lrnorman@ksu.edu. You also may contact Dr. Kay Ann Taylor, my committee chairperson, at 785-532-6974 or ktaylor@ksu.edu. Additionally, if you have further questions about your child's participation in this study, you may contact Dr. Rick Scheidt, the Committee Chair of Research Involving Human Subjects, at (785) 532-1483 or 1 Fairchild Hall, Kansas State University, Manhattan, KS 66506. Thank you so much for considering your child's participation in my dissertation research. I look forward to spending time in your child's seventh-grade science classroom!

Sincerely,

Lashaunda Norman, Ph.D. Candidate
Kansas State University

C-4 Student Information Letter

Dear_____,

My name is Lashaunda Norman, a doctoral student in Education at Kansas State University that is conducting research for my dissertation at _____ in _____ classroom on seventh-grade science teaching strategies that improve science learning. I am an Alabama certified science teacher and administrator that has worked in the education profession for the past thirteen years. My dissertation is titled: *What Is Taking Place in Science Classrooms? A Case Study Analysis of Teaching and Learning in Seventh-Grade Science of One Alabama School and the Impact on African American Student Learning*. The purpose of this research is to explore teaching strategies that improve science learning, with a focus on African American students, as an attempt to assist with closing the achievement gap in science. I will be observing teaching strategies and student-teacher interactions in your class over a period of four to six weeks (January – February 2012); however, I will be more than happy to assist in the classroom upon your teacher's request.

My study calls for two semi-structured individual interviews with students to seek their views on teaching strategies that impact their learning experience. Semi-structured interviews are individual interviews where a set of open-ended questions are prepared to guide the individual interview, but opportunities may be presented for the participant to be more descriptive. You have been recommended by _____ to participate. The individual interview questions will be provided to you in advance and each individual interview is estimated at least 30 minutes. The individual interviews will not be audio-taped, and they will not interrupt the daily learning process. There are no anticipated risks to your participation in this study and is at no cost to you or your family. Your name, school's name, and school's location will not be revealed in the dissertation. This information will also not be revealed if, in the future, a journal publication or conference presentation is given over what is learned from this study.

This letter comes to request your permission to participate in two semi-structured individual interviews with me. Your participation is completely voluntary. If you give consent to be individually interviewed, you may withdraw your consent at any time without explanation, penalty, or loss of academic standing you may otherwise be entitled. Your signature on the attached consent form indicates that you have read and understand it, willingly agree to participate in this study under the terms described, and acknowledges that you will receive a signed and dated copy of the parent and student consent form.

In order for these two semi-structured individual interviews to begin, I am requesting that you and your parent sign the attached Parent and Student Informed Consent and you return it to me in the enclosed envelope. If you have any questions at any time during this project, please do not hesitate to contact me at (334) 657-8242 or lrnorman@ksu.edu. You also may contact Dr. Kay Ann Taylor, my committee chairperson, at 785-532-6974 or ktaylor@ksu.edu. Additionally, if you have further questions about your child's participation in this study, you may contact Dr. Rick Scheidt, the Committee Chair of Research Involving Human Subjects, at (785) 532-1483 or 1 Fairchild Hall, Kansas State University, Manhattan, KS 66506.

Thank you so much for considering your participation in my dissertation research. I look forward to spending time in your seventh-grade science classroom!

Sincerely,

Lashaunda Norman, Ph.D. Candidate
Kansas State University

C-5 Parent and Student Informed Consent Form

I have read the letter from Mrs. Lashaunda Norman and understand her doctoral research, *What Is Taking Place in Science Classrooms? A Case Study Analysis of Teaching and Learning in Seventh-Grade Science of One Alabama School and the Impact on African American Student Learning,* will be investigating the teaching strategies utilized in seventh-grade science classrooms to improve science learning, with a focus on African American students, as an attempt to assist in closing the achievement gap in science.

I understand that my child/I, _____, will participate in two semi-structured individual interviews with Mrs. Norman for at least 30 minutes throughout the observation period. I understand that the individual interview questions will be provided in advance and these individual interviews will not interrupt the daily learning process or be audio-taped. I understand that consent for my child/my participation in these two semi-structured individual interviews with Mrs. Norman is for her dissertation towards the completion of a Doctor of Philosophy (Ph.D.) in Education.

It is my understanding that there are no anticipated risks from this study. If, in the future, a journal publication or conference presentation is given over what is learned from this study, it is my understanding that my child's/my name, school name, and school's location will not be revealed. I understand that consent for my child/my participation is completely voluntary. I also understand that if I consent participation in this study, I may withdraw my consent at any time without explanation, penalty, or loss of academic standing to which my child/I may otherwise be entitled. I verify that my signature below indicates that I have read and understand this consent form, willingly agree to participate in this study under the terms described, and acknowledges that I will receive a signed and dated copy of this parent and student consent form.

If I have any questions or concerns, I may contact Lashaunda Norman at (334) 657-8242 or lrnorman@ksu.edu. I also may contact Dr. Kay Ann Taylor, the committee chairperson, at 785-532-6974 or ktaylor@ksu.edu. Additionally, if I have further questions about participation in this project, I may contact Dr. Rick Scheidt, the Committee Chair of Research Involving Human Subjects, at (785) 532-1483 or 1 Fairchild Hall, Kansas State University, Manhattan, KS 66506.

Printed Name of Student_____

Signature of Student _____ Date_____

Printed Name of Parent _____

Signature of Parent _____ Date_____

PLEASE SEAL AND RETURN THIS FORM IN THE ENVELOPE PROVIDED

C-6 Copyright Permission Email

K-State Webmail

FWD: Request for Permission to Use ASCD Work by Dr. Johnnie McKinley in my Dissertation – L. Norman (Thread: 936714)

----- Forwarded Message -----
From: "Permissions" <permissions@ascd.org>
To: "Lashaunda Norman" <lrnorman@k-state.edu>
Sent: Friday, September 16, 2011 6:08:15 PM
Subject: Re: Request for Permission to Use ASCD Work by Dr. Johnnie McKinley in my Dissertation - L. Norman (Thread: 936714)

Good evening Lashaunda,

Happy Friday to you and thank you for taking the time to contact me today.

In response to your request below, **ASCD is pleased to grant you permission** to include passages from Raising Black Students' Achievement Through Culturally Responsive Teaching, by Johnnie McKinley, in your forthcoming dissertation. Please include a proper reference or citations with the excerpts.

If you wish to publish your work for commercial purposes, you are required to contact us again to secure additional rights to do so.

Thank you for your interest in ASCD publications and best of luck with your dissertation!

Best regards,

Matt

Matthew Mayer
ASCD
Rights & Permissions Project Coordinator
www.ascd.org

-----Original Message-----
From: Lashaunda Norman
Sent: Friday, September 16, 2011 4:26 PM
To: Permissions (permissions@ascd.org)
Cc: lrnorman@k-state.edu
Subject: Request for Permission to Use ASCD Work by Dr. Johnnie McKinley in my Dissertation - L. Norman (Thread:936714)

Dear ASCD's Rights and Permissions Unit,

I am a doctoral student at Kansas State University, and I am emailing to **request permission to adapt and use, without charge, the form specified below for use as an observation tool and as a teacher survey in my dissertation**:

"Raising Black Students' Achievement Through Culturally Responsive Teaching" by Johnnie McKinley, Copyright 2010
FORM: Appendix A - Assessment of Effective and Culturally Responsive Strategies (AECRS) Form, pages 133-142.

The reason I would like to adapt this form is because it is so comprehensive that is may become overwhelming for me to complete while I observe classrooms and teachers to self-assess with their limited availability every time. My dissertation is titled, *What Is Taking Place in Science Classrooms? A Case Study Analysis of Teaching and Learning in Seventh-Grade Science of One Alabama School and the Impact on African American Student Learning*.

I emailed and spoke with Dr. Johnnie McKinley, the author of the text, and she granted permission (see forwarded email below) and informed me of who I needed to contact from ASCD for official permission. Proper acknowledgment of the title of the book, author, copyright date, ASCD, and ASCD's location will be provided. Will you please supply a statement granting me permission to adapt and use the form in my dissertation? You can mail or email the permission to:

Lashaunda Norman, PhD Candidate
Kansas State University
College of Education
Curriculum & Instruction Department

--------- Forwarded message ----------
From: Johnnie McKinley
Date: Wed, Feb 2, 2011 at 4:50 AM
Subject: Re: Colleague Interested in Your Research - Please Read and Respond!
To: LASHAUNDA NORMAN

Lashaunda,

Your research sounds most exciting. In fact, a colleague with whom I taught classroom based assessment at the University of Washington for the past 10 years is writing a book on effective assessment of science learning.

As for the use of the tools within my new book, I would gladly grant permission to use the forms. I will need to contact ASCD, the publisher, and find out the requirements around

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permission for portions of the book.

I so look forward to talking with you,

--
Johnnie McKinley, MA ABS, Ed.D.

On Mon, Jan 31, 2011 at 4:19 PM, LASHAUNDA NORMAN wrote:

Hello Dr. McKinley,

I teach Biology for UOP-Online. I was conducting some research for my literature review and came across your research and your book: Raising Black Students' Achievement Through Culturally Responsive Teaching. I am a PhD student at Kansas State University majoring in Education - Curriculum & Instruction.

My research interest is Increasing Student Achievement of African Americans in Science. I plan to do an all qualitative study versus a mixed-method study. My research calls for me to have a checklist of culturally responsive practices as an observation tool. I have ordered your book and wanted to know if the AECRS forms and/or Walk-through Feedback Forms would be effective to use. If so, will you PLEASE grant me permission to use your form(s) as an observation instrument for my research? There were other observation instruments I have come across; however, your book was most recent and appeared to be all encompassing.

I would love to talk with you concerning your research. Nevertheless, permission to use forms and any other information you can assist me with will be highly appreciated. I can be reached at 334-657-8242 or lrnorman@ksu.edu. Thank you for your time. I look forward to your response.
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Lashaunda Norman, M.Ed.
University of Phoenix, Faculty

Appendix D—Pre-and-Post-Test Seventh-Grade Science Results

To reveal the amount of science learning that took place for almost all the students, a pre-and-post-tests were administered over the content. The participating teachers administered the pre-and-post-tests to all students in the regular and advanced seventh-grade classes that were observed. Both teachers informed their students that the pre-and-post tests would not count for a grade and are given only to provide an ideal of the areas that need more focus. She asked them not to stress over the assignment and told them to do the best that they could. She explained that there was no penalty for guessing.

In regular seventh-grade science, pre-and-post tests were administered to all students on Plants and Animals and another on Skeletal and Muscular Systems. In advanced seventh-grade science, pre-and-post tests were administered to all students on Plants and another on Animals. The tables below present the pre-and-post test results of all participating African American seventh-grade students and their pre-and-post-test averages.

Regular 7th Grade Students' Name	Animal & Plant Pre-Test	Animal & Plant Post-Test	Skeletal & Muscular Pre-Test	Skeletal & Muscular Post-test	Pre-and-Post-Test Average
Ashley	64	101	46	67	84
Mekka	73	97	50	63	80
Bubbles	55	97	42	70	84
Chris	18	49	15	26	38
Alexis	45	92	27	63	78
Tiana	55	72	50	78	75
Tra'Von	55	70	46	78	74
Advanced 7th Grade Students' Name	Plant Pre-Test	Plant Post-Test	Animal Pre-Test	Plant Pre-Test	Pre-and-Post-Test Average
Marie	71	100	75	94	97
Tyrell	57	72	32	68	70
Elizabeth	14	68	16	81	75