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## A Systematic Review of Research on Successful African American Students in Mathematics: Implications for Seminole High School

Trung Vong  
*University of Central Florida*



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A SYSTEMATIC REVIEW OF RESEARCH ON SUCCESSFUL AFRICAN AMERICAN  
STUDENTS IN MATHEMATICS: IMPLICATIONS FOR SEMINOLE HIGH SCHOOL

by

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B.A. University of Florida, 1998  
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A dissertation in practice submitted in partial fulfillment of the requirements  
for the degree of Doctor of Education  
in the College of Education and Human Performance  
at the University of Central Florida  
Orlando, Florida

Summer Term  
2014

Major Professor: David N. Boote

## **ABSTRACT**

The purpose of this study was to synthesize the counter-narratives of mathematically successful African American students. The gap in educational achievement between African American and White students is well documented in the United States, especially in mathematics education. Although Florida Comprehensive Assessment Test scores have increased for both groups at Seminole High School, the gap has remained over 30% for nearly a decade. Most research on this topic has focused on the reasons why African American students fail to achieve. Various individual, social, and organizational factors have been suggested. However, a growing body of research has highlighted the stories of mathematically successful African American students.

Using best evidence review methods, an exhaustive review of the literature identified 22 research articles published between 2004 and 2013. All studies collected interview data with mathematically successful African American middle school, high school, and higher education students in the United States. Meta-synthesis was used to synthesize findings across studies. Among the 151 participants across 22 studies, six common experiences were identified as contributing to students' mathematical success: supportive teachers, supportive family, supportive peers, a strong mathematics identity, ability to deal with racial stereotype, and supportive organizations. Most importantly, this meta-synthesis highlights the tendency of prior research to focus on de-contextualized factors rather than understanding students holistically within their broader social and community environment. Insights from this study lead to several recommendations for improving mathematics education for African American students at Seminole High School and for suggested future research on this topic.

## ACKNOWLEDGMENTS

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## **LIST OF ACRONYMS AND ABBREVIATIONS**

EOC	End Of Course
ESEA	Elementary and Secondary Education Act
FCAT	Florida Comprehensive Achievement Test
NCLB	No Child Left Behind
RTTT	Race To The Top
SHS	Seminole High School

## INTRODUCTION

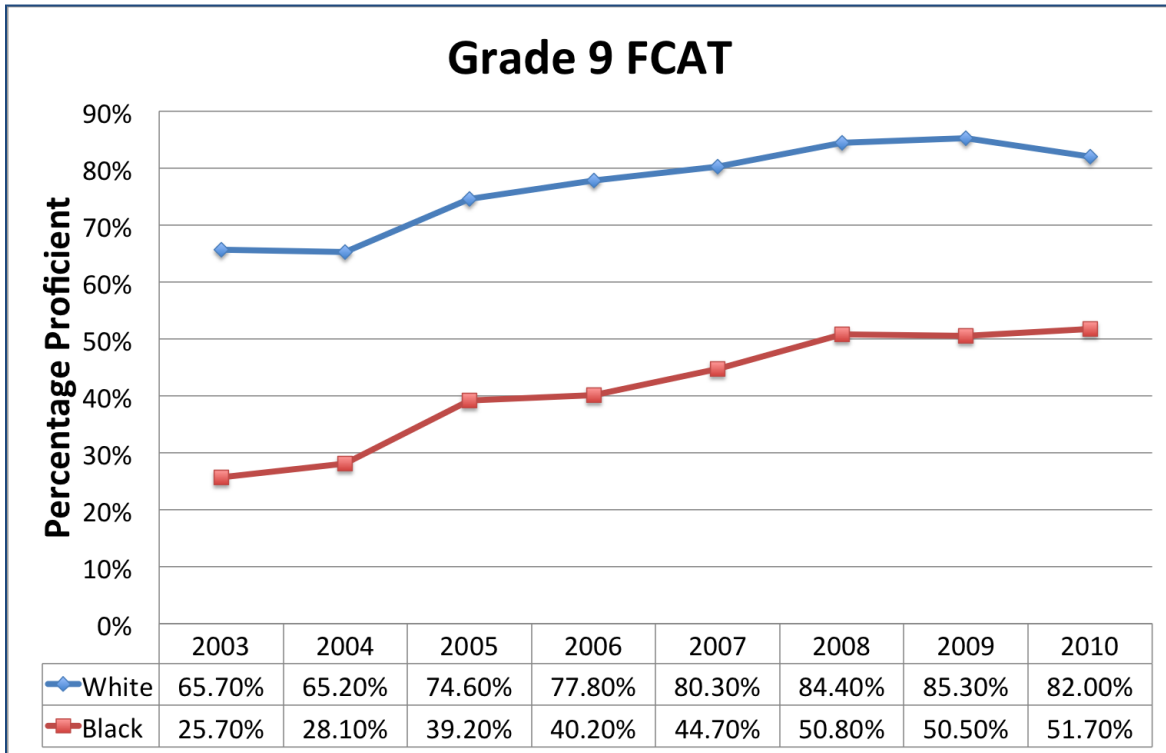


Figure 1 – FCAT 9 Math Data for SHS

Data Source: Florida Department of Education

### Problem of Practice

Figure 1 displays the FCAT Math results for ninth-grade students at Seminole High School. The good news is that there has been improvement. Both line graphs show growth in the eight years of data. A higher percentage of students passed the FCAT math test in 2010 as compared to 2003. The percentage of Black students who passed more than doubled in the eight-year span. The bad news is there has been a consistently large gap between Black and White students. Both line graphs show a nearly parallel progression through the eight years. Figure 2

shows a similar disparity in the FCAT Math data for tenth graders at Seminole High School.

(Note: The terms “Black” and “White” are used in order to be consistent with categories often reported on standardized assessments.)

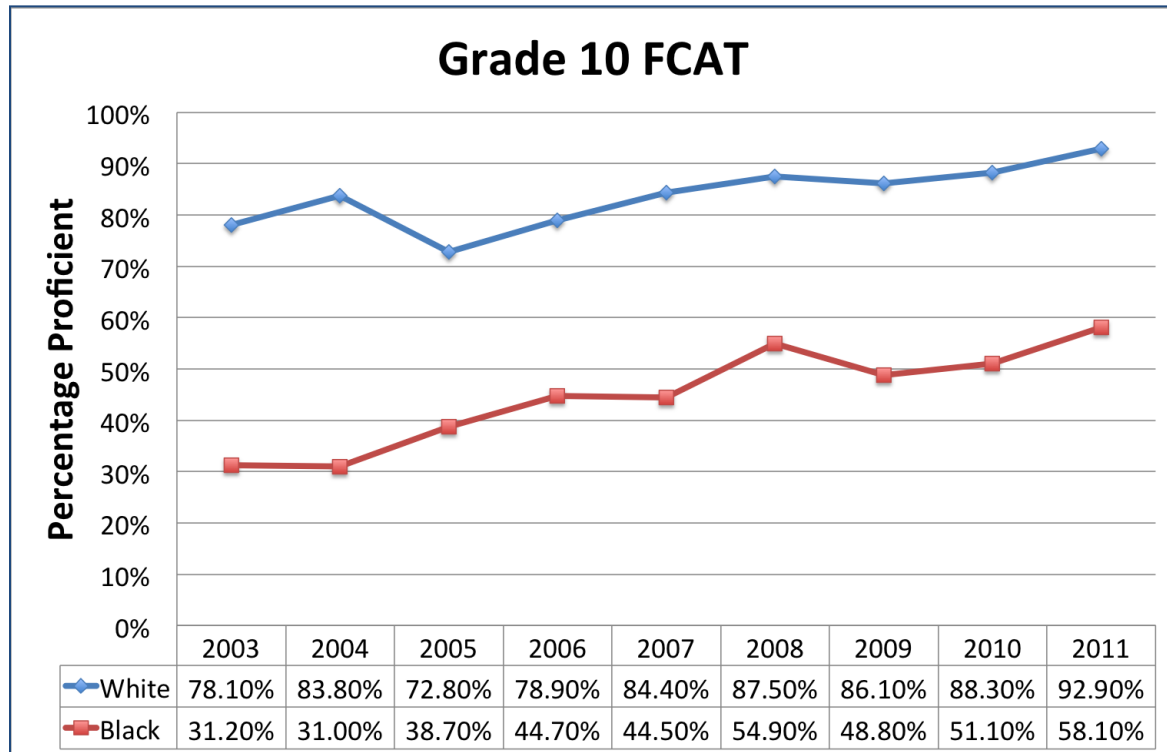


Figure 2 – FCAT 10 Math Data for SHS

Data Source: Florida Department of Education

The problem of practice addressed in this dissertation was the achievement gap between Black and White students at Seminole High School on mathematics assessments. The Florida Comprehensive Achievement Test was used to measure the gap in this study, though the gap likely appears in other assessments. FCAT was established as a valid and reliable measure of mathematics proficiency by the Florida Department of Education, (Florida Department of Education, 2006). This is a problem because all students should be achieving at the same level

regardless of race or ethnicity. Legislation and initiatives such as No Child Left Behind (Pub. L. No. 107-110, 2002) have set goals of 100% proficiency for all students.

This achievement gap has far-reaching effects. This problem affects the students directly. The exam scores are tied to graduation requirements. The problem affects teachers, administrators, the school, and the school district. The student test scores are used in part to evaluate the performance all of these stakeholders. For teachers and administrators, the evaluations are tied to salary increases and bonuses. These assessment results also affect funding for schools and districts. High performing and improving schools are rewarded through additional monies from the state.

### Organizational Context

Established in 1902, Seminole High School was the first high school in Seminole County. The school is located in Sanford, a suburban city outside Orlando, Florida. In addition to a traditional high school program, Seminole High School houses two magnet programs, the International Baccalaureate Program and the Academy of Health Careers. Though most students live in Sanford, the magnet programs draw students from the entire county.

The school population numbers about 3000 students. The racial breakdown includes about 44% White students, 23% Black or African American students, 19% Hispanic or Latino students, 9% Asian students, and 5% other. This is compared to the city's racial breakdown of 45% White, 30% Black or African American, 20% Hispanic or Latino, 3% Asian, and 3% other. About 44% of students are registered for the Free and Reduced Lunch Program.

Seminole High School was a primarily White school, with some other ethnicities such as Hispanic and Asian until 1970. At that time, Seminole County was desegregated as a result of

legal action by the US Department of Justice. The school district fell under five consent decrees as it worked to eliminate all vestiges of segregation in its schools. Seminole High School was awarded the International Baccalaureate Program in 1999 in order to address one of the consent decrees. The district achieved Unitary Status in 2006 when it demonstrated in Federal court that it had dismantled all remnants of the dual school system.

Bolman & Deal (2008) describe the structural frame as a hierarchy of responsibilities within an organization. They also introduce Mintzberg's five-sector model which best describes the structure at Seminole High School. The principal is the head of the organization. The leadership team consists of six assistant principals, two deans, a registrar, a testing coordinator, and the head of the guidance department. The six assistant principals supervise the subject-matter departments and oversee various aspects of the school. Four out of the twelve members of the administrative team are Black. The rest are White. About 158 teachers round out the faculty at Seminole High School. The math department consists of 25 teachers with two serving as co-department chairs. Most of the teachers are white, three are African American, two are Asian, and one is Hispanic.

## BACKGROUND

### Local History

Tables 1 and 2 show the history of the achievement gap at Seminole High School on FCAT Math for ninth and tenth grade students. Table 1 shows a historical achievement gap of about 35.6% in the proficiency of Black students as compared to White students. Table 2 shows an average gap of about 38.9%. The tables show different numbers of years because the Florida Department of Education started phasing out FCAT Math, beginning with the 2011 cohort. FCAT was replaced by subject-specific end-of-course exams. The most recent data was excluded because the exams were being developed and field-tested.

Table 1 – Percentage of Students Proficient on FCAT 9 Math

Note: All data are percentages.

<b>FCAT 9</b>	<i>2003</i>	<i>2004</i>	<i>2005</i>	<i>2006</i>	<i>2007</i>	<i>2008</i>	<i>2009</i>	<i>2010</i>	<b>Avg</b>
<b>White</b>	65.7	65.2	74.6	77.8	80.3	84.4	85.3	82.0	<b>76.9</b>
<b>Black</b>	25.7	28.1	39.2	40.2	44.7	50.8	50.5	51.7	<b>41.4</b>
<b>Difference</b>	40.0	37.1	35.4	37.6	35.6	33.6	34.8	30.3	<b>35.6</b>

Data Source: Florida Department of Education

Table 2 – Percentage of Students Proficient on FCAT 10 Math

Note: All data are percentages.

<b>FCAT 10</b>	<i>2003</i>	<i>2004</i>	<i>2005</i>	<i>2006</i>	<i>2007</i>	<i>2008</i>	<i>2009</i>	<i>2010</i>	<i>2011</i>	<b>Avg</b>
<b>White</b>	78.1	83.8	72.8	78.9	84.4	87.5	86.1	88.3	92.9	<b>83.6</b>
<b>Black</b>	31.2	31.0	38.7	44.7	44.5	54.9	48.8	51.1	58.1	<b>44.8</b>
<b>Difference</b>	46.9	52.8	34.1	34.2	39.9	32.6	37.3	37.2	34.8	<b>38.9</b>

Data Source: Florida Department of Education

During the past nine years, two men have served as principal of Seminole High School: Dr. Walt Griffin from 2004 to 2007 and Mr. Mike Gaudreau from 2007 to 2013. Mr. Gaudreau also served as assistant principal over the math department from 2000 to 2007. Dr. Griffin and Mr. Gaudreau were interviewed to determine the history of the problem at the local level. Neither man focused on the Black/White achievement gap specifically. Most efforts were targeted at improving overall FCAT Math scores as well as increasing the learning gains of the lowest quartile and improving graduation rates of at-risk students.

Dr. Griffin approached the problem from two different organizational viewpoints. From a Structural viewpoint, he worked with feeder elementary and middle schools to develop strong mathematics programs. He specifically selected the Springboard Curriculum written by College Board based on its data and research results. Dr. Griffin worked with middle schools to actively recruit minority subgroups for their pre-International Baccalaureate programs. In addition, Owens and Valesky (2007) discuss the ideas of building human capital and Human Resources as assets. Dr. Griffin believed that no program could be successful without highly qualified teachers. He made it a priority to hire teachers who fit specific needs within the math department. He actively promoted professional development by sending teachers to Advanced Placement and International Baccalaureate trainings.

Mr. Gaudreau approached the problem from several individual viewpoints. The Ladies of Seminole and the Men of Excellence were two student clubs primarily consisting of African American students. The goal of the clubs was to promote positive behavior among the members. The school offered one-on-one mentoring and large-group assemblies to address motivation among the at-risk population. Mr. Gaudreau won the 21<sup>st</sup> Century Grant to fund an after-school

program. The program was open to all students, but the target population was Black males. With a cognitive and motivational aim, the program offered food and recreational activities that were tied to time spent in tutoring. The Transition Program allowed students who did not pass the eighth grade to enter high school. Students in the program attended remediation classes in math, reading, science, and life management skills during summer school. Upon successful completion of the program, students earned a high school credit.

The efforts of both former principals reached many of the outcomes that they intended to address. FCAT math scores increased. At-risk graduation rates improved. The lower quartile made sufficient learning gains. Seminole High School even earned its first school grade of A for the 2007-2008 school year. However, as shown above, the achievement gap always remained above 30%.

### National History

The U.S. national history of the Black/White achievement gap begins with Reconstruction. Banks (2004) summarized the history of Black education from the post-Civil War era to the effects of the Brown v. Board of Education (1954) case. Three models of education - Liberal Classical, Industrial, and Black Self-Reliance - carried African American learners to the middle of the twentieth century. Desegregation caused interpersonal, institutional, and community effects and opened the door for comparison of educational inequalities.

The discussion of the Black/White achievement gap must begin with an examination of data, assessment, and accountability in the United States. Following Desegregation, the Civil Rights Movement of the 1960s brought to light racial inequalities in many areas including education. The Elementary and Secondary Education Act of 1965 (Pub. L. No. 89-10, 1965)



sought to close the achievement gap between children from low-income homes and children from middle-income homes. One provision of ESEA, Title 1, provided opportunities for all children by funding schools and districts with high rates of poverty. The federal government enacted Improving America's Schools Act of 1994 (Pub. L. No. 103-382, 1994). In revising ESEA, the act added mathematics and language arts standards. Those standards were to be used to assess student learning in general and provide accountability of schools receiving federal funding. No Child Left Behind, or NCLB, (Pub. L. No. 107-110, 2002) added an emphasis on proving achievement through delineated assessment data for subgroups, such as White, Black, and Hispanic. It added provisions to penalize schools that did not meet annual progress. NCLB led to the development of state assessments such as the FCAT in Florida in the early 2000s. NCLB set a deadline of 2014 for all students to achieve proficiency on state assessments.

The federal legislation described above provided the impetus for defining and studying the Black/White achievement gap. The achievement gap has been well documented (Strutchens et al., 2004; U.S. Department of Education, 2003; Education Commission of States, 2005). The gap narrowed in the 1970's and 1980's only to widen again in the 1990s (Lee, 2002). Strutchens et al. (2004) found gaps of over 30% for eighth graders on the National Assessment of Educational Progress. The achievement gap remained even after accounting for Socio-Economic Status (Lubienski, 2002).

Within the large body of research examining the achievement gap, the problem has been conceptualized as an individual problem. Researchers sought to determine reasons why Black students failed to succeed in academics. Osborne (1999) summarized three motivational/behavioral ideas: Steele's Stereotype Threat Model, Ogbu's Cultural-Ecological Perspective, and

Majors and Billson's Cool Pose Theory. Steele's Theory of Stereotype Threat (Steele, 1997) describes students who identify with a subgroup that is negatively stereotyped. African American students would avoid activities for fear that their personal failure would confirm the negative general stereotype of low academic achievement. Ogbu's Cultural-Ecological Perspective (Ogbu, 1997) separates minorities into two groups. Latin and Asian Americans comprise the voluntary minority group that views education as a path to success. African and Native Americans comprise the non-voluntary group that views education as a system controlled by the majority group that oppressed their ancestors. Members of the latter group see academic success in opposition to their cultural identity – "acting White." Ogbu conceptualized coping strategies used by involuntary minorities such as Uncle Tomming, collective struggle, hustling, camouflaging, and emulating Whites (Foster, 2004). Majors and Billson's Cool Pose Theory (Majors & Billson, 1992) identifies coping strategies used by African American males to deal with low self-confidence and academic failure. Students put up a façade of indifference that leads to anti-school behaviors.

Research on motivation, though not specifically focused on African American students, can be applied when viewing the problem from an individual level. Rueda (2011) described the motivational dimension of improving student performance. A student's belief in his competence influences motivation and affects achievement (Schunk & Pajares, 2005). An individual's attributions and control beliefs on success and failure affect motivation (Wiener, 2005). Values given to a particular task, such as importance value, enjoyment value, usefulness value, and cost value, affect motivation (Wigfield & Eccles, 2002). Motivation is affected by the nature of goals,

such as their specificity and difficulty, (Locke & Latham, 2002) and the approach to achieving goals, such as mastery and performance, (Pintrich, 2003).

The problem has also been conceptualized as an organizational problem. Cultural mismatch has contributed to the gap (Au, 1980; Delpit, 1995; Foster, 1996; Brice-Heath, 1983; Irvine, 2003; Lee, 2004). Curriculum and schools were discussed as sources of the gap (Banks, 2004; Gay, 2004; Grant, 2003; Apple, 1990; Cornbleth & Waugh, 1995; Popkewitz, 1998). Research has focused on the pedagogical practices of teachers as relating to the gap (Sleeter, 2001; Cochran-Smith, 2004; Zeichner, 2002; Lasdon-Billings, 1994). Stinson (2006) reviewed literature pertaining to three areas: 1) The consequences of racism and discrimination, 2) Strategies for racism and discrimination, and 3) Achievement of African Americans despite racism and discrimination. Black students experience peer discrimination, which is related to lower academic achievement (Chavous, et. al., 2008). Thomas and Stevenson (2009) argued that negative teacher perception and disproportionately large percentage discipline referrals for African American students lead to lower academic performance.

Most of the previous research either focused on the gap itself or on the factors that hampered Black students. The approach to the problem shifted in the late 2000s. Gutierrez (2008) argued against the fad of “gap gazing” without a focus on mathematics achievement. Stinson (2006) called for a move toward a discourse of achievement of African Americans. Jett (2011) summarized qualitative research that studied individual students to describe their experiences in high achievement in mathematics. This more recent literature was the focus of my dissertation.

### Causes and Factors

The first row of Table 3 presents stakeholders that are related to the achievement gap at Seminole High School. The second row displays theoretical models that affect the stakeholders. The third row lists possible causes that result from the theories. The table is based on my experiences and observations as a teacher and math coach at Seminole High School and as a member of various committees for the school district. The research described earlier primarily points to teacher- and student-related causes of the problem.

Table 3 – Stakeholders in the Achievement Gap at SHS

	<u>FLDOE / SCPS</u>	<u>Administration</u>	<u>Teachers</u>	<u>Students</u>	<u>Parents</u>
<b>Theoretical Context</b>	<ul style="list-style-type: none"> <li>•Assessment &amp; Accountability</li> <li>•Organizational</li> <li>•Leadership</li> </ul>	<ul style="list-style-type: none"> <li>•Organizational</li> <li>•Leadership</li> </ul>	<ul style="list-style-type: none"> <li>•Organizational</li> <li>•Teaching, Learning, &amp; Assessment</li> <li>•Motivation</li> </ul>	<ul style="list-style-type: none"> <li>•Teaching, Learning, &amp; Assessment</li> <li>•Motivation</li> </ul>	<ul style="list-style-type: none"> <li>•Motivation</li> </ul>
<b>Possible Causes</b>	<ul style="list-style-type: none"> <li>•NCLB, RTTT</li> <li>•FCAT, EOC Exams</li> <li>•Political</li> <li>• Superintendent</li> </ul>	<ul style="list-style-type: none"> <li>•Structural</li> <li>•Human Resource</li> <li>•New Principal</li> </ul>	<ul style="list-style-type: none"> <li>•Curriculum &amp; Instruction</li> <li>•Human Resources</li> <li>•Performance Pay</li> </ul>	<ul style="list-style-type: none"> <li>•Curriculum &amp; Instruction</li> <li>•Peer pressure</li> <li>•Math Anxiety</li> </ul>	<ul style="list-style-type: none"> <li>•Cultural background</li> </ul>

### Research Question

The problem of the Black/White mathematics achievement gap was analyzed in various ways in the literature. This nationwide phenomenon was manifest at Seminole High School as well. Some researchers developed theories explaining the failure of African American students at an individual level. Other researchers related the achievement gap to various external variables.

This scholarship and my prior experience led to the many possible causes and factors presented in Table 3. However, no clear solution to the problem was evident in the published literature. This led me to change my approach to this complex problem of practice from development of a treatment to reviewing more research.

A promising shift in the research turned from a mainstream focus on the failures of Black students in mathematics to a focus on the counter-narratives of mathematically successful African American students. In order to move toward a more informed treatment of the achievement gap at Seminole High School, I decided to review and analyze the literature in order to answer the following research question:

What experiences have been previously reported in qualitative research studies as contributing to the development of mathematically successful African American students?

The findings of this review and analysis would be used to provide similar experiences to the students at Seminole High School. These experiences could help students be more successful in mathematics.

## **METHODS**

### Introduction

The purpose of this study was to determine the experiences that influenced mathematically successful African American students. As described earlier, a call was made to present counter-narratives that would depart from the mainstream notion of underachievement and failure (Stinson, 2006). Several authors answered this call by describing the experiences of successful Black students (Jett, 2011; McGee & Martin, 2011b; Nzuki, 2010; Stinson, 2008). This study was significant in that it synthesized the existing literature.

In this section, I will first describe the rationale behind using a systematic literature review and meta-synthesis. Next, the theoretical framework supporting the literature review will be outlined. I will then describe the selection criteria based on best-evidence synthesis and the search strategies used to find studies. Finally, the summary of the sample and the analysis process will be presented.

### Rationale

Systematic literature reviews are important in the development of educational policies and programs (Gough & Elbourne, 2002; Oakley, 2003). Such systematic reviews of research studies allow summary of a body of knowledge that is more powerful and useful than any of the individual studies on their own (Davies, 2000; Evans & Benefield, 2001). Conducting an original study would not produce the power of the combined voices of a systematic review. For this reason, I chose a systematic literature review as the instrument to collect studies that focus on mathematics achievement among successful African American students. Qualitative studies that

involve interviews such as ethnographies, phenomenologies, and case studies can vary greatly in sample size (Baker & Edwards, 2012; Sandelowski, 1995). Many of the counter-narrative studies included relatively small sample sizes because of the atypical nature of the participants in these studies.

Meta-synthesis is a process of combining topically similar qualitative studies into a single narrative with the purpose of developing a general theory to explain a phenomenon (Estabrooks et al., 1994; Jensen & Allen, 1996; Sandelowski et al., 1997; Walsh & Downe, 2005) Therefore, I decided to conduct a meta-synthesis was conducted to analyze the common experiences for major trends and themes that would be applicable to the situation at SHS.

### Approach

Davies, Wolfe, & Holmes (2002) presented an organizational framework for describing systematic literature reviews in education. They defined four broad categories that must be chosen to define the scope of the systematic review: educational intervention, target group, educational outcome, and research methodology. Educational interventions comprise the various treatments that can be administered in a school setting such as class size, classroom management, and problem-based learning. Target groups describe the object of the interventions such as gender, religion, emotional needs, and physical needs. Educational outcomes are the results of the treatment such as increased test scores and skill acquisition. Research methodologies explain the techniques used in the studies. The following table displays the specific subcategories that were the focus of this systematic review.

Table 4 – Literature Review Framework

<b>Literature Review Framework</b>	
<i>Category</i>	<i>Sub-Category</i>
Educational Intervention	Mathematics Learning
Target Group	African American Learners
Educational Outcome	Mathematics Success
Research Methodologies	Case Study, Ethnography, Phenomenology

Cooper (1998) described a taxonomy that delineates six characteristics of literature reviews: focus, goal, perspective, coverage, organization, and audience. Focus, goal, and coverage describe the approach of the literature review. Perspective, organization, and audience relate to the review’s presentation.

The focus defines the area of research that will be searched such as findings, methods, theories, and practices/ applications. For this study, I chose to focus on the research findings related to the description of African American students who have been successful in mathematics. The goal describes what is to be done with the research. Most literature reviews seek to integrate research by way of summarizing studies, comparing different works, or connecting them. Other reviews may intend to critique existing literature or to identify central issues. The goal of this study was to integrate and summate the literature into several general statements describing the experiences of successful Black students. The coverage of a literature review defines the number and kinds of works searched for and included. Exhaustive reviews find and present all relevant studies. Some exhaustive reviews only present a purposive subset of



entire population of works. Representative and pivotal literature reviews search for and present only a selected set of important studies. The coverage of my literature review was exhaustive. I found and analyzed all available studies based on a predetermined set of criteria.

Perspective represents the viewpoint of the reviewer. A literature review can take either a neutral or positional viewpoint. My viewpoint on this review was neutral because I was seeking to discover salient factors of student achievement without imposing my viewpoint on the studies being reviewed. Literature reviews can be organized based on chronology, conceptual commonalities, or methodological ties. The organization that I used was conceptual in that the studies were analyzed based on common themes and concepts. Finally, the intended audience for a literature review may be specialists in the field, general scholars, practitioners and policymakers, or the general public. From the beginning, my intended audience was practitioners and policymakers. I hoped that teachers and administrators could use the results to improve student learning.

Table 5 – Literature Review Taxonomy

<b>Literature Review Taxonomy</b>	
<i>Characteristic</i>	<i>Specific Choice</i>
Focus	Research Findings
Goal	Integration and Summation
Coverage	Exhaustive
Perspective	Neutral
Organization	Conceptual
Audience	Practitioners and Policymakers

### Selection Criteria

Meta-syntheses of qualitative studies often suffer from difficulty establishing adequate selection criteria (Davies, 2000). In order to address this issue, I adapted a process from best-evidence synthesis (Slavin, 1986). Best-evidence synthesis suggests that selection criteria be developed before conducting the literature search in order to reduce the reviewer's bias during the process. Selection criteria are a set of attributes used to determine if a study should be included or excluded from the literature review. The selection criteria are also used to guide the search process. The development of the criteria should follow three guiding principles: relevance to the topic, methodologies that reduce bias, and value placed on applicability or usefulness. To that end, I developed the following inclusion and exclusion criteria.

1. *Relevance*. In addition to high school students, I included studies involving middle school students and university students. University students could give insights on their high school experiences. Middle school students often share the same experiences as high school students in terms of the level of mathematics and the environment of public schools. I decided to exclude studies of elementary and pre-school students as they differ too greatly in terms of intellectual development and level of mathematics. Hispanic students are also studied with regard to achievement gap. I decided to include studies that involved Hispanic students as long as African American students comprised at least 50% of the sample. I included studies that selected participants based on mathematics success based on grades, exam scores, and teacher recommendations. I included only studies conducted in the English language within the United States. The history and causes of the achievement gap are unique to America.

2. *Methodology*. Slavin (1986) developed best-evidence synthesis in order to address weaknesses in meta-analyses of quantitative research. He was concerned about the bias in meta-analysis in favor of experimental and quasi-experimental research because a lot of important issues in education cannot be studied experimentally. Meta-syntheses of qualitative studies, like this present study, do not usually involve such experimental issues. It was important, however, to make decisions about what constitutes good quality research so I addressed the issue of methodology. Seidman (2006) described the purpose and process of interviewing as a qualitative research instrument. The purpose of interviewing is to tell the story of the subject. Interviewing is a way to give context and meaning to behavior. Since I was interested in the subjective meaning that African American students give to their experiences with mathematics, interviewing was the most appropriate method. I decided to include studies where interviews were the primary method of data collection without regard for the methodology that guided the study. An important methodological issue in qualitative research is that of data triangulation. Data triangulation is the collection and use of information from different gathering techniques to validate a finding (Begley, 1996; Fenech-Adami & Kiger, 2005; Guion et al., 2011). This data triangulation may take the form of using grades, test scores, and teacher recommendations to determine success in mathematics. In addition to interview, a researcher could use observation, documentation, autobiography, and member check to verify results.

I decided to exclude dissertations from this study. Though dissertations often include very detailed methods and rationales, a small committee of experts usually reviews them. In contrast, professional journals are first officially reviewed by panel of field experts and then unofficially reviewed and critiqued by the readership. Also, many dissertations are subsequently

published as journal articles. In meta-analysis the choice to focus exclusively on journal articles raises concerns about “publication bias.” That is, in quantitative research journals are often biased in favor of publishing studies that yielded statistically significant results. In meta-analysis, publication bias can lead to lead to biased results. However, there is no suggestion that publication bias can affect meta-synthesis.

3. *Usefulness.* I limited the timeframe of studies that were published from 2003 to 2014. This twelve-year span follows the implementation of assessment and accountability brought on by NCLB. This timeframe also ensures that the topic would be well covered within the research. It would also allow for the most current research. NCLB led to so many changes in public education teaching, curriculum, and assessment that it may be difficult to compare research conducted before and after the implementation of NCLB.

The table below summarizes the inclusion and exclusion criteria used in the selection of research studies.

Table 6 – Inclusion / Exclusion Criteria for Literature Search

	<b>Inclusion Criteria</b>	<b>Exclusion Criteria</b>
<i>Sample</i>	<p>Middle school students</p> <p>High school students</p> <p>University students</p> <p>≥ 50% African American participants</p>	<p>Elementary school students</p> <p>Pre-school students</p>
<i>Method</i>	<p>Interview methodology</p> <p>Peer-reviewed journals</p>	<p>Dissertations</p>
<i>Research Focus</i>	<p>Mathematics success</p>	
<i>Relevance</i>	<p>English language</p> <p>United States</p>	
<i>Time frame</i>	<p>2003-2014</p>	

### Search Strategies

After establishing the inclusion/exclusion criteria, I conducted search for literature reviews and syntheses related to my topic within the past decade using the University of Central Florida Library website's search tool as well as the Google Scholar webpage. This search revealed one literature review (Berry & Thunder, 2012) relating to my topic of interest. My study differed from Berry & Thunder's study in several ways. Firstly, the two studies differed in purpose. The Berry & Thunder study sought to describe students' location- and time-based experiences and to describe the development of math identities. The purpose of my study was to determine factors that contributed to the success of African American students in mathematics. Secondly, the two studies differed in selection criteria. Theirs included samples from K-12 whereas mine included samples from middle school through university. My literature review focused on only successful Black students, while theirs did not. Berry & Thunder's study used research that interviewed parents, whereas my literature review focused exclusively on student interviews. Another difference was time frame. My research included five works produced after their 2012 publication date. The differences in the purpose and the literature reviewed were great enough to justify the continuation of my study.

Next, I conducted an initial search using the University of Central Florida, or UCF, Library website's OneSearch tool with the following search string: "African American" AND mathematics AND success. I then consulted with the subject-area librarian with expertise in database search methods. Additionally, I conducted searches through the following databases: Web of Science, Science Direct, ERIC-EBSCOhost, JSTOR, Springer LINK, and Ethnic NewsWatch.

I applied the predetermined selection criteria while reading study titles and abstracts. I then conducted a hand-search by reading through the literature review sections of the most recent studies in order to find any additional studies. Next, I conducted a reverse citation search. Using Google Scholar, I entered some of the older studies to determine studies that cited them. Finally, I contacted two of the major authors in this area. I sent them a list of the researchers that I had found and asked them to review the list for any missing authors. One author responded with short affirmative note. The other author sent me a list research studies. My final list included some more recent studies that were missing from his. Based on these procedures, I was confident that I had found an exhaustive list of research studies.

### Sample

The search produced 22 studies that were published from 2004 to 2013. The figure below illustrates the number of studies published each year. A total of 151 students were included. Three studies interviewed middle school students, eight interviewed high school students, one interviewed both high school and university students, and the remaining ten studies interviewed university students. Thirteen of the studies interviewed male students only, three interviewed female students only, and six interviewed both males and females. Most of the studies interviewed twelve or fewer students. Two studies (Berry et al., 2011; McGee & Martin, 2011b) interviewed 23 students each. One study (Nzuki, 2010) involved both successful and unsuccessful students, but only the findings for the two successful students were included in this study. One study (Walker, 2006) included Black and Latino students. I reported only the findings

for the Black students in the study.

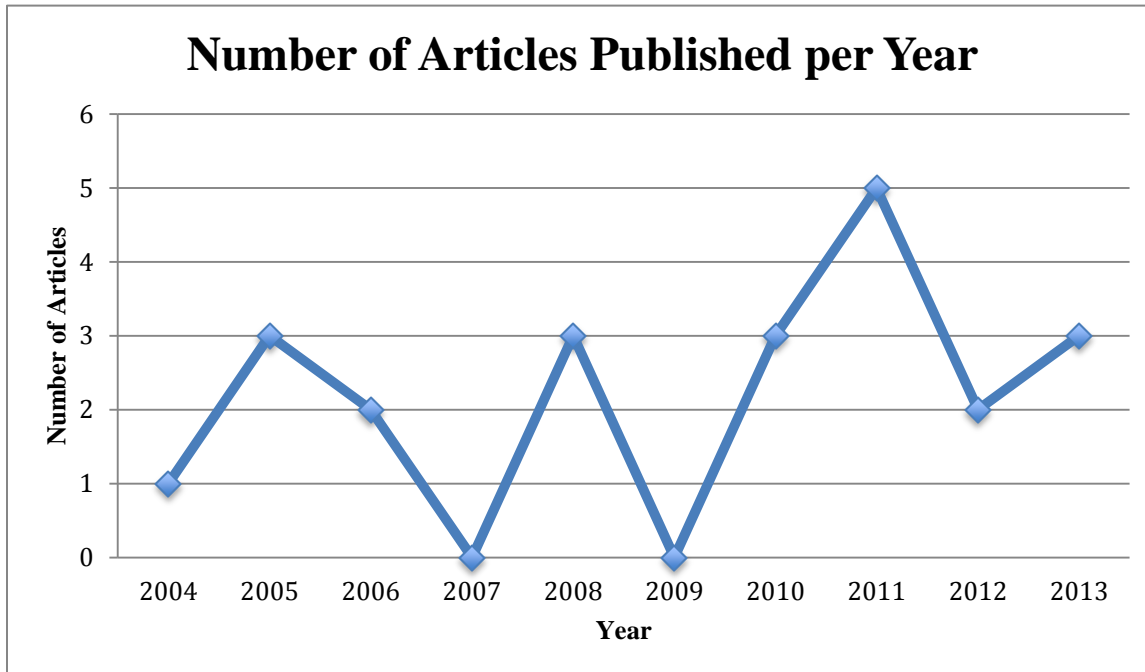


Figure 3 – Number of Articles Published per Year



Table 7 – Summary of Studies Found in Literature Review

<b>Author(s)</b>	<b>Date</b>	<b>Journal</b>	<b>Theoretical Framework(s)</b>	<b>Methodological Framework(s)</b>	<b>Data Collected</b>	<b>Level(s)</b>	<b>Gender</b>	<b>Size</b>
R. Q. Berry, III	2008	Journal of Research in Mathematics Education	Critical race theory	Phenomenology	Interview, questionnaire, autobiography, documents, observation	Middle school	Male	8
R. Q. Berry, III K. Thunder O. L. McClain	2011	Journal of African American Males in Education	Racialized forms of experience	Phenomenology	Interview, document, autobiography, observation	Middle school	Male	23
V. Borum E. Walker	2012	Journal of Negro Education	Black feminist thought Grounded theory	Qualitative research	Interview, documents	University	Female	12
B. R. Brand G. E. Glasson A. M. Green R. Ellington R. Frederick	2006  2010	School Science & Mathematics  The Negro Educational Review	Sociocultural theory  Self-efficacy Positive math attitude Positive math identity	Qualitative research  Case study Qualitative research	Interview  Interview	High school University University	Both  Both	5  1 8
C. C. Jett	2010	Journal of Negro Education	NA	Case study Qualitative research	Interview	University	Male	4
C. C. Jett	2011	Journal of Black Studies	Critical race theory	Case study	Interview	University	Male	1
C. C. Jett	2013	Journal of African American Studies	NA	Case study Qualitative research	Interview	University	Male	1
R. Lattimore	2005	Journal of Black Studies	NA	Qualitative research	Interview, observation	High school	Male	2

<b>Author(s)</b>	<b>Date</b>	<b>Journal</b>	<b>Theoretical Framework(s)</b>	<b>Methodological Framework(s)</b>	<b>Data Collected</b>	<b>Level(s)</b>	<b>Gender</b>	<b>Size</b>
J. H. Lim	2008	Race Ethnicity and Education	Social constructivism	Critical ethnography	Interview, documents, observation	Middle school	Female	2
E. O. McGee D. B. Martin	2011a	Journal of African American Males in Education	Phenomenological variant of ecological systems theory	Narrative analysis Life story interview approach	Interview	University	Male	1
E. O. McGee D. B. Martin	2011b	American Educational Research Journal	Critical race theory Racial micro-aggression Stereotype threat Stereotype management	NA	Interview, questionnaire	University	Both	23
E. O. McGee	2013	Urban Review	Phenomenological variant of ecological systems theory	Narrative analysis	Interview	High school	Male	11
V. R. Moody	2004	Journal of Educational Research	Sociocultural theory	Phenomenological research strategy	Interview, questionnaire, autobiography	University	Female	2
R. Noble	2011	Journal of African American Males in Education	Social cognitive theory	Culturally appropriate research	Interview, autobiography	University	Male	6
F. M. Nzuki	2010	Journal of Urban Mathematics Education	Critical race theory Sociocultural theory	Case study	Interview, questionnaire, observation	High school	Both	2
P. Sheppard	2005	Education	NA	Qualitative approach	Interview, questionnaire	High school	Both	11
D. W. Stinson	2008	American Educational Research Journal	Critical race theory Postcultural theory Critical theory	Participative action	Interview, questionnaire, autobiography, documents	University	Male	4

<b>Author(s)</b>	<b>Date</b>	<b>Journal</b>	<b>Theoretical Framework(s)</b>	<b>Methodological Framework(s)</b>	<b>Data Collected</b>	<b>Level(s)</b>	<b>Gender</b>	<b>Size</b>
C. L. Terry, Sr. E. O. McGee	2012	Journal of Mathematics Education at Teachers College	Critical race theory	Grounded theory	Interview	High school	Male	12
L. R. Thompson B. F. Lewis	2005	The High School Journal	NA	Case study	Interview, documents	High school	Male	1
L. R. Thompson B. F. Lewis	2013	Urban Review	African-centered worldview theory	Phenomenology	Interview, documents, observation	High school	Male	4
E. N. Walker	2006	American Educational Research Journal	Multiple worlds framework	NA	Interview, documents	High school	Both	10

### Data Analysis

The data analysis process began by reading and summarizing the studies. The studies were summarized onto data cards containing the following information: (a) Author(s), (b) Publication Date, (c) Journal Title, (d) Sample Size, (e) Sample Gender, (f) Sample Education Level, (g) Methodological Framework, (h) Theoretical Framework, (i) Instrument(s) Used, (j) Research Question(s), and (k) Findings. This method was used to make it easier to analyze and synthesize the information. Most of this information is represented in Table 7 found on the preceding pages.

I used techniques from Grounded Theory (Glaser & Strauss, 1967) to analyze and synthesize the results of studies that I found. Grounded Theory prescribes a specific procedure for categorizing a systematically collected data set. The first step is data collection. For this step, I read through the lists of findings from the data cards. The next step involves creating preliminary or “open” codes. A code is “a word or short phrase that symbolically assigns a summative, salient, essence-capturing, and/or evocative attribute for a portion of language-based or visual data” (Saldana, 2009, p. 3). As I worked through the coding process, I often found that the codes were already evident as subheadings in the findings sections of the studies. For example, the concepts of parent, family, peers, teachers, and role models often occurred and therefore were used as codes. Thus, the preliminary codes were amalgamated into axial codes

In order to determine which experiences occurred most often, I constructed a matrix that related the studies to all of the codes that I found during the coding process. I then recorded the findings that each study reported and computed total for each category. This first matrix can be found in Appendix A. In addition, I created a weighted matrix. Instead of tallying the number of

studies that reported each concept, I input the number of students that were studied. This matrix would give more weight to studies that involved more students. This second matrix can be found in Appendix B. I set a minimum inclusion standard of one-third for both matrices. A category was included if at least 8 out of the 22 studies reported it or if at least 50 out of the 151 students experienced it. Consequently, the most common issues affecting high achieving African American students were teacher influence, family influence, peer influence, mathematics identity, racial stereotypes, and organizational influence.

### Summary

In this section, I defined the methodology used to collect the research studies in the systematic literature review. I also described the meta-synthesis used to analyze the findings of the studies in the review. I then outlined the search criteria and search strategies used. Finally, I described the sample and analysis procedures. In the next section, I will synthesize the studies and describe major themes found across the studies.

## FINDINGS

### Introduction

Several themes arose from the data analysis described above: (a) teacher influence, (b) family influence, (c) peer influence, (d) mathematics identity, (e) racial stereotypes, and (f) organizational influence. In various ways, the students in the studies reported that these experiences affected their experiences with mathematics. In the following section, I will present a description of these experiences. The findings are summarized in the table below. These findings are ordered based their analyzed frequency within the sample.

Table 8 – Summary of Findings

<b>Influence</b>	<b>Descriptions</b>	<b>Examples</b>
Teacher	Relationship	Encouragement, high expectations, guidance
	Instruction	Content delivery, knowledge
Family	Direct	Early learning, high expectations, advocacy
	Indirect	Role models, competition
Peer	Positive	Support, group work, competition
	Negative	Distraction, misbehavior
Math Identity	Attributes	Self efficacy, math enjoyment, purpose
	Sources	Early experiences, grades, faith
Racial Stereotype	Experiences	Classroom, teachers, media
	Effects	Discouragement, anger, stress
	Responses	Defensive stance, “on point”
Organization	Positive	Advanced classes, summer programs
	Negative	Lack of resources, bad guidance

### Teacher Influences

Seventeen out of the 22 studies reported on teacher influences in their findings. These studies represented the voices of 99 out of a total of 151 students who were interviewed. For the most part, the studies described positive experiences in their relationships with and learning from their teachers.

The mathematically successful students were influenced by their relationships with their teachers. Some teachers conveyed words of encouragement, caring, and support (Ellington & Frederick, 2010; Moody, 2004; Noble 2011; Walker, 2006). This encouragement led students to enjoy and love mathematics (Ellington & Frederick, 2010; Moody, 2004). Other schoolteachers imparted high expectations and confidence in the abilities of their students that motivated the students to try harder to succeed (Brand, 2006; Ellington & Frederick, 2010; Sheppard 2005; Stinson 2008; Thompson & Davis, 2013; Walker, 2006). For example, Ellington & Frederick (2010) relate one student's experience:

I told my teacher I couldn't do it at first. I was like, no, I'm not smart enough to do it. She's like: yes you are! I'm like, no, I'm really, really not. She's like, yes you are. So she made me do it and I did it- yeah, it was no problem, but I didn't think I could [do the work] at first. (p. 69)

University students had already found success in mathematics. College faculty guided and encouraged their students to continue studying mathematics (Borum & Walker, 2012; Ellington & Frederick, 2010; Jett, 2011; Moody, 2004). African American professors served as role models, father figures, and friends to their male students (Jett, 2013).

Students attributed their success to the quality of their teachers' instructional practices.

Teachers delivered lessons that excited, engaged, and challenged the students (Berry et al., 2011; Lattimore 2005; Thompson & Davis, 2013; Walker, 2006). They also took time to explain concepts and tutor their students (Berry et al., 2011; Borum & Walker, 2012; Jett, 2011; Lattimore, 2005; Moody, 2004; Noble, 2011, Sheppard 2005). Students felt that it was important for teachers to be knowledgeable about mathematics and its applications (Jett, 2011; Lim, 2008; Noble, 2011; Terry & McGee 2012; Thompson & Lewis, 2005; Walker, 2006). Teachers modeled mathematics learning and their students followed their examples (Noble, 2011; Terry & McGee, 2012). For example, Noble (2011) presents the following student quote:

I believe what made him such a great teacher was that he was very charismatic and truly cared about making every student a math success. Whenever there was a tough question that he nor the students couldn't easily find the answer to, he would always go home and work on it before returning the next day with a logical explanation. His class was always full of discussions of math and life which made it easy for the students to relate to him and his teachings. (p. 199)

All of these practices helped students to develop positive mathematics identities (Berry et al., 2011; Moody, 2004; Noble, 2011; Sheppard, 2005; Terry & McGee, 2012) and paved the way for future mathematics studies (Borum & Walker, 2012; Jett 2011).

The same students described some negative experiences with their teachers. Some teachers misjudged academic potential by basing their evaluation on behavioral observations (Berry, 2008; Lim, 2008). Teachers showed racial and gender bias (Berry et al., 2011; Borum & Walker, 2012; Brand et al., 2006; McGee & Martin, 2011a; Moody 2004). This overt bias often took the form of unequal instructional attention. These biased actions evoked feelings of doubt,



fear, and resentment in the students (Borum & Walker, 2012; Brand et al., 2006; McGee & Martin, 2011a; Moody 2004). One student expressed her feelings saying, “Ironically, I did not see getting a "B" in Mr. Miller's class as an academic achievement. I saw it as one of the many battles I would win in life” (Moody, 2004, p. 140). As a result these feelings, some students took defensive stances in opposition to the teachers’ classroom goals (Brand et al., 2006). They acted as skeptics and sometimes rebelled. Students sometimes used their feelings to fuel their drive to exceed the low teacher expectations (McGee & Martin, 2011a; Moody, 2004).

### Family Influences

Nine out of the 22 studies reported on family influences in their findings. These studies represented the voices of 73 out of a total of 151 students who were interviewed. In general, the studies described both the active influences and the passive influences of parents.

Students reported that their parents took steps to help them achieve in mathematics. Parents gave their children preschool experiences with mathematics by using educational toys and materials (Berry, 2008; Ellington & Frederick, 2010; McGee & Martin, 2011a; Walker, 2006). Parents involved themselves in school activities such as parent organizations and athletic booster clubs in order to more closely monitor and advocate for their children (Berry, 2008; Ellington & Frederick, 2010; Terry & McGee, 2012). At home, they placed great importance on education and set high expectations for the students to aspire to (Berry, 2008; Ellington & Frederick, 2010; McGee & Martin, 2011a; Noble, 2011; Stinson, 2008; Terry & McGee, 2012; Walker, 2006). Parents served as academic facilitators by helping with homework, reviewing materials, and arranging tutoring sessions (Berry, 2008; Noble, 2011; Walker, 2006). These

active relationships helped students develop positive mathematics identities (Berry et al., 2011; Terry & McGee, 2012).

Parents and family members influenced students indirectly as well. Parents, aunts, and cousins served as academic role models for the students to follow (Berry, 2008; Ellington & Frederick, 2010; Noble, 2011; Stinson, 2008; Terry & McGee, 2012; Walker, 2006). Students sought to please their parents through their academic achievements (McGee & Martin, 2011a; Walker, 2006). Students worked hard to compete with and follow successful siblings and cousins (Berry, 2008; Noble, 2011; Walker, 2006). Students wanted to serve as role models for younger siblings (Walker, 2006). In one study (Lim, 2008), a lack of family support was reported. As a result, though successful, the student was hindered from pursuing her career aspirations.

#### Peer Influences

Nine out of the 22 studies reported on peer influences in their findings. These studies represented the voices of 73 out of a total of 151 students who were interviewed. By and large, the studies portrayed aspects of positive peer influence, though some described negative experiences.

University students worked together in study groups and developed strong ties with peers that contributed to their mathematics success (Borum & Walker, 2012; Ellington & Frederick, 2010; Jett, 2013). Descriptions of the relationships ranged from collegial to familial. High school students worked with like-minded peer groups to improve their knowledge and used others to measure their own progress (Noble, 2011; Terry & McGee, 2012; Walker, 2006). As one student stated, "...when I have friends who I know are good at math, then a lot of times we'll work

together. And so they help me learn more and become better” (Noble, 2011, p. 201). Students used peer groups as a source of comfort as well as a source of competition (Stinson, 2008; Thompson & Davis, 2013; Walker, 2006). The challenge to better their peers motivated their successes. Students also recognized and actively avoided peers who might distract them (Terry & McGee, 2012; Nzuki, 2010; Walker, 2006). These students resisted peer pressure to misbehave in class, skip school, and socialize too much. A lone study (Lim, 2008) presented a negative effect of peers. There was an inner conflict between the student’s approval with the mathematics teacher and her peers’ disapproval. This conflict caused her to withdraw in the classroom and hindered her potential.

### Positive Math Identity

Seven out of the 22 studies cited math identity in their findings. These studies represented the voices of 72 out of a total of 151 students who were interviewed. The studies defined mathematical identity in terms of its characteristics and its sources.

Students exhibited mathematical identity in several different ways. Some pushed themselves to succeed and possessed high self-efficacy (Berry, 2008; Noble, 2011; Sheppard, 2005). After giving credit to teachers and parents, students would make statements such as “I worked hard” and “I excelled”. Others enjoyed mathematics and saw its importance in their future aspirations (Berry, 2008; Ellington & Frederick, 2010; McGee & Martin, 2011b; Noble, 2011; Nzuki 2010; Stinson, 2008; Thompson & Lewis, 2005). These students recognized that success in mathematics would parlay in to recognition, graduation, college readiness, and career choices.

Several factors contributed to mathematical identity. Students identified computational performance in elementary school, school performance in later years as factors (Berry et al., 2011; Noble, 2011). School grades, test scores, and placement in advanced courses helped validate their self-images. As stated earlier, teacher and family relationships helped to build positive mathematics identities. Another factor was the ability to recognize and overcome the unique challenges of mathematics (Berry et al., 2011; Ellington & Frederick, 2010; Noble, 2011). Some students attributed their abilities to divine intervention (Ellington & Frederick, 2010; Jett, 2010), making statements such as “I feel like God blessed me with this talent to be good at math. And I feel like it’s almost a duty of mine to persist in it and to advance that talent” (Ellington & Frederick, 2010, p. 73). University students realized their mathematics identities after futile years battling racial stereotypes (McGee & Martin, 2011b).

### Racial Stereotypes

Eight out of the 22 studies reported on racial stereotypes in their findings. These studies represented the voices of 70 out of a total of 151 students who were interviewed. The studies revealed where students experienced racial stereotyping, how it affected them, and what they did to combat it.

Students developed an awareness of stereotyping as early as elementary school, especially in math classes (McGee & Martin, 2011b). Students were well versed in both social and academic stereotypes (McGee, 2013; Nzuki, 2010; Stinson, 2008). Students identified teacher interactions and expectations as a source of racial stereotyping (Berry et al., 2011; McGee & Martin, 2011a; McGee & Martin, 2011b). Students perceived that some teachers gave less attention to African American students. Students saw racial stereotyping in society’s

perception and media's portrayal of African Americans (Brand et al., 2006; McGee & Martin, 2011a; Stinson, 2008). One student laments that her appearance "determines whether I'm smart or not. We don't get a chance from day one" (Brand et al., 2006, p. 232). A graduate teaching assistant saw racial stereotyping as his students questioned his mathematical abilities due to his race (Jett, 2011).

One student recalled feelings of anger and resentment over the racial stereotyping that he experienced in his class (McGee & Martin, 2011a). As there were few African Americans in advanced classes, students felt uncomfortable and alone (Berry et al., 2011). Students felt stressed by the pressure of constantly representing the counter-narrative of being mathematically successful African American students (McGee & Martin, 2011b; McGee, 2013). Racial stereotypes reduced students' self esteem thus they were discouraged from choosing science and mathematics courses and career paths (Brand et al., 2006; McGee & Martin, 2011a; McGee & Martin, 2011b). Students compared the large number of Black professional athletes to the relatively small number of Black scientists and mathematicians. Students questioned whether their college admission was due to affirmative action. Students were critical of behaviors of other Black students that continued to propagate stereotypes (McGee & Martin, 2011b).

High achieving students differentiated themselves from other Black boys who "pretend that they're cool and not nerds and not answer questions" (Berry et al., 2011, p. 18). They expressed contentment in their identities. Some students took defensive positions in the classroom to combat negative teacher dispositions (Brand et al., 2006; McGee, 2013; Stinson, 2008). Students had to prove their worth each school year with new teachers. Other students sought to disprove the stereotypes by always being "on point" and "frontin" (McGee & Martin,

2011b; McGee, 2013, Nzuki, 2010). These students took great care to fulfill their academic demands and adopt the dress and speech of their predominantly White environments. These efforts, while affording momentary victories, often ended in losing battles. One such story is summed up as follows: "his self-confidence is accompanied by an extra levy at each and every academic tollbooth." (McGee & Martin, 2011b, p. 1364). One student avenged the racial stereotyping he experienced by beating the White students at a mathematics competition (McGee & Martin, 2011a). The same student also used humor to rebuff racism (McGee & Martin, 2011a). As stated earlier, the failed battle to counteract racial stereotypes led students to approach mathematics from a more intrinsic viewpoint (McGee & Martin, 2011b). Students sought to succeed in mathematics for their personal enjoyment and benefits.

### Organizational Influences

Nine out of the 22 studies reported on organizational influences in their findings. These studies represented the voices of 57 out of a total of 151 students who were interviewed. Most studies highlighted the positive aspects of organizational influence. A few described how organizations hindered student progress.

Positive influences ranged from course offerings to university climate. Accelerated classes in elementary school gave students access to motivating teachers and challenging work, which led to gifted and advanced placement opportunities in high school (Ellington & Frederick, 2010; Noble, 2011). One student described experiences in a privileged neighborhood filled with mathematicians and scientists who nurtured his interest in mathematics (McGee & Martin, 2011a). Research and enrichment programs at the high school and university levels provided pivotal experiences (Borum & Walker, 2012; Ellington & Frederick, 2010; Terry & McGee,

2012). One university student summarized, “I guess those are the experiences that made me make up my mind that I would pursue mathematics as a career” (Borum & Walker, 2012, p. 372). High schools that promoted a cooperative mindset among students had positive effects academically (Terry & McGee, 2012). Likewise, Historically Black Colleges and Universities provided supportive racial environments for African American students (Borum & Walker, 2012; Jett, 2013). Historically Black Colleges and Universities also provided service project opportunities that allowed students use their talents (Jett, 2013). The projects included SAT prep courses and math tutoring.

While these studies highlight several ways the organizations helped mathematically able students, there is still more to be done. Students cited a lack of advanced, challenging courses (McGee, 2013; Thompson & Lewis, 2005). Several students were not familiar with the Advanced Placement Program. One student had to petition his school to restore a Pre-Calculus/Calculus course that had been removed from the schedule in previous years. A lack of resources was an obstacle to student success (McGee, 2013; Nzuki, 2010). These resources ranged from textbooks to college and career counseling.

### Summary

In this section, I summarized the voices of the students as they described important experiences with mathematics. While most were positive, the negative experiences highlight the need for improvement. In the following section, I will discuss implications of these findings.

## **DISCUSSION**

### Introduction

The purpose of this study was to determine the factors that influence African American student achievement in the area of mathematics. In the preceding section, I outlined and described six major experiences that were cited by students as having impacted their success in mathematics. The factors ranged from individual, such as teacher praise, to organizational, such as enrichment programs, to societal, such as racial stereotypes portrayed in the media. In this section, I will discuss the findings in light of related research. This will be followed by suggested application of the findings to Seminole High School. I will then propose directions for future research. Finally, limitations of this study will be discussed.

### Relation to Existing Research

The findings of this literature review largely conformed with established research on student achievement in general as well as research on African American students. Teachers have the greatest impact among all school-related factors (Rivkin et al., 2000; Rowan et al. 2002; Wright et al., 1997). Teacher relationships also impact Black students' academic performance (Decker et al., 2007; Oates, 2003). At home, parent and family involvement in education are related to the school success of African Americans (Gonzales et al., 1996; Sanders, 1998; Taylor et al., 1995). The praise and encouragement from teachers and parents motivated the students to achieve. Attribution research connects motivation to an individual's belief in the internal and controllable nature of success (Wiener, 2005). Support from positive peers can help improve grades (Somers et al., 2008; Stewart, 2008). Self-efficacy is related to academic performance



(Hackett & Betz, 1989; Lent et al., 1986; Pajares, 1996). Research suggests that students' beliefs in their ability is based on prior success and leads to higher motivation and persistence (Rueda, 2011). The students included in the studies reviewed here possessed high self-efficacy based on their previous good grades and high test-scores. They persisted in the face of racial stereotypes. Educational environments, such as Historically Black Colleges and Universities, helped advance African American learners (DeSousa & Kuh, 1996; Flowers, 2002; Guiffrida, 2003).

Some of the findings were contrary to established research. The students included in the studies pursued academic success. This seems to be in direct opposition to Ogbu's Cultural-Ecological Perspective (Ogbu, 1997), which argues that cultural norms generally pit involuntary minority groups against the White majority-established institution of education and that there is a "compelling force against identification with academics" (Osborne, 1999, p. 558). Ogbu did address strategies, such as camouflage and emulation of Whites, used by academically successful African American students (Foster, 2004). The findings of this study did not show that students tried to hide their success using camouflaging techniques, but they did at times take on White norms and values. The students in the studies reviewed here recognized racial tensions, yet most engaged in academic activities. Steele's Stereotype Threat Theory would have predicted behavior that avoids academic activities for fear of fulfilling the negative stereotypes (Steele, 1997). Some students identified traits of Majors and Billson's Cool Pose Theory (Majors & Billson, 1992) in their classmates, but distanced themselves from such behaviors.

The findings of this study are consistent with Bronfenbrenner's Ecological Model of Human Development (Bronfenbrenner, 1994). The model describes an ecosystem that influences the growth of a person over time. The ecosystem begins with the individual who is most closely

affected by microsystems, such as schools, parents, and peers. The microsystems intersect within mesosystems. The mesosystems extend to macrosystems. All of these nested systems are viewed within the chronosystem as they, along with the individual, change over time.

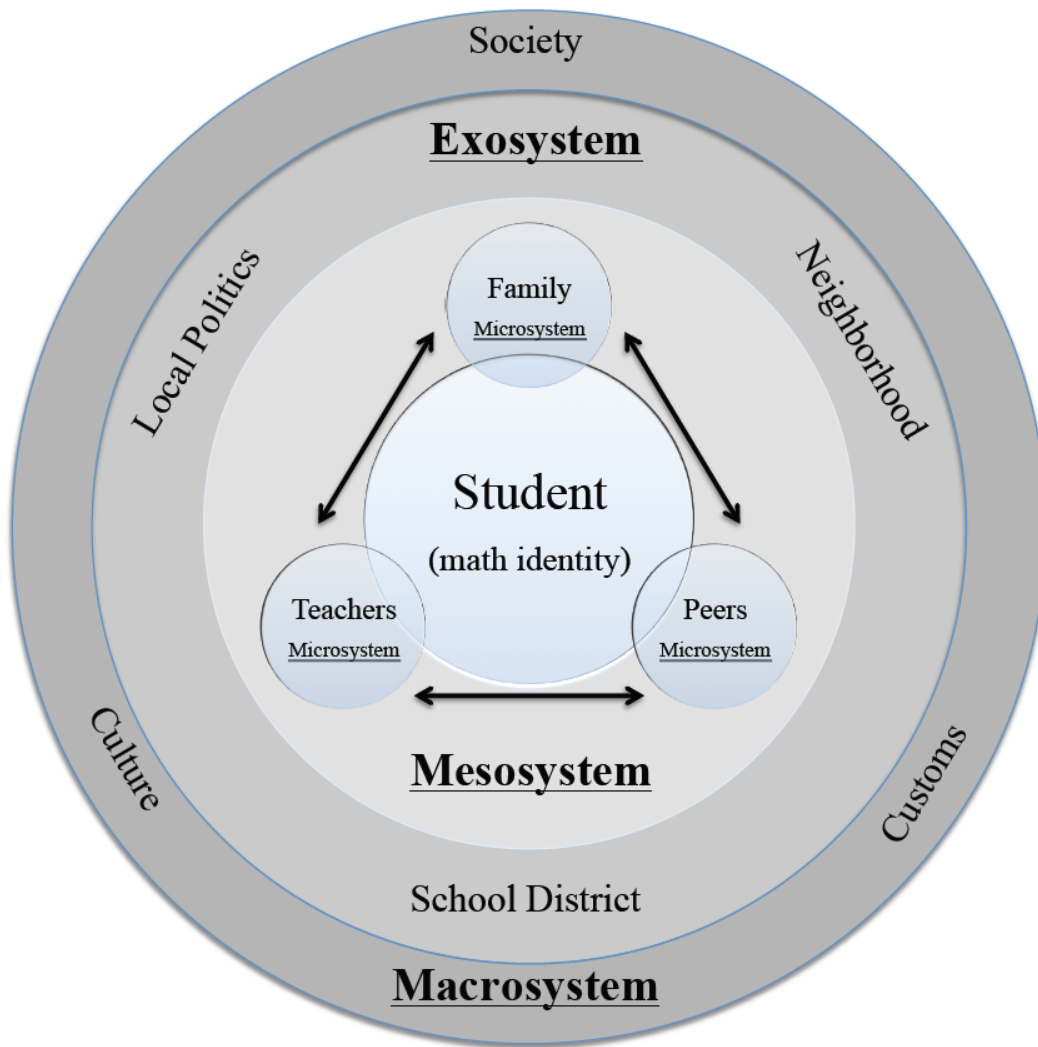


Figure 4 – Bronfenbrenner's Model

The figure above relates the findings of this study to Bronfenbrenner’s model. The findings show that mathematics identity develops within the individual at the center of this ecosystem. Teacher-, family-, peer-, and organizational-influences appear as microsystems interacting with the individual. These four influences interact within the mesosystem. Racial stereotypes show up in many of the levels. The counter-narratives of the students, especially the university students, show their growth over time within the chronosystem as shown in the figure below.

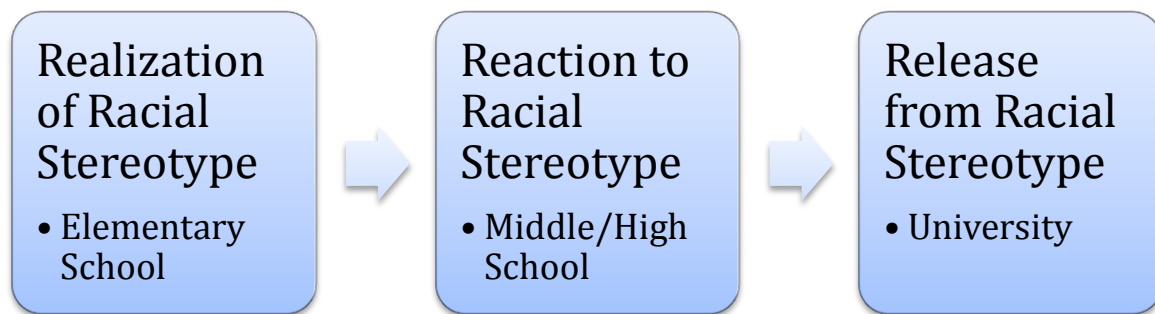


Figure 5 – Student Progression through Chronosystem

The findings of this study, together with Bronfenbrenner’s model, describe the development of a typical mathematically successful African American student. Early on the influence of parents is seen as they provide him learning opportunities and set examples of learning. Parents and teachers nurture the student by providing encouragement and high expectations. The student begins to develop a mathematics identity through pre-school learning and mastery of arithmetic in elementary school. In the classroom, he also begins to observe and experience racial stereotyping. In middle and high school years, good grades, high exam scores, and participation in advanced courses, after-school programs, and camps foster the positive math

identity. The student forms bonds with like-minded peers who provide support, competition, and camaraderie yet recognizes and turns from the negative influences of other classmates. During this time, he continues to feel the effects of racial stereotype coming from an individual level to a societal level. The student also begins to employ coping behaviors to combat racial stereotyping and prove himself as a capable student. He perseveres based on his strong mathematics identity, seeing the future benefits of working hard. The student decides to study at a Historically Black College or University, drawn by the promise of a supportive community. He continues to grow, guided by African American professors who serve as role models. At some point, the burden of constantly battling racial stereotyping becomes too great. The student realizes that he must continue to study mathematics because of his intrinsic love of the subject. He completes his degree and enters the world with a mission to inspire other students.

This systematic review of the literature contributed to the existing body of research. One tradition of research established and analyzed the achievement gap by studying aggregate student data (U.S. Department of Education, 2003; Education Commission of States, 2005; Strutchens et al., 2004; Lubienski, 2002), but did not offer solutions. Another tradition of research described the causes of Black student failure (Majors & Billson, 1992; Ogbu, 1997; Steele, 1997), but ignored stories of success. A third tradition of research related the achievement gap to various factors (Desimone & Long, 2010; Hanushek & Rivkin, 2006; Jeynes, 2010; Yan & Lin, 2005), but generally examined one or a few factors at a time. In contrast to these traditions of research, the works that were included in this current systematic review examined successful African American students (Borum & Walker, 2012; Jett, 2011; Walker, 2006). The qualitative nature of these studies allowed them to provide a holistic perspective and describe multiple factors

affecting success. In addition, these studies investigate causes of success rather than causes of failure. This approach may be more useful in addressing the problem. The meta-synthesis that I conducted provided cross-case corroboration of the studies. Many of the studies showed similar findings, allowing for corroboration and triangulation. So as a whole, this body of research is more impactful than any of the studies alone.

### Application to Seminole High School

The findings of this review have revealed possible factors that influence African American achievement. Applying these findings to Seminole High School would involve a multi-step approach. The first step would be to determine the existence and extent of those factors on the educational experiences of students at Seminole High School. This could take the form of any combination of the following: surveys, interviews, and observational research. Analysis of the data may show influences with major impact at the school. The next step would involve evaluation of current programs for their effectiveness with regard to the evidenced influences. Based on the evaluation results, revision of existing programs or development of new programs could occur. Finally, this would be followed by the implementation and continued evaluation of school programs.

These changes could take many forms. Because this systematic review suggests that teachers may be the most important factor impacting student success, a teacher-focused change would involve professional development and continued monitoring on instructional practice, content proficiency, student motivation, or racial diversity. This review also suggested that families have a great impact on student success, so a family-focused program may have training on the importance of education and the resources available to help children. A peer-based change

could involve the formation of study groups in classrooms, cohorts in the Transition program, or campus-wide homeroom groupings. Changes to address mathematics identity could start with tutoring to improve basic skills, rewards and awards for improvement, or treatments for math anxiety. The negative effects of racial stereotyping could be addressed through teacher training, mentoring by African American role models, and career counseling. Implementation of any of the aforementioned changes would constitute organizational influence. More organizational influence could be leveraged by working on the retention of Black students in the International Baccalaureate program or increased African American enrollment in Advanced Placement courses based on PSAT scores.

Ideally, such an investigation, evaluation, development, and implementation process would take place on a school-wide scale and in conjunction with feeder middle schools. On a campus with over 3000, this may be difficult. Alternatively this process could be piloted within the existing summer Transition program or through school clubs such as Men of Excellence and Ladies of Seminole. These subgroups would provide convenient populations for field-testing any recommended changes.

### Implications for Future Research

Most of the studies in this review looked at the students through a general lens, aiming to “tell their stories.” Some studies viewed the students from a racial viewpoint; some from a socio-cultural standpoint. A few studies took a motivational stance. Only one study approached the topic from a pedagogical standpoint. Another lone study investigated the relationship between spirituality and achievement. These two lone studies point to possible future lines of research.

Future case studies could focus on pedagogy and curriculum. The practice of teaching mathematics is an area that is currently an area of concern. Many states have adopted the Common Core Standards, which have to be correctly implemented in order for them to be effective. This is an area that may be more easily addressed than family support or societal racial stereotypes. In the area pedagogy, studies could investigate the effects of culturally relevant pedagogy on student achievement. Spirituality is another subject that is lacking in the current research. Faith is an important aspect of many African American students' lives and their communities. Schools could partner with local churches and other faith-based organizations to support student achievement.

#### Limitations of this Study

One limitation of this study, as stated above, is that the research articles were varied in their goals. Some were general in their aim, while others were focused on answering specific questions. The findings, therefore, shouldn't be taken as representing a single voice of African American students as much as a list of possible influences. Another limitation was the unusually large sample size of two of the studies. Most of the studies interviewed a single-digit number of students. Two studies involved 23 students each. In the analysis of the data, I used sample size to rank-order the educational factors. Inclusion of the two larger studies could have skewed the results, as they comprised nearly 20% of the entire group. A third limitation was the inclusion of organizational influences as a finding. Out of the six factors, organizational influence was ranked the lowest. While it was mentioned in 9 of the 22 studies, those studies only represented 57 out of the 151 total students, which was less than 38% of the total. Also, organizational influence was a broad category that included examples that varies from counseling to textbooks to course

offerings. A fourth limitation was the unusual nature of the participants of the studies. All of the students were selected based on their mathematics success. The experiences of the general population of students may differ from their experiences.

### Conclusion

The NCLB legislation set a deadline of 2014 for all students, regardless of background, to be proficient in mathematics. At this current midpoint in the year 2014, we have not met that goal. Some populations are close to the target, while some are still far from it. The achievement gap between Black and White students on mathematics at Seminole High School is an important, complex problem with many facets to explore. The purpose of this systematic review was to highlight the experiences of mathematically successful African American students. In synthesizing the existing counter-narrative research, this review may allow teachers and administrators to be more sensitive to the needs and perspectives of this population of students. It is my hope that this study will be a part of continued efforts to make mathematics attainable to all students – that one day we will be able to close the Black/White achievement at Seminole High School.



## **APPENDIX A – MATRIX 1**

Matrix 1 – Analysis of Findings

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	Article		
																							POSTIVE	
1	1			1										1	1								5 Early Experiences	
1	1			1							1			1			1	1			1		8 Family Support	9
1	1			1						1				1			1	1					7 Positive Math Identity	
	1	1	1	1		1	1	1			1		1	1		1	1	1		1	1		15 Teacher Support	17
		1	1	1		1					1			1				1	1		1	1	8 Peer Support	9
		1		1			1				1			1					1				6 Organizational Support	9
				1			1											1					3 Give Back	
				1	1																		2 Spirituality	
							1			1	1		1				1	1					6 Afr Am Role Models	7
															1					1	1		3 Math Usefulness	
																							NEUTRAL	
											1		1										2 Academic Coping	
												1											1 Social Coping	
																							NEGATIVE	
1	1	1							1														4 Individual Discrimination	
	1		1				1			1	1	1			1		1						8 Racial Stereotypes	
						1																	1 Content Difficulty	
									1														1 Family Lack	
									1														1 Peer Lack	
												1			1					1			3 Organizational Lack	
																					1		1 Role Model Lack	
									1												1		2 Teacher Lack	

- |    |                |    |               |
|----|----------------|----|---------------|
| 1  | Berry 2008     | 12 | McGee 2011a   |
| 2  | Berry 2011     | 13 | McGee 2013    |
| 3  | Borum 2012     | 14 | Moody 2004    |
| 4  | Brand 2006     | 15 | Noble 2011    |
| 5  | Ellington 2010 | 16 | Nzuki 2010    |
| 6  | Jett 2010      | 17 | Sheppard 2005 |
| 7  | Jett 2011      | 18 | Stinson 2008  |
| 8  | Jett 2013      | 19 | Terry 2012    |
| 9  | Lattimore 2005 | 20 | Thompson 2005 |
| 10 | Lim 2008       | 21 | Thompson 2013 |
| 11 | McGee 2011b    | 22 | Walker 2006   |

## **APPENDIX B – MATRIX 2**

Matrix 2 – Analysis of Findings

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	Article			
8	23	12	6	8	4	1	4	2	2	23	1	11	2	6	2	11	4	12	1	4	10	151	Number of Participants		
																								POSTIVE	
8	23			8										6	2								47	Early Experiences	
8	23			8							1			6			4	12			10	72	Family Support	73	
8	23			8						22				6		1	4					72	Positive Math Identity		
	23	12	6	8		1	4	2			1		2	6		1	4	12		4	10	96	Teacher Support	98	
		12		8			4							6			4	12		4	10	60	Peer Support	73	
		12		8			4				1			6				12				43	Organizational Support	57	
				8			4											4				16	Give Back		
				8	4																	12	Spirituality		
							4			22	1		2				4	12				45	Afr Am Role Models	46	
															2				1	4		7	Math Usefulness		
																								NEUTRAL	
										22		11										33	Academic Coping		
												11										11	Social Coping		
																								NEGATIVE	
8	23	12							1													44	Individual Discrimination		
	23		6			1				22	1	11			2		4					70	Racial Stereotypes		
						1																	1	Content Difficulty	
									1														1	Family Lack	
									1						2							10	13	Peer Lack	
												11			2							1	14	Organizational Lack	
																						1	1	Role Model Lack	
									1													1	2	Teacher Lack	

- |    |                |    |               |
|----|----------------|----|---------------|
| 1  | Berry 2008     | 12 | McGee 2011a   |
| 2  | Berry 2011     | 13 | McGee 2013    |
| 3  | Borum 2012     | 14 | Moody 2004    |
| 4  | Brand 2006     | 15 | Noble 2011    |
| 5  | Ellington 2010 | 16 | Nzuki 2010    |
| 6  | Jett 2010      | 17 | Sheppard 2005 |
| 7  | Jett 2011      | 18 | Stinson 2008  |
| 8  | Jett 2013      | 19 | Terry 2012    |
| 9  | Lattimore 2005 | 20 | Thompson 2005 |
| 10 | Lim 2008       | 21 | Thompson 2013 |
| 11 | McGee 2011b    | 22 | Walker 2006   |

## REFERENCES

- 89<sup>th</sup> Congress. (1965, April 11). Public Law – 89 -10. Retrieved September 10, 2011, from <http://www.gpo.gov/fdsys/pkg/STATUTE-79/pdf/STATUTE-79-Pg27.pdf>.
- 103<sup>rd</sup> Congress. (1994, March 31). Public Law – 103 -227. Retrieved September 10, 2011, from <http://www2.ed.gov/legislation/GOALS2000/TheAct/intro.html>.
- 107<sup>th</sup> Congress. (2002, January 8). Public Law – 107 -110. Retrieved September 10, 2011, from <http://www2.ed.gov/policy/elsec/leg/esea02/107-110.pdf>.
- Apple, M. (1990). *Ideology and Curriculum* (2nd ed.). New York :Routledge
- Au, K. (1980). Participation structures in a reading lesson with Hawaiian children. *Anthropology and Education Quarterly*, 11(2), 91-115.
- Baker, S. E., & Edwards, R. (2012). *How many qualitative interviews is enough?* Southampton, UK: National Centre for Research Methods. Retrieved from [http://eprints.ncrm.ac.uk/2273/4/how\\_many\\_interviews.pdf](http://eprints.ncrm.ac.uk/2273/4/how_many_interviews.pdf)
- Banks, J. A. (2004). Multicultural education: Historical development, dimensions, and practices. In J. A. Banks & C. M. Banks (Eds.), *Handbook of Research in Multicultural Education* (2nd ed., pp. 3-29). San Francisco: Jossey-Bass.
- Bean, R. A., Bush, K. R., McKenry, P. C., & Wilson, S. M. (2003). The impact of parental support, behavioral control, and psychological control on the academic achievement and self-esteem of African American and European American adolescents. *Journal of Adolescent Research*, 18(5), 523-541.
- Begley, C. M. (1996). Using triangulation in nursing research. *Journal of Advanced Nursing*, 24(1), 122-128.

- Berry, R. Q. (2005). Voices of success: Descriptive portraits of two successful African American male middle school mathematics students. *Journal of African American Studies*, 8(4), 46-62.
- Berry, R. Q. (2008). Access to upper-level mathematics: The stories of successful African American middle school boys. *Journal for Research in Mathematics Education*, 39(5), 464-488.
- Berry III, R. Q., Thunder, K., & McClain, O. L. (2011). Counter narratives: Examining the mathematics and racial identities of Black boys who are successful with school mathematics. *Journal of African American Males in Education*, 2(1), 10-23.
- Berry, R., & Thunder, K. (2012). The Promise of Qualitative Metasynthesis: Mathematics Experiences of Black Learners. *Journal of Mathematics Education at Teachers College*, 3(2).
- Borum, V., & Walker, E. (2012). What makes the difference? Black women's undergraduate and graduate experiences in mathematics. *The Journal of Negro Education*, 81(4), 366-378.
- Brand, B. R., Glasson, G. E., & Green, A. M. (2006). Sociocultural factors influencing students' learning in science and mathematics: An analysis of the perspectives of African American students. *School Science and Mathematics*, 106, 228-236.
- Brice-Heath, S. (1983). *Ways with Words: Language, Life and Work in Communities and Classrooms*. Cambridge, UK: Cambridge University Press
- Bronfenbrenner, U. (1994). Ecological models of human development. In *International Encyclopedia of Education*, Vol. 3, 2<sup>nd</sup>. Ed. Oxford: Elsevier. Reprinted in: Gauvain, M.

- & Cole, M. (Eds.), *Readings on the Development of Children*, 2<sup>nd</sup> Ed. (1993, pp. 37-43).  
NY: Freeman.
- Brown v. Board of Education 347 U.S. 483 (1954).
- Bolman, L. G., & Deal, T. E. (2008). *Reframing organizations: Artistry, choice and leadership*.  
San Francisco: Jossey-Bass.
- Chavous, T., Rivas-Drake, D., Smalls, C., Griffin, T., & Cogburn, C. (2008). Gender matters,  
too: The influences of school racial discrimination and racial identity on academic  
engagement outcomes among african american adolescents. *Developmental Psychology*,  
44(3), 637-654.
- Cochran-Smith, M. (2004). Multicultural teacher education: Research, practice and policy. In J.  
A. Banks & C. M. Banks (Eds.), *Handbook of Research in Multicultural Education* (2nd  
ed., pp. 931-975). San Francisco: Jossey-Bass.
- Cornbleth, C., & Waugh, D. (1995). *The Great Speckled Bird: Multicultural Politics and  
Education*. Mahwah, N J: Lawrence Erlbaum
- Davies, P. (2000). The relevance of systematic reviews to educational policy and practice.  
*Oxford Review of Education*, 26(3-4), 365-378.
- Decker, D. M., Dona, D. P., & Christenson, S. L. (2007). Behaviorally at-risk African American  
students: The importance of student–teacher relationships for student outcomes. *Journal  
of School Psychology*, 45(1), 83-109.
- Delpit, L. (1995). *Other people's children: Cultural conflict in the classroom*. New York: Free  
Press

- Desimone, L., & Long, D. A. (2010). Teacher effects and the achievement gap: Do teacher and teaching quality influence the achievement gap between black and white and high-and low-SES students in the early grades. *Teachers College Record*, 112(12), 3024-3073.
- DeSousa, D. J., & Kuh, G. D. (1996). Does institutional racial composition make a difference in what Black students gain from college?. *Journal of College Student Development*.
- Education Commission of the States. (2005). The nation's report card. Retrieved November 13, 2013, from <http://nces.ed.gov/nationsreportcard>
- Ellington, R. M., & Frederick, R. (2010). Black high achieving undergraduate mathematics majors discuss success and persistence in mathematics. *Negro Educational Review*, 61(1), 61-84.
- Estabrooks, C. A., Field, P. A., & Morse, J. M. (1994). Aggregating qualitative findings: An approach to theory development. *Qualitative Health Research*, 4(4), 503-511.
- Evans, J., & Benefield, P. (2001). Systematic reviews of educational research: Does the medical model fit?. *British Educational Research Journal*, 27(5), 527-541.
- Fenech-Adami, M., & Kiger, A. (2005). The use of triangulation for completeness purposes. *Nurse Researcher*, 12(4), 19-29.
- Florida Department of Education. (2006). *Assessment & Accountability Briefing Book*. Retrieved on October 9, 2013, from <http://fcata.fldoe.org/pdf/fcataabb.pdf>
- Florida Department of Education. (2011). *Florida Comprehensive Assessment Test*. Retrieved on November 1, 2011, from <http://fcata.fldoe.org/results/default.asp>



- Flowers, L. A. (2002). The Impact of College Racial Composition on African American Students' Academic and Social Gains: Additional Evidence. *Journal of College Student Development, 43*(3), 403-10.
- Foster, K. M. (2004). Coming to terms: a discussion of John Ogbu's cultural- ecological theory of minority academic achievement. *Intercultural Education, 15*(4), 369-384.
- Foster, M. (1996). *Black Teachers on Teaching*. New York: New Press.
- Gay, G. (2004). Multicultural curriculum theory and multicultural education. In J. A. Banks & C. M. Banks (Eds.), *Handbook of Research in Multicultural Education* (2nd ed., pp. 30-49). San Francisco: Jossey-Bass.
- Gonzales, N. A., Cauce, A. M., Friedman, R. J., & Mason, C. A. (1996). Family, peer, and neighborhood influences on academic achievement among African-American adolescents: One-year prospective effects. *American Journal of Community Psychology, 24*(3), 365-387.
- Gough, D., & Elbourne, D. (2002). Systematic research synthesis to inform policy, practice and democratic debate. *Social policy and society, 1*(3), 225-236.
- Grant, C. A. (2003). *An Education Guide to Diversity in the Classroom*. Boston: Houghton Mifflin.
- Guiffrida, D. A. (2003). African American student organizations as agents of social integration. *Journal of College Student Development, 44*(3), 304-319.
- Guion, L. A., Diehl, D. C., & McDonald, D. (2011). *Triangulation: Establishing the validity of qualitative studies*. Gainesville, FL: University of Florida IFAS Extension. Retrieved from <http://edis.ifas.ufl.edu/fy394>

- Gutiérrez, R. (2008). A “gap-gazing” fetish in mathematics education? Problematizing research on the achievement gap. *Journal for Research in Mathematics Education*, 39, 357–364.
- Hackett, G., & Betz, N. E. (1989). An exploration of the mathematics self-efficacy/mathematics performance correspondence. *Journal for Research in Mathematics Education*, 261-273.
- Hanushek, E. A., & Rivkin, S. G. (2006). *School quality and the Black-White achievement gap* (No. w12651). National Bureau of Economic Research.
- Irvine, J. J. (2003). *Educating Teachers for Diversity: Seeing with a Cultural Eye*. New York: Teachers College Press.
- Jensen, L. A., & Allen, M. N. (1996). Meta-synthesis of qualitative findings. *Qualitative Health Research*, 6(4), 553-560.
- Jett, C. C. (2010). “Many are called, but few are chosen”: The role of spirituality and religion in the educational outcomes of “chosen” African American male mathematics majors. *Journal of Negro Education*, 79(3), 324-334.
- Jett, C. (2011). “I once was lost, but now am found”: The mathematics journey of an African American math mathematics doctoral student. *Journal of Black Studies*, 42(7) 1125–1147.
- Jett, C. C. (2013). HBCUs propel African American male mathematics majors. *Journal of African American Studies*, 17(2), 189-205.
- Jeynes, W.H. (2010). Religiosity, religious schools, and their relationship with the achievement gap: A research synthesis and meta-analysis. *The Journal of Negro Education*, 79(3),
- Ladson-Billings, G. (1994). *The Dreamkeepers: Successful Teachers of African American Children*. San Francisco: Jossey-Bass.

- Lattimore, R. (2005). Harnessing and channeling African American children's energy in the mathematics classroom. *Journal of Black Studies*, 35(3), 267-283.
- Lee, C. D. (2004). African American students and literacy. In D. Alvermann & D. Strickland (Eds.), *Bridging the Gap: Improving Literacy Learning for Pre-Adolescent and Adolescent Learners, Grades 4-12*. New York: Teachers College Press
- Lent, R. W., Brown, S. D., & Larkin, K. C. (1986). Self-efficacy in the prediction of academic performance and perceived career options. *Journal of Counseling Psychology*, 33(3), 265.
- Lim, J. H. (2008). The road not taken: two African-American girls' experiences with school mathematics. *Race Ethnicity and Education*, 11(3), 303-317.
- Locke, E. A., & Latham, G. P. (2002). Building a practically useful theory of goal setting and task motivation: A 35-year odyssey. *American Psychologist*, 57(9), 705-717.
- Lubienski, S. T. (2002). A closer look at Black-White mathematics gaps: Intersections of race and SES in NAEP achievement and instructional practices data. *The Journal of Negro Education*, 71, 269-287.
- Majors, R., & Billson, J. M. (1992). *Cool pose: The dilemmas of Black manhood in America*. New York: Lexington Books.
- McGee, E. O., & Martin, D. B. (2011). From the hood to being hooded: A case study of a Black male Ph.D. *Journal of African American Males in Education*, 2(1), 46-65.
- McGee, E. O., & Martin, D. B. (2011). "You would not believe what I have to go through to prove my intellectual value!": Stereotype management among academically successful Black mathematics and engineering students. *American Education Research Journal*, 48(6), 1347-1389.

- McGee, E. O. (2013b). Threatened and placed at risk: High achieving African American males in urban high schools. *Urban Review*, 45(4), 448-471.
- Moody, V.R. (2004). Sociocultural orientations and the mathematics success of African American students. *The Journal of Educational Research*, 97, 135-146.
- Noble, R. (2011). Mathematics self-efficacy and African American male students: An examination of models of success. *Journal of African American Males in Education*, 2(2).
- Nzuki, F. M. (2010). Exploring the nexus of African American students' identity and mathematics achievement. *Journal of Urban Mathematics Education*, 3(2), 77-115.
- Oakley, A. (2003). Research evidence, knowledge management and educational practices: Early lessons from a systematic approach. *London Review of Education*, 1(1) 21-33.
- Oates, G. L. S. C. (2003). Teacher–student racial congruence, teacher perceptions, and test performance. *Social Science Quarterly*, 84(3), 508–525.
- Ogbu, J. U. (1997). Understanding the school performance of urban African-Americans: Some essential background knowledge. In H. Walberg, O. Reyes, & R. Weissberg (Eds.), *Children and youth: Interdisciplinary perspectives* (pp. 190-222). London: Sage.
- Osborne, J. (1999). Unraveling underachievement among african american boys from an identification with academics perspective. *The Journal of Negro Education*, 68(4), 555-565.
- Owens, R. G. & Valesky, T. (2007). *Organizational behavior in education, 10<sup>th</sup> Edition*. New Jersey: Prentice Hall

- Pajares, F. (1996). Self-efficacy beliefs in academic settings. *Review of educational research, 66*(4), 543-578.
- Pintrich, P. R. (2003). A motivational science perspective on the role of student motivation in learning and teaching contexts. *Journal of Educational Psychology, 95*(4), 667-686.
- Popkewitz, T. S. (1998). *Struggling for the Soul: The Politics of Schooling and the Construction of the Teacher*. New York: Teachers College Press.
- Rivkin, S. G., Hanushek, E. A., & Kain, J. F. (2005). Teachers, schools, and academic achievement. *Econometrics, 73*, 417-458
- Rowan, B., Correnti, R., & Miller, R. J. (2002). What large-scale survey research tells us about teacher effects on student achievement: Insights from the prospects study of elementary schools. *Teachers College Record, 104*, 1525-1567.
- Rueda, R. (2011). *The 3 dimensions of improving student performance*. New York: Teachers College Press.
- Sandelowski, M. (1995). Sample size in qualitative research. *Research in Nursing & Health, 18*(2), 179-183.
- Sandelowski, M., Docherty, S., & Emden, C. (1997). Focus on qualitative methods qualitative metasynthesis: Issues and techniques. *Research in Nursing and Health, 20*, 365-372.
- Sanders, M. G. (1998). The effects of school, family, and community support on the academic achievement of African American adolescents. *Urban Education, 33*(3), 385-409.
- Sheppard, P. (2005). Successful African-American mathematics students in academically unacceptable high schools. *Education, 126*(4), 609–625.

- Schunk, D. H., & Pajares, F. (2005). Competence perceptions and academic functioning. In A. J. Elliot, C. S. Dweck (Eds.), *Handbook of Competence and Motivation* (pp. 85-104). New York, NY, US: Guilford Publications.
- Sleeter, C. (2001). *Culture, Difference and Power*. New York: Teachers College Press
- Somers, C. L., Owens, D., & Piliawsky, M. (2008). Individual and social factors related to urban African American adolescents' school performance. *The High School Journal*, 91(3), 1-11.
- Steele, C. (1997). A threat in the air: How stereotypes shape intellectual identity and performance. *American Psychologist*, 52, 613-629.
- Stewart, E. B. (2008). School structural characteristics, student effort, peer associations, and parental involvement the influence of school-and individual-level factors on academic Achievement. *Education and Urban Society*, 40(2), 179-204.
- Stinson, D. W. (2006). African american male adolescents, schooling (and mathematics): Deficiency, rejection, and achievement. *Review of Educational Research*, 76(4), 477-505.
- Stinson, D. W. (2008). Negotiating sociocultural discourses: The counter-storytelling of academically (and mathematically) successful African American male students. *American Educational Research Journal*, 45(4), 975-1010.
- Strutchens, M. E., Lubienski, S. T., McGraw, R., & Westbrook, S. K. (2004). NAEP findings regarding race and ethnicity: Students' performance, school experiences, and attitudes and beliefs, and family influences. In P. Kloosterman & F. K. Lester (Eds.), *Results and interpretations of the 1990 through 2000 mathematics assessment of the national*

- assessment of education progress (pp. 269-304). Reston, VA: National Council of Teachers of Mathematics.
- Taylor, L. C., Hinton, I. D., & Wilson, M. N. (1995). Parental influences on academic performance in African-American students. *Journal of Child and Family Studies*, 4(3), 293-302.
- Terry Sr, C. L., & McGee, E. O. (2012). " I've come too far, i've worked too hard!": Reinforcement of support structures among Black male mathematics students. *Journal of Mathematics Education at Teachers College*, 3(2), 73-85.
- Thomas, D. E., & Stevenson, H. (2009). Gender risks and education: The particular classroom challenges for urban low-income african american boys. *Review of Research in Education*, 33, 160-180.
- Thompson, L. R., & Lewis, B. F. (2005). Shooting for the stars: A case study of the mathematics achievement and career attainment of an African American male high school student. *High School Journal*, 13, 6-18.
- Thompson, L., & Davis, J. (2013). The meaning high-achieving African-American males in an urban high school ascribe to mathematics. *The Urban Review*, 45(4), 490-517.
- U.S. Department of Education. (2003). Status and trends in the education of Blacks, (NCES 2003–034). Washington, DC: National Center for Education Statistics. From <http://nces.ed.gov/pubs2003/2003034.pdf>
- Walker, E. N. (2006). Urban high school students' academic communities and their effects on mathematics success. *American Educational Research Journal*, 43(1), 43–73.

- Walsh, D., & Downe, S. (2005). Meta-synthesis method for qualitative research: A literature review. *Journal of Advanced Nursing*, 50(2), 204-211.
- Weiner, B. (2005). Motivation from an attributional perspective and the social psychology of perceived competence. In A. J. Elliot & C. S. Dweck (Eds.), *Handbook of competence and motivation* (pp. 73–84). New York: Guilford
- Wigfield, A., & Eccles, J. (2002b). The development of competence beliefs, expectancies for success, and achievement values from childhood through adolescence. In A. Wigfield & J. Eccles (Eds.), *Development of Achievement Motivation* (pp. 91–120). San Diego, CA: Academic Press
- Wright, S. P., Horn, S. P., & Sanders, W. L. (1997). Teachers and classroom context effects on student achievement: Implications for teacher evaluation. *Journal of Personnel Evaluation in Education*, 11, 57-67.
- Yan, W., & Lin, Q. (2005). Parent involvement and mathematics achievement: Contrast across racial and ethnic groups. *The Journal of Educational Research*, 99(2), 116-127.
- Zeichner, K. M. (2002). The adequacies and inadequacies of three current strategies to recruit, prepare, and retain the best teachers for all students. *Teachers College Record*, 105(3), 490-511.