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*Georgia State University*

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## ACCEPTANCE

This dissertation, YES, WE LIKE MATH TOO! – AFRICAN AMERICAN WOMEN MATHEMATICS EDUCATORS’ STORIES OF SUCCESS, by KATRINA ELIZABETH STANFIELD, was prepared under the direction of the candidate’s Dissertation Advisory Committee. It is accepted by the committee members in partial fulfillment of the requirements for the degree, Doctor of Philosophy, in the College of Education & Human Development, Georgia State University.

The Dissertation Advisory Committee and the student’s Department Chairperson, as representatives of the faculty, certify that this dissertation has met all standards of excellence and scholarship as determined by the faculty.

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YES, WE LIKE MATH TOO! –  
AFRICAN AMERICAN WOMEN MATHEMATICS  
EDUCATORS’ STORIES OF SUCCESS

by

KATRINA ELIZABETH STANFIELD

Under the Direction of Dr. David W. Stinson

ABSTRACT

For centuries, stories of the successes of African American women in mathematics have been somewhat invisible from history books. Their accomplishments, research, and inventions have been buried, stolen, omitted, and overlooked—in a word, hidden (Shetterly, 2016). The purpose of this study is to bring these accomplishments to the forefront by exploring the narratives of African American women mathematics educators. Considering the United States’ tumultuous history of racial and gender oppression and inequality, the plight and contributions of African American women mathematicians has often gone unrecorded and uncelebrated.

Womanism (A. Walker, 1984), therefore, was used as a frame of analysis to honor the experiences of mathematical successful African American women to be fully committed to their survival as women, and to share the practice of self-love (Jain & Turner, 2011–2012). The objective of this study was to identify accomplishments of four African American mathematics educators by collecting data through interviews using narrative case study analysis (e.g., Connelly & Clandinin, 1990) coupled with womanist theory. The research questions that guided the study were inquiring about whether (or not) race and gender had an effect on their matriculation from grade school through college, and if this intersection influenced their success

in mathematics. I also inquired about who or what influenced the life and schooling experiences of these successful mathematics educators, and whether (or not) these relationships influence their pedagogical philosophies and teaching practices in the classroom.

Through an analysis of the data, several themes were identified when exploring factors contributing to African American girls' and women's success in mathematics education. There were three commonalities: (a) at least one strong African American woman influence; (b) an absence of African American women mathematics teachers growing up or in college; and (c) they built strong insightful relationships with their students. The results indicate a need for African American women in mathematics education as role models in a male dominated field. Participants' narratives illuminated the intersections of race and gender, their role in the success of African American girls and women in mathematics education, and the theories and methodologies that support the analysis of narratives in research.

**INDEX WORDS:** African American women, intersectionality, mathematics educators, narratives, narrative analysis, womanist theory



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Katrina Elizabeth Stanfield

A Dissertation

Presented in Partial Fulfilment of Requirements for the

Degree of

Doctor of Philosophy

in

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in

the Department of Middle and Secondary Education

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Georgia State University

Atlanta, GA  
2020

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## **DEDICATION**

I dedicate this dissertation to my amazing husband, Kibwe and my sons, Nolan and Nicholas. I love you all dearly. To my parents, Grier Godfrey and Elizabeth Partridge-Godfrey, and my brother Grier Trevor—there is no me without each of you. You are my love and foundation.

And—to my mother, grandmothers, aunts, and African American women in mathematics education whose stories are never heard or told.....this is for you.

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## TABLE OF CONTENTS

LIST OF TABLES.....	vii
CHAPTER 1: NAVIGATING A NEW MATHEMATICAL WORLD.....	1
Introduction.....	1
My Story .....	1
Problem Statement .....	3
Research Questions.....	4
CHAPTER 2: LITERATURE REVIEW .....	5
Introduction .....	5
African American Girls, African American Women, Education, and Mathematics .....	6
Brief History: African American Education in the United States.....	7
Lack of Educational Research: African American Girls and Women in Mathematics .....	13
African American Women’s Positionality in Mathematics .....	15
African American Girls and Women in Mathematics .....	20
African American Girls in Mathematics (and in Gifted Classrooms) .....	21
Womanist Theory: Race, Gender, and Class in Mathematics Education .....	38
CHAPTER 3: THEORETICAL FRAMEWORK.....	44
Introduction.....	44
Womanist Theory.....	44
Historical Development of Womanist Theory .....	45
Theoretical and Methodological Appropriateness of Womanist Theory.....	51
Womanist Theory and Feminist Theory .....	53
Womanist Theory and Under-Served Populations .....	55
Narrative Analysis, Womanism, and Intersectionality .....	57
Concluding Words on Theory.....	60
CHAPTER 4: METHODOLOGY .....	62
Introduction.....	62
Qualitative Science .....	62
Narrative Case Study Analysis .....	64
Problem Statement .....	66
Guiding Research Questions.....	68
Research Setting.....	70
Research Participants .....	70
Data Collection .....	72
Data Analysis .....	74
Data Representation .....	77
Confidentiality and Ethical Concerns .....	78

Subjectivity Management Plan .....	79
Limitations .....	81
Implications and Future Directions.....	83
Concluding Words on Methodology.....	86
CHAPTER 5: FINDINGS AND ANALYSIS .....	88
Introduction.....	88
The Mover and Shaker: Elizabeth.....	89
Introduction.....	89
Educational Experiences from Grade School to College.....	90
Reflections of Success in College Mathematics .....	92
Successful Experiences in Teaching Mathematics .....	94
Summative Remarks on The Mover and Shaker .....	96
The Influencer: Ibbie.....	97
Introduction.....	97
Educational Experiences from Grade School to College.....	98
Reflections of Success in College Mathematics .....	100
Successful Experiences in Teaching Mathematics .....	102
Summative Remarks on The Influencer .....	105
The Changer: Louise.....	106
Introduction.....	106
Educational Experiences from Grade School to College.....	107
Reflections of Success in College Mathematics .....	109
Successful Experiences in Teaching Mathematics .....	111
Summative Remarks on The Changer .....	113
The Runner: Mattie .....	114
Introduction.....	114
Educational Experiences from Grade School to College.....	115
Reflections of Success in College Mathematics .....	117
Successful Experiences in Teaching Mathematics .....	118
Summative Remarks on The Runner .....	122
My Story – The Researcher: Katrina .....	124
Introduction.....	124
Educational Experiences from Grade School to College.....	125
Reflections of Success in College Mathematics .....	127
Successful Experiences in Teaching Mathematics .....	130
Summative Remarks on My Story – The Researcher.....	133
Discussion.....	133
Strong African American Woman Influence .....	135
Lack of African American Women Mathematics Teachers .....	142
Building Strong Insightful Relationships.....	148
Concluding Words on Findings and Analysis .....	154
Chapter 6: CONCLUSION AND RECOMMENDATIONS.....	156

Implications and Recommendations .....	159
Suggestions for Future Research .....	161
Conclusion .....	162
REFERENCES .....	165
APPENDICES .....	179



## LIST OF TABLES

Table 1 Participant Summary.....	134
Table 2 Summary of Participants' Family Characteristics.....	135
Table 3 Number of African American Woman Mathematics Teachers.....	143

## CHAPTER 1

### NAVIGATING A NEW MATHEMATICAL WORLD

*Many stories matter. Stories have been used to dispossess and to malign. But stories can also be used to empower, and to humanize. Stories can break the dignity of a people. But stories can also repair that broken dignity.*

– Chimamanda Ngozi Adichie

#### Introduction

In this chapter, I provide a description of my relationship with mathematics beginning in elementary school. My experiences in elementary school with mathematics was a successful yet tumultuous one that was reminiscent of a roller coaster ride. There were many highs and lows. Reflecting on my relationship and accomplishments with mathematics caused me to want to understand African American women’s success stories in mathematics. I wanted to know more about how they were able to deal with their roller coaster ride of navigating their race and gender while being a successful mathematics student and educator. I seek to use my research to examine the narratives of successful African American\Black<sup>1</sup> women mathematics educators. I conclude this chapter with the problem statement and research questions that will guide this research project.

#### My Story

My mathematical journey began in elementary school when I was identified with other students in the third grade as being accelerated in mathematics. Out of the entire third grade, only two other African American girls were identified along with me. I guess even then I realized I was classified as different. The three of us along with 25 White boys and girls were pulled out of

---

<sup>1</sup> African American/Black – For the purpose of my research, these terms “will be used interchangeable. Both terms refer to girls of African decent living in the United States” (Lindsay-Dennis, 2015, p. 517). African American will be the predominant term used throughout the research study unless Black is used by a reference.

our regular classes and put in a trial accelerated track that a teacher included as a part of her study for her master's thesis project. We were considered the advanced students in our grade, and the curriculum that we were taught spanned from grades 4–6. All the students in this advanced pilot group were successful with the advanced material, and we were able to have different experiences in our classes and outside in the community.

During this time, I was often teased by my African American friends for being placed in these new advanced math courses. They would say that I thought I was White or that I was acting White. They said I thought I was better than them. Honestly, I felt different, but I did not feel that I was White. I did not understand why I received ridicule from my own friends. Now, I did not fit in with people that looked like me or the students I was now in classes with.

Navigating these new classes was difficult, and I sometimes struggled with self-esteem and not being accepted by my peers. I started questioning if being smart was worth not being in the popular crowd. As an adolescent, being accepted was important. I did not like being picked on. I did not like being left out, and not invited to birthday parties. Although I did feel good about my accomplishments, I was in a lonely place.

I suppose being in church helped me cope with the highs and lows of feeling like an outcast in school. Church became my refuge. In church, I felt important, and I was included. In church, I had many friends that did not judge me. My parents had my brother and me involved in every aspect of the church. My family was at church from Sunday to Sunday. The beauty being at church almost every day was that our friends and their families were there just as much. We were a part of the youth ministry, youth usher board, youth choir, and youth Bible study. I was also a member of the Red Circle church group which was for young women to learn about manners, etiquette, and womanly values. In the Red Circle group and other youth groups, I built

strong friendships with other young women in my church. The older church women were our mentors and guides. We also learned from each other.

My core friendships and support came from my church and my family. They did not treat me like an outcast, and I drew my strength and confidence from them. Church helped build my self-esteem, because our youth leaders taught us how to sing and speak in public. Eventually, I was given the opportunity to speak in front of my peers at church as the Youth Day Speaker and as a panelist for Teen Summit. My family and my church family had a significant influence on my life. My very being was shaped and molded by those experiences which helped me deal with school.

Later in life, I realized excelling sometimes meant not fitting in with anyone, and that was okay. Excelling also meant sometimes fitting in with everyone depending on the environment. Over time, I have developed a sense of pride to have many African American women who were my mentors, church friends, study partners, listeners, and storytellers. I was able to use their stories as inspiration, and eventually I was able to share mine.

### **Problem Statement**

Using qualitative research methodology, positioned in womanist theory, I interviewed five African American women between the ages of 35 and 70 who have been “successful”<sup>2</sup> in mathematics education. These women have completed their graduate studies in mathematics or mathematics education and have worked in the education field teaching middle school or high school mathematics for at least 10 years. I investigated how the intersections of race and gender influenced the personal and professional lived experiences of these African American women using narrative case study analysis.

---

<sup>2</sup> Successful in mathematics – One that achieves high scores on standardized tests, receives above average grades, exceeds average/norm in mathematics, and/or takes advanced level courses (Martin, 2000).

## **Research Questions**

1. What factors do mathematically successful African American women attribute to their success in mathematics courses in grade school and in college?
2. What did these mathematically successful African American women do inside and outside of the mathematics classroom to cultivate and nurture success in mathematics?
3. How did these mathematically successful African American women navigate their gender and race during grade school and in college, and did this intersection influence their success in mathematics?
4. Who or what influenced the life and schooling experiences of these successful mathematics educators? Did these relationships influence (or not) their pedagogical philosophies and teaching practices in the classroom?

## CHAPTER 2

### LITERATURE REVIEW

*The single story creates stereotypes, and the problem with stereotypes is not that they are untrue, but that they are incomplete. They make one story become the only story.*

– Chimamanda Ngozi Adichie

#### Introduction

In my opinion, my ancestors' storytelling was their method of scholarship because some were not afforded the opportunity to go to school. They divulged stories as a way of teaching their children and grandchildren about authentic lived experiences of African American women. My cousins and I gained information about African American women's experiences in our family, and we were taught the importance of education. We learned how our mothers' and grandmothers' lives were molded through their successes and failures in school and in the workplace while enduring the oppressions of being lower class, African American, and a woman. The juxtaposition of class, race, and gender situated the African American women in my family and other African American women in educational spaces where they had to learn to navigate and survive.

In this literature review, I examine the history of African American girls and women and their relationship with education and mathematics. I give a brief overview of the history of African American people and their education in the United States along with a synopsis of the positionality of African American students in mathematics. This literature review also highlights the lack of educational research of African American girls and women in mathematics and examine womanist theory as it relates to African American women and their stories.

## **African American Girls, African American Women, Education, and Mathematics**

African American women's identities are not one-dimensional and their stories of mathematics success are rarely given a "voice" in research studies. When their narratives are highlighted, they are condensed and clustered with other groups of people and are seldom expressed in ways suitable and reflective of the intersections of race and gender (Baxley, 2012). Gender and race groupings "seek to erase meaningful cultural differences among social groups and to silence internal racial identity politics in favor of collectivism" (Martin, 2009a, p. 27).

By the pure nature of identifying as African American and a woman, students encounter situations exclusive to them while navigating educational institutions in the United States (Martin, 2012). Regularly in schools, "African American students work in the struggle against racism, educational tracking, and the systematic negotiation and devaluation of their histories" (p. 47). In the sporadic mathematics education research on African American women, their portrayal as one-dimensional students reject the significance of examining culture, gender, and racialized concepts as contributors to identity formation. Identity intersections and educational experiences impact African American women's value of self and contribute to their success or lack of success in mathematics.

External and internal influences upon African American women's identity construction includes but are not limited to peer pressure, gender stereotypes, race, media, home life experiences, positive mentors, and disabilities (Newman, 2007). Excluding these variables in mathematics educational research contributes to the "disparities in achievement and persistence [which] are then inadequately framed as reflecting race effects rather than as consequences of the racialized nature of students' mathematical experiences" (Martin, 2009b, p. 295).

With the support of my review of the literature, I explore the achievement and persistence of African American women graduates and postgraduates in mathematics and assess what contributed to their robust mathematical identity<sup>3</sup> and success in high-level mathematics courses. This literature review opens with a brief history of mathematics education of African American people in the United States and follows with an exploration of the lack of educational research that focuses on African American women's academic achievements in mathematics. Additionally, I assess the primary causes for the omission of this critical focal group.

As one of three African American women in advanced-level mathematics courses from elementary school to middle school and one of maybe ten through high school, I was constantly compared to my White classmates. Navigating this space would have been difficult had it not been for my confidence in my mathematical abilities and depth of self-identity. Because of my experiences, a comparison between African American and White women's position and identity formation in mathematics education is noteworthy to emphasize. Through the lens of womanist theory, I evaluate the intersections and effects of race, gender, and class in mathematics education particularly with African American women. Finally, I discuss the power of educational identity and positionality and success in mathematics on the future choices of African American women to pursue advanced-level mathematics courses and mathematics-related careers.

#### *Brief History: African American Education in the United States*

Martin's (2012) "critical analyses have shown that mathematics education research and policy are deeply implicated in racialized constructions of who is considered mathematically literate and who is not" (p. 50). Generally, racialized constructions worked as a catalyst in

---

<sup>3</sup> Mathematical Identity – "Martin's (2000) concept of mathematics identity, [is] defined as students' beliefs about their mathematics abilities, their beliefs about the instrumental importance of mathematics, their beliefs about the opportunities and constraints that exist to participate in mathematics, and their motivations to obtain mathematics knowledge" (Stinson, 2008, p. 977).



devaluing the educational narratives in research studies and diminishing mathematics success and experiences of African American students. Although the “research literature does not...[specifically] address aspects of the mathematics education of African American students before the early 1980” (Snipes & Waters, 2005, p. 108), there are some research studies documenting the educational experiences during the periods of desegregation, the *Brown vs. Board of Education*<sup>4</sup> court ruling, and the No Child Left Behind Act (NCLB)<sup>5</sup>.

Growing up, I always heard stories from my parents about using old and tattered textbooks and going to one-room schools without heat or air conditioning during the 1950s and 1960s in Greenville, Georgia. Walking to school daily while nice school busses drove past them on the way to the White schools served as a constant reminder of things being separate and unequal. My parents often talked about their parents and grandparents not being afforded the opportunity to receive an education. My paternal and maternal grandparents tried teaching themselves, and they also asked their kids to teach them how to read and write. I remember my grandfather writing his mark, which was an X because he could not write or spell his name.

During the 1800s, “many states created laws prohibiting the education of not just slaves but also free or freed Blacks” (Ricks, 2014, p. 12). Marable (2005) states that before desegregation—

In 1896, in the *Plessy v. Ferguson* decision, the Supreme Court had declared that racially segregated schools were constitutional, provided that all-black schools were “separate but equal” to white schools. In practical terms, however, the separate-but-equal standard

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<sup>4</sup>For more information on *Brown vs. Board of Education*, see: <http://www.nps.gov/brvb/index.htm>.

<sup>5</sup> For more information on No Child Left Behind, see: <http://www.nea.org/home/NoChildLeftBehindAct.html>.

created and perpetuated gross inequalities in the educational access of African Americans, especially in the Jim Crow South. (p. 34)

Many did not recognize, want to recognize, or care to recognize the educational disparities between racial groups. Hatred ran deep. Yet there were some educational activists on both sides that pushed the government for change. In 1954, the *Brown vs. Board of Education* ruling “set the legal framework for the emergence of what would become a mass Black Freedom movement to overturn legal racial segregation in all public accommodations and institutions” including schools (Marable, 2005, p. 34). With this decision, the United States Supreme Court “recognized that separation of students by race was a means of perpetuating white dominance in every important aspect of life...and [served] as a catalyst for the modern Civil Rights Movement” (Snipes & Waters, 2005, p. 109).

The deep-rooted hostility and disapproval for school integration, and opposition translated into institutionalized and structural racism particularly within the educational system (Rury, 2014). There were many “widely publicized battles over desegregation [which] added fuel to the fire...and [there were] conflicts over questions of educational equity, curriculum change, and discrimination on the part of teachers and administrators” (p. 255). In their historical research, Snipes and Waters (2005) note, “institutionalized and structural racism is when an organization’s rules, procedures, and practices carried out by members by the dominant group have a negative impact on members of the subordinate group” (p. 110). Because of tremendous opposition and structural racism, it took many years for schools to be integrated, and additional Supreme Court rulings had to force institutions into compliance. After the Brown II decision in 1955, the Civil Rights Act of 1964, and the Voting Rights Act in 1965, schools were slowly

integrated, but structural and institutionalized racism has never disappeared (Snipes & Waters, 2005).

While some changes have occurred, African American students remain marginalized and devalued by having minimal contact with new technologies, being tracked<sup>6</sup> away from advanced classes especially in mathematics, detaching students from course standards by not relating their lives to the material, and not subjecting them to adequate teachers in the lower-level courses in which they were tracked (Snipes & Waters, 2005). Often, African American students, specifically African American male students, are “characterized as incapable of measuring up to schools’ predetermined goals and objectives and lacking the behavioral and social skills and life experiences to be academically successful” (Stinson, 2006, p. 485). These tactics, in many ways, led directly to modern day race, class, and gender segregation within schools and school districts, and helped to define what value is placed on education and educational access.

The continuous “dismissal and resistance only amount[ed] to a desire to maintain status quo and to avoid the work of understanding how society’s laws, policies, and practices routinely continue to converge in subjugating Black children” (Martin, 2009a, p. 30). Critics of the educational system such as Ricks (2014) often discuss “the complexity of systemic and interlocking forces at work in education, which can sometimes lead to a Band-Aid approach” (p. 10) to fixing the disparities with underrepresented groups. Over “sixty years since that landmark decision, Blacks, regardless of gender, age, educational level, and income level, find themselves continuing to fight the same battle—demanding educational equity and fighting for the rights of their children” (p. 12).

The No Child Left Behind Act (NCLB) of 2002 was signed by President George W. Bush

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<sup>6</sup> For more information on tracking, see: <http://www.theatlantic.com/education/archive/2014/11/modern-day-segregation-in-public-schools/382846/>.

in order to “level” the educational playing field for African American students by making education more accessible through governmental funding for schools in low-income areas (Snipes & Waters, 2005; U. S. Department of Education, 2015). Although the NCLB Act was the federal government’s “educational reform designed to improve student achievement and change American school culture...the federal government expected the state education systems to make sure that no child is left behind” (Snipes & Waters, 2005, p. 108). Hursh (2007) revealed, “for many neoliberals, the ultimate goal of the [NCLB] reform [was] to covert the educational system into markets and, as much as possible, privatize educational services” (p. 501). Darling-Hammond (2007) describes how—

Civil Rights advocates initially hailed the Bush Administration’s major Education Bill, optimistically entitled ‘No Child Left Behind’ (NCLB), as a step forward in the long battle to improve education for those children traditionally left behind in American schools—in particular, students of color and those living in poverty. (p. 245)

Various advocates for educational equity like Hursh and Darling-Hammond realized that the NCLB goals for African American students and other underrepresented groups were never fulfilled, and they had no problem voicing their disappointment with the NCLB facade.

Ultimately “the complex requirements of the law...failed to achieve [the] goals, and...provoked a number of unintended negative consequences which frequently harm the students the law is most intended to help” (Darling-Hammond, 2007, p. 245).

When I started teaching high school mathematics in 2004, my initial professional development session included information about the NCLB Act. I quickly recognized that NCLB and other regulations forced me to focus on low achieving groups, particularly African American students, and concentrate on tracking students’ mathematical progress through testing. In my

district, we also had to maintain deficiency<sup>7</sup> log reports, which mainly brought attention to the African American students that were not measuring up to the standards. To stay in compliance with district and mathematics departmental rules, I had to make sure to communicate with, remediate, and retest underachieving students. Teachers were required to give student updates during parent conferences, data meetings, and teacher evaluations using the deficiency log reports as our supporting documents for students' successes and failures. In some of these meetings, I witnessed "African American children...[being] characterized as incapable of measuring up to schools' predetermined goals and objectives and lacking the behavioral and social skills and life experiences to be academically successful" (Stinson, 2006, p. 485) by teachers and administrators. This "perceived deficiency...[led those] school administrators and teachers to hold lower achievement and behavioral expectations for African American students" (p. 486). Consequently, after the NCLB Act, many of us started believing that our job as educators was evolving into being menders and fixers.

The discourse of deficiency<sup>8</sup> (Stinson, 2006) "cast African American students as needing to be "fixed," as opposed to casting the instructional system as the problem in need of fixing" (Jackson & Wilson, 2012, p. 358). Jackson and Wilson (2012) explain—

In exchange for federal dollars, NCLB requires states, which in turn require districts and schools, to report disaggregated student performance data in terms of racial (and other) groups. As a result, educational practitioners and researchers are operating in a context where there is perhaps more emphasis than ever before on comparing groups of students' performances on standardized assessments of mathematics. (p. 358)

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<sup>7</sup> Deficiency log – a letter outlining student's low and/or failing grades during the semester midpoints.

<sup>8</sup> The discourse of deficiency "focuses on the perceived deficient cultural, schooling, and life experiences in general of Black children" (Stinson, 2006, p. 483; emphasis added).

Our school's other disaggregated data reports helped to compare and emphasized the dismal number of African American girls in advanced-level mathematics courses. This data had me wondering why after all of the years since *Brown vs. Board of Education*, Civil Rights Act, and numerous other reforms that focus on educational equality, so few African American girls choose to enroll in advanced mathematics courses. So, I went digging. I searched numerous databases, books, and other resources looking for educational research on African American girls and women success in mathematics. After hours, days, and weeks of searching, not much turned up focused solely on African American girls and women achievement in mathematics. In the articles that I found, they were grouped with either all African American people or with all girls and women. The absences in research certainly sparked my curiosity and drive to highlight success stories in advanced-level mathematics for African American girls and women.

*Lack of Educational Research: African American Girls and Women in Mathematics*

As a little girl all I heard from my parents was that you will do well in school, and you will go to college and be successful. They placed a high value on education because they grew up as African American people in the South during the 1950s and 60s where they were not always afforded the best educational experiences. Historically, research studies position African American women and White women differently, and “when researchers examine marginalized groups in education, the focus is almost exclusively on Black males and White females, with little attention devoted to the unique experiences and needs of Black females” (Ricks, 2014, p. 11). Muhammad and Dixson (2008) explain—

The mainstream public and the Black community, in life as in literature, often overlook Black female experiences from childhood through adulthood. Overwhelmed by “the Black problem” in education, research on the underperformance of Black students

generally, and young Black males specifically, abounds in education and allied fields. (p. 163)

My parents realized that I could be limited in my life choices and opportunities if I did not excel in my studies, especially in mathematics. Because of their undergraduate backgrounds in science and mathematics, they shoved me into courses and majors that were “gate-keeper” focused subjects (Stinson, 2004).<sup>9</sup> Stinson reaffirmed the idea “that reveals [the] existence of mathematics as a gatekeeper (and instrument for stratification) in the current education structure of the United States” (p. 9). He also disclosed that “over 2300 years ago...Plato believed that mathematics was of value for all people in everyday transactions, [but] the study of mathematics...should be reserved for those that were ‘naturally skilled in calculation’; hence, the birth of mathematics as the privileged discipline or gatekeeper” (p. 9). The birth of mathematics disparities, and “the concept of mathematics as providing the key for passing through the gates to economic access, full citizenship, and higher education is located in the core of Western philosophy” (p. 12). So, my parents were on the right track when they pushed me toward mathematics!

Because of the mathematics gatekeeper mentality in education, my parents recognized that there was a lack of African American girls’ presence in the advanced-level mathematics courses and advanced degrees. They pushed me to pursue a degree and career in mathematics, because they saw the endless opportunities for scholarships and jobs for me being a woman and being African American. This shortage has also fueled my need to conduct research that

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<sup>9</sup> Mathematics as gatekeeper – “The concept of mathematics as providing the key for passing through the gates to economic access, full citizenship, and higher education is located in the core of Western philosophy” (Stinson, 2004, p. 12).

highlights success stories of African American girls and women in mathematics and their position in mathematics education.

Given that there is a low enrollment of African American girls and women in advanced-level mathematics courses, there is consequently an absence of research and stories of success, which makes my research even more important. Stinson (2004) proclaims—

In the United States, school mathematics evolved from a discipline in “crisis” into one that would provide the means of “sorting” students. As student enrollment in public schools increased, the opportunity to enroll in advanced mathematics courses (the key) was limited because some students were characterized as “incapable.” Female students, poor students, and students of color were offered a limited access to quality advanced mathematics education. (p. 12)

#### *African American Women’s Positionality in Mathematics*

When I often reminisce about my experiences in mathematics courses, I remember being compared to other students in class. I was often the only or one of the few African American students in the advanced courses from elementary school through high school. I had to discover how to navigate this space and find my position very quickly. Learning to work cooperatively with White students, while trying to maintain my “Blackness” with the African American students became a tough space to inhabit. I, like many other African American girls, learned to survive in school by adopting a “race-less” persona by denying who we were and adopting the characteristics of the majority culture, so as to be successful African American girls in education (Ricks, 2014). Our position was to try to fit in. Ricks argues that this assimilation “logic is problematic in that it teaches Black girls that in order to be successful, they cannot be who they are organically” (p. 14). To ensure I excelled at my studies, especially mathematics, I had to



study hard as I maintained active involvement in extra-curricular activities. My mom felt being “well-rounded” was just as important as maintaining all A’s.

Although I had a strong determination to do well, I was also fortunate enough to have a support system, access, and an opportunity to enroll in advanced-level courses, which helped with my positionality in school. The open entry and access that I had to advanced courses was often not the norm for other African American girls. In comparison to White women, “African American women, the stark contrast of what is deemed ‘normal,’ are frequently deemed lesser in both ability and intellect” (Farinde & Lewis, 2012, p. 422). Generally, African American girls’ presence in advanced mathematics and other STEM<sup>10</sup> courses were underrepresented and disregarded. Ricks (2014) wondered, “Where do Black girls fit within a society [and educational system] that historically marginalized<sup>11</sup> them based on race and based on gender” (p. 15). She wanted to find the positionality of African American women and girls in mathematics educational environments.

Positionality is a term that “has been used to describe an individual’s self-perceived social location that informs that individual’s world-view. According to positionality theory, an individual’s position in relationship networks defines that individual and determines the amount of individual power” (Adams, LaFrumenta, Pringle, & West-Olatunji, 2009, p. 1). Positionality, “whether consciously or unconsciously, the engrained perceptions, beliefs, and popular depictions of African American women, past and present, have led many to either overlook or discount their contributions and capabilities” (Farinde & Lewis, 2012, p. 422) in mathematics and other STEM subjects. This self-concept is often the determining factor for success or failure

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<sup>10</sup> STEM – The acronym for science, technology, engineering, and mathematics.

<sup>11</sup> Marginalization – “the social process of being made or becoming marginalized (relegated to the fringes, made to seem unimportant, pushed out of or not accepted in the mainstream)” (b. hooks as cited in Ricks, 2014, p. 14).

in education.

Some of my African American friends in high school would often ask me how I was able to take Advanced Placement mathematics courses and participate in so many activities. We would have conversations about studying together, making good grades, and our plans after high school. During that time, I figured that the only difference between them and me was the course choices they picked with their counselors and the course placement pathways they chose. What I did not realize was that “positionality is a salient element of all classroom dynamics” (Adams et al, 2009, p. 2). Until I went to college and became a mathematics educator, I did not understand that there were “large gender-based disparities and inequities in education and...in particular, girls of color and girls from low-income backgrounds underperform academically compared with their white, higher-income peers” (Center for American Progress, 2014, p. 1). I observed that a lot of “school personnel spending more time addressing the social skills of African American girls (speech and dress patterns), and less time promoting their academic skills” (Adams et al, 2009, p. 2). School faculty and staff addressing African American girls’ social skills coupled with the employing “achievement test and ability group tracking weakens African American female students’ confidence in their personal abilities, formulating negative perceptions of math and science, while reinforcing inaccurate stereotypes about girls’ strengths and weaknesses” (Farinde & Lewis, 2012, p. 423).

In hindsight, I realized that some of the African American girls in my school “often lack[ed] access to high-quality, rigorous courses, particularly in science, technology, engineering, and math, or STEM...[which could have led to] better preparing them for college and for careers that pay competitive wages” (Adams et al, 2009, p. 1). Ricks (2014) contends, “the needs of Black girls [are] often overlooked by teachers, administrators, and policy makers”

(p. 10). Consequently, “this oversight has contributed to a lack of educational programming and policies that address the impact of the intersection of racism and sexism on the educational experiences of Black girls, with some attention to the achievement gap” (p. 10). So, how was my positionality any different than theirs?

Initially, I believed having a combination of personal internal drive for success and a stable support system were the solutions to opening the gateway for success in mathematics for African American girls and women like me. Having an internal drive for success meant being determined to be the best and thrive without someone constantly pushing you to do well. Stable support systems could be family, mentors, friends, individual, and groups that give encouragement, reassurance, strength, and care to someone for the purpose of uplifting and building the internal drive for success. I felt that these things would situate my African American women friends in a space where they could succeed in mathematics like me. But Stinson (2006) acknowledged through his research that “the institutional deficiency theory [affirmed] that Black children perform less well academically than White children because the institution of school is not organized to favor them...[rather] to suppress the aspirations of children from disadvantaged groups” (p. 484). Along with the institutional deficiency theory, “positionality is present in the classroom where power dynamics among teachers and students are affected by gender and racial differences. This position determines the level of power an individual possess and if internalized, impacts their access to opportunities” (Adams et al, 2009, p. 1–2). Another obstacle affecting positionality in the educational system African American girls is school discipline. The White House Council on Women and Girls (2014) researchers found—

girls of color also face unique challenges regarding school discipline. Black girls enrolled in public schools are six times more likely (12 percent) ...to be suspended from school

than their White peers (2 percent). Additionally, nearly one in five girls of color with disabilities receive an out-of-school suspension compared with just 6 percent of White girls with disabilities. (p. 8)

How can African American girls and women learn or excel when they are not in school because of suspension?

According to the National Assessment of Educational Progress (NAEP) “in math, the gap in proficiency between boys and girls is only 1 percent, but large race-based gaps persist. While 44 percent of white girls reach proficiency in math, just 15 percent of black girls...reach proficiency” (Center for American Progress, 2014, p. 2). These are alarming numbers and should raise red flags for lawmakers and educational advocates for equity. Although some assessment scores have generally “improved for girls...since 2000, girls of color remain behind. But while girls of color are more likely to graduate from high school than boys of color, Black girls are 14.6 percentage points less likely...to graduate than White girls” (The White House Council on Women and Girls, 2014, p. 8).

While African American girls and women “share such issues as sexism, motherhood/parenting, body issues, with our White female counterparts” (Ford, 2014, p. 9), we do not share the same issues when analyzing assessment scores and other aspects for opportunity in education. African American girls and women have often been in a position to “privilege their race or gender identities, rather than embracing both and [they are] den[ied] the opportunity to embrace” (Rick, 2014, p. 14) the multidimensional portions of themselves. Like many other African American girls, I learned how to ignore my gender, race, and or social class in different educational spaces that I navigate through daily.

Although my parents came from a sharecropping upbringing, they both went to college and medical school. They maintained a successful dental practice for over twenty years as one of two African American dentists in our small town. In my eyes, we were not a part of the upper social class by any means, but my peers identified us as “rich.” We did not live in a fancy big house or drive expensive cars. We lived a very modest life, but I knew that my parents were growing their wealth for our future. I did not wear name brand clothes, and I had to work for the things that I really wanted by working at the town movie theater. My mom was serious about us working hard at work and in school, and she taught us how to not flaunt what we had. This type of “societal invisibility” (Rick, 2014, p. 15) has been the mantra of many African American women, which led to theories and methodologies like Womanism to address intersections of gender and race in research.

### **African American Girls and Women in Mathematics**

President Obama frequently discussed the daily narratives of African American women when he first got into office. While in office, President Obama created The White House Council on Women and Girls in 2009 “to ensure that every agency, department and office in the federal government takes into account the needs and aspirations of women and girls in every aspect of their work” (The White House Council on Women and Girls, 2014, p. 2). During his discussion centered on the position of African American women and girls, President Obama stated—

Women of color struggle every day with biases that perpetuate oppressive standards for how they’re supposed to look and how they’re supposed to act. Too often, they’re either left under the hard light of scrutiny, or cloaked in a kind of invisibility. (p. 2)

The Council emphasized, “when addressing the challenges women and girls of color face—

challenges that often lie at the intersection of race and gender—we often fail to fully acknowledge, and account for, this complexity” (p. 2). This certainly holds true for some of the research dedicated to examining the relationship between African American girls and women in mathematics education.

*African American Girls in Mathematics (and in Gifted Classrooms)*

Within the past decade there has been an upswing for research studies inclusive of African American girls and women in mathematics education. Although the research is still limited, Dr. Morgan Williams’ literature review delivered a foundation for her 2017 dissertation research study “by chronicling historical moments related to Black girls and women’s schooling and unpacking the complexities of their multi-layered teaching and learning experiences in the mathematical arena” (p. 17). M. Williams provided a background of Blacks in education by revealing historical experiences beginning with preventive educational practices during the enslavement of Africans in America. She emphasized the way many of the enslaved Africans challenged the system by learning to read and write despite laws against Blacks being taught these skills (M. Williams, 2017). Transitioning from the suppression of education for slaves to public education for Blacks to Black women and girls in mathematics education to Spelman women’s quest for mathematics, M. Williams’ evolution through the literature painted an amazing portrait of mathematical success timeline for Black girls and women.

Gholson and Martin (2014), in their study of African American and mathematics, took “an intersectional and emic view to studying a group of African American girls in a third-grade class” as they “attempt[ed] to capture the complexity of mathematics learning for these girls” (p. 19). The purpose of the study was—

to reframe Black girls in the context of mathematics education by first and foremost

putting Black girlhood in the picture. We attempted to highlight the ways in which race and gender uniquely shift in the social and learning experiences of Black girls creating different forms and expressions of Black girlhood. Instead of defining Black girls singularly, we sought to produce thematic representations of Black girlhood emanating from the data—bullies, smart girls, mean girls, and Black girls—to show how individuals and collectives of Black girls’ resist, revise, challenge, and reinforce different representations. (p. 32)

Gholson and Martin posed a number of questions: “What does it mean to be a learner and doer of mathematics in the context of being a young Black girl? and What does it mean to be a young Black girl in the contexts of learning and doing mathematics?” (p. 19). Black girlhood was defined as “being a girl, being Black, and being in middle childhood” (p. 20). Although the definition appears simplistic, Black girlhood is very complex and intersectional. They used “the girls’ voices in this study to make sense of the emergent social structures that organize access to mathematics participation and learning” (p. 19).

The participants’ social structures played a major part in the experiences of the African American girls in the mathematics classroom (Gholson & Martin, 2014). The girls’ mathematical learning experiences were influenced by “being surrounded by, making friends with, and being taught by other Black women and girls [which created] an opportunity for Black girlhood and womanhood to be defined in multiple ways” (p. 20). Throughout the observations and interviews “identities and positions emerge[d] as students negotiated these social networks and classroom-based communities of practice” (p. 32). Gholson and Martin (2014) realized that “analyzing the content of the girls’ talk—about themselves, about others, and about their relationships and social positions relative to others—and the style of their talk are useful strategies to make visible

their intersectional selves” (p. 20). During the research process, Gholson and Martin wanted to understand how two specific girls— “Shawna and Mia—were positioned and the circumstances around which their positions were mutually enforced or denied by the community of practice and/or the social network” (p. 24). They contemplated “the girls’ experiences moving in, out, and through the community of practice (as mediated by the social network) [and] attempted to capture a phenomenal aspect of their mathematics learning (p. 24). Ultimately, Gholson and Martin acknowledged that their—

framing suggests that the intersection of different identities confers unique privileges and disadvantages in different situations and contexts. Therefore, Black girlhood in our view is not to be perfected or achieved in a universal or developmental sense, but rather, to be seen as an elastic, eclectic, and useful construction for understanding the life experiences of Black girls. (p. 32)

Overall, the Gholson and Martin study emphasized, “the ways in which race and gender uniquely shift in the social and learning experiences of Black girls creating different forms and expressions of Black girlhood” (p. 32).

Haynes, Stewart, and Allen (2016), in their attempt to capture the unique social and learning experiences in general of African American girls and women, examined the consequences of African American girls and women traversing through their education while trying to overcome the master narrative imposed from society. This research team, however, were active participants in the project because they selected collaborative auto-ethnography (CAE) “to deconstruct” their “prior classroom experiences as Black girls and women using the invisibility syndrome paradigm” (p. 384). In the process, they—



assembled items that triggered memories from our years of formal schooling in the United States. By in large, that began with looking back at family photos of ourselves as grade school, high school, and college students. Independently, we gathered as much information as possible about our past educational experiences, particularly those from within the classroom. (p. 384)

The study exposed the researchers' experiences as African American women in the first-year of their PhD program. Here, they "encountered a classroom unlike any experienced before. For the first time, we were taught to identify and deconstruct educational norms that reinforce racism, sexism, and other acceptable forms of oppression" (p. 380).

Haynes and colleagues (2016) retellings of their journey in and through education revealed many alarming events of injustices; one particular event occurred in a mathematics classroom. Their narratives of suppression, disrespect, racism, sexism, and neglect cause African American women and girls to acquire feelings of invisibility and powerlessness (Haynes, et.al, 2016). Haynes and colleagues explained how "Black girls are socialized early to ascribe to a subordinate status in schools" (p. 382). They further described how the "racist and sexist structural inequality that Black women experience was designed to provide us with very little access to political power. Despite that, Black womanhood remains a publicly traded-on commodity that has defied time and space" (p. 382).

For many years there was a socially fashioned "master narrative...rooted in White supremacist ideology that permits racists and sexist conditioning...that denigrates Black womanhood" (Haynes et al., 2016, p. 382). Haynes and colleagues acknowledged that this narrative enabled "the subordinate status that Black women have been assigned...[and] has

successfully attributed [them] with little value in American consciousness” (p. 382).

Collectively, they affirmed—

looking back on our experience as doctoral students, we now recognize how feelings of invisibility could have inhibited our ability to successfully make the transition to independent researcher. By way of our doctoral training, we learned (and now teach our students) how to disrupt the master narrative that renders Black women and girls invisible with critical-inclusive pedagogy (Stewart, 2016) and scholarship. (p. 388)

Subsequently, these negative patterns of feeling invisible have been consistent amongst African American women and girls, and a major contributor to the lack of research focused on successful African American women in mathematics education. Their findings—

suggest that unless disrupted by counter-hegemonic teaching practice, academic transactions can promote a brand of invisibility marked by the effects of *race* on *gender*, which is conceivably symptomatic of the racialized sexism Black women and girls experience inside, and outside of the classroom. (p. 388)

Once Haynes and colleagues (2016) were able to consider their experiences in the doctoral program, they could disturb the master narrative and suppress the feelings of being invisible. They were now capable of training other African American women and girls in ways to break free of the master narrative and forge their own path to success. Triumphant, everyone involved in the study was able to “find [their] dignity in liberation from the racist and sexist oppression that persists inside, yet outside of the classroom (hooks, 1981), in the development of a scholar identity” (p. 388).

Campbell (2012) investigated “the extent to which teachers influence Black girls’ opportunities along the math pipeline. The aim [was] to determine the role of Black girls’

cognitive and non-cognitive behaviors on teachers' decisions to place them in advanced courses" (p. 390). She recognized "the underrepresentation [of Black girls] begins early in the education process and continues into college and later occupations. For women of color, the intersectionality of race and gender magnifies the inequities in access to math and science" (p. 389–390). She used "a logistic regression to estimate the probability of being recommended for advanced courses as a function of school, peer, family and individual student factors" (p. 396). Campbell reviewed—

nationally representative survey data, the findings indicate that Black girls' confidence in their ability to master skills taught math reduced the odds teacher recommendations to advanced courses. Additionally, teachers' expectations of the educational attainment of Black girls were related to the recommendation process. Overall, the findings suggest that subjective beliefs held by students and teachers critically influence Black girls' persistence along the math pipeline. (p. 389)

From a 2011 National Science Foundation report, Campbell (2012) discovered "Black, Hispanic, and American Indian women comprise 3% of the science and engineering workforce. Despite steady increases in undergraduate degrees earned by Black women, only 7% major in STEM-related fields" (p. 390). Many believed that this decrease is directly influenced by teacher and counselor tracking; Campbell used teacher, student, and administrative surveys to collect data about "socio-demographic and educational characteristics; school experiences; extracurricular and sports participation; use of time; standardized test scores; values; and expectations" (p. 393).

Campbell acknowledged "that in high-poverty schools, counselors frequently enrolled Black students into classes without directly speaking with them due to time constraints and

limited personnel. These studies illustrate how counselors' decisions consciously and unconsciously maintain educational inequalities among students" (p. 391). Ultimately, the study uncovered—

the importance of Black girls' cognitive and non-cognitive behaviors on teacher recommendations. As expected class participation has a positive effect on teachers' recommendation decisions, however, belief regarding mastering math skills negatively affects future assignments. In addition, teachers' beliefs about students' educational attainment affect recommendation decisions. Taken together, the findings from this study suggest that subjective beliefs held by students and teachers are critical factors that influence Black girls' math pipeline outcomes. (p. 399–400)

To address the issue of underrepresentation of African American girls and other girls of color in STEM related fields, school leaders need to take notice of the power teachers and counselors have on guiding these students into STEM related classes like mathematics. Scheduling practices need to be taken into account in order to positively and fairly enroll African American girls and other girls of color into upper level mathematics courses and other STEM courses.

For nearly four centuries, African American girls' and women's images have been painted in a condescending fashion due to enslavement and years of oppression. Gholson acknowledged in her 2016 study, the various ways African American girls and women were ostracized by public opinions and sometimes their own community. Data in her identified "since the mid-1880's, the images surrounding Black girls and women have responded to shifts in the economy, media, and popular culture, but many of these images remain denigrating to Black girls and women" (p. 291). Many "Black feminist scholars have enumerated and traced the origins of stereotypical images, including mammy, matriarch, welfare recipient, hot mama, bad

Black mother, jezebel, and angry Black woman” (p. 291). Over time “prevailing narratives about White girls and women, as well as Black boys and men, make the existence of coherent narratives of Black girls and women in mathematics essentially impossible” (p. 290).

Gholson (2016) discussed the ways “Black girls and women serve as a referent group providing a quiet, invisible, and menial labor of sanitizing theoretical and empirical spaces for other demographic groups” (p. 290). According to the National Women’s Law Center in 2014, “the pernicious stereotypes that lead to disidentification with the discipline of mathematics, Black girls often lack basic access to high quality, advanced mathematics and science courses in schools located in their communities” (p. 291). Examining relationships with mathematics, Gholson investigated “the construction of Black girls and women in mathematics is something of a paradox. That is, Blacks girls and women are constructed in mathematics for the purpose of becoming invisible” (p. 295). She was disheartened that “Black girls and women lurk in the proverbial shadows of inquiry of mathematics education and become visible only briefly to illuminate the status of Black boys and men or White girls and women” (p. 298). She was adamant about promoting visibility of Black girls and women in mathematics.

Within mathematics education, Gholson (2016) supported “Black girls and women can become visible by intentionally creating their own space, clarifying existing theoretical spaces, and sharing theoretical space with other mathematics learners, particularly, Black boys and men, as well as White girls and women” (p. 298). Ideally, Gholson was pushing for Black women and girls to have a genuine location in mathematics education where they can have their “experiences...centered, knowable, and legitimized for their own sake” (p. 296). This centering would allow fair assessments of their mathematical experiences, and they will no longer feel invisible in any educational setting.

Marsh, Chaney, and Jones (2012) assessed the strength of African American male and female students that were classified as high achievers at an honors math and science academy. The academy was dedicated to minorities that wanted to pursue math and science careers once they leave or graduate college. This academy “serves students who attended public or private middle schools and who have a passion and talent for math and science” (p. 43). The researchers evaluated the students’ personal experiences to distinguish the core values which attributed to their success school environment that had students from many different cultures and races (Marsh et al.). The students chosen for the study participated in interviews and completed a questionnaire.

Marsh and colleagues (2012) “examined the emotions experienced by Blacks students prior to and once entering a racially diverse setting as well as how these students establish solidarity through social clubs” (p. 39). They acknowledged “during the first half of the twentieth century Black women's activism focused on challenging racism and the resulting social and economic problems” (p. 41). Paying close attention to the Black female students in the study, “Black scholars, such as hooks (1981), Collins (1990), and Thornton-Dill (1983), strongly believe that it is crucial for Black women to maintain ties to one another in order to balance and enhance their dual identities of being Black and female” (p. 46). Marsh and colleagues noted—

to sustain their dual identities, these young Black women created a special collegial nexus that incorporated gender and race, an action suggesting that, although they are no longer in a Black world, they remain resilient in a racially diverse academic setting by organizing in social clubs to express their Blackness. (p. 46)

These Black female students formed a social club called “Nubian Sisters. More than half (59%) of the young Black women who completed the student wide questionnaire belonged to this club, which is the largest of any other racially focused club” (p. 46). Within the social club

the 58% membership of Nubian Sisters spoke to the kinship bonds that Black women forge among themselves. Although not biologically related, fictive relationships allow these young women to learn about their cultural heritage, experience Afro-centric markers of womanhood (rites of passage), cultivate individual and “sisterly” resilience (writing essays on why they like being a Black female), and forge strong friendships, separate and apart from academic achievement. (p. 48)

Historically “Black women...use social clubs to provide a network of support and resources for individuals, families and communities of color faced with on-going multiple challenges of survival and resiliency” (p. 41). Social clubs like Nubian Sisters were important at the academy because they helped “to mitigate the effects of inequality for themselves and their brethren” (p. 41).

During analysis, Marsh and colleagues (2012) discovered “young Black men and women were resilient by overcoming their self-doubt and by regarding their symbolic brethren as motivators for success” (p. 48). While—

social inequality and the diversify rationale posited that Black students need to associate with racial others in order to achieve certain skills, these students relied on five historical strengths (strong kinship bonds, strong work orientation, adaptability of family roles, high achievement orientation, and religious orientation). (p. 49)

The researchers also highlighted the schools' attention to "encouraging positive race relations" (p. 47) between students and teachers. The school offered countless opportunities for students to participate in social events and join clubs within the school.

Joseph, Hailu, and Boston (2017), investigating over 20 years of studies, examined the tenacity Black girls and women's mathematics. Within the research from the past five years, they noticed a trend of uplifting Black girls and women within organizations across the nation (Joseph, et al., 2017). These movements "spanning the public and private sector, including academe—are important because they acknowledge racism, sexism, and other structural inequalities that affect Black women's lives" (p. 204). Although these movements are empowering, "none of these initiatives [are] addressing the underrepresentation of Black women and girls in mathematics and mathematics education specifically, which is a phenomenon inextricably connected to issues of race, racism, and sexism" (p. 204). Black women and girls are underrepresented in mathematics classrooms as students and as teachers, and recognizing these P-20 issues is critical to imposing change and reform.

Throughout the research, the "national discourse about Black girls' and women's academic mathematics performance has come from a deficit-based perspective, exacerbating poor performance and underrepresentation, and creating and sustaining a negative master narrative" (Joseph, et al., 2017, p. 204). Joseph and colleagues "suggested that mathematics is embedded in White supremacy and thrives on exclusion" (p. 205). This exclusion from mathematics courses causes "serious consequences for racial minorities who find themselves in low-tracked mathematics courses because once a student is on the low track, it is plausible that she or he will stay on that low track through high school" (p. 205). Joseph and colleagues agreed "racism and sexism are social oppressions that have historical roots and contemporary lived



implications, including the underrepresentation and underperformance of Black women and girls in the mathematics pipeline” (p. 206).

Often, teachers’ opinions of Black girls and women have been misconstrued because they are often portrayed “as loud, hypersexual, and disrespectful in popular media” (Joseph, et al., 2017, p. 206) which does not “validate or affirm Black girls” (p. 207). This representation “can influence how they get viewed and perceived by teachers” (p. 206) which can affect placement in upper level classes namely mathematics courses. Joseph and colleagues acknowledged that—

high-achieving Black women and girls are isolated and experience feelings of not belonging in mathematics in part because of societal stereotypes of being perceived as “less than” and not capable. Additionally, racism and racialized experiences also contribute to feelings of isolation. (p. 214)

African American women and girls have to be strong because of these experiences, and they need to have high expectations for themselves, especially given that “teachers’ low expectations and the overall assumptions about Black girls in society impede the opportunity for Black girls to learn in mathematics classrooms” (p. 215). When African American women and girls are successful in mathematics, they “have strong mathematics identities since they persist in obtaining mathematics knowledge, even though it can come at great personal costs given the prevailing norms of Whiteness or even anti-Blackness” (p. 217). Joseph and colleagues concluded—

Black women and girls deserve the opportunity to fully participate by making important contributions in the following ways: solving grand challenges in mathematics, expanding mathematics leadership and decision making, and making mathematics achievements by Black women visible. Black women’s and girls’ persistence in mathematics and

mathematics education matters. (p. 220)

Incorporating African American girls and women in authentic mathematical dialogue and the mathematical community can help increase equity and fairness within mathematics education.

In an effort to pinpoint the connections between mathematics teachers and the African American girls in their classes, Booker and Lim (2018) analyzed “the importance of positive teacher–student relationships in the development of engagement in the mathematics classroom” (p. 1038). This phenomenological study uncovered during the interviews two main ideas of genuine instruction and special relationships between African American girls and their teachers. Most recently, “researchers interested in African American adolescents have extended their efforts to examine ethnic and racial differences in sense of school belonging” (p. 1038) but these studies did not focus solely on African American girls. These studies found—

for many African American students, it is critical to have a teacher who is well versed in youth culture and sees the benefit and importance of positive interpersonal interactions.

When students perceive that their teachers care about them and are willing to provide social and academic support, the effect on belongingness is substantial. (p. 1040)

The interaction between African American girls and their mathematics teachers “may play a more critical role in supporting their academic pursuit than in any other group of students due to their vulnerability in a traditionally White male subject” (Booker & Lim, 2018, p. 1041). During the analysis of interviews Booker and Lim noticed “when African American girls feel that the possibility of such connectedness with their teachers is slim or near impossible, developing a sense of belongingness and understanding an abstract mathematical concept may become a challenging task” (p. 1041). In a classroom and/or school setting, “school belonging refers to the degree to which students feel a sense of connection to others” (p. 1038). African

American girls “must feel they are respected as individuals. When students have encounters in which they are disrespected by peers and teachers, they do not feel that they are welcomed as members of the larger school culture” (p. 1039). Once African American construct solid relationships with their peers and “with their teachers, they are more likely to develop higher motivation and persistence in their academic work” (p. 1049). Positive and compassionate relationships in the classroom translates to African American girls being able to receive and understand advanced mathematics concepts. Ultimately, high teacher expectations in mathematics coupled with students’ openness leads to African American girls feeling a sense of belonging and being more successful.

In 2014, Evans-Winters explored the marginalization of Black girls in gifted programs across the United States. She discovered “current research and theoretical models that address racial inequity or gender disparities in gifted education often overlook the underrepresentation of Black girls in gifted programs” (p. 22). The rules and regulations in place to address discrepancies in gender inclusion are only from “a White middle class female prospective” (p. 22). Evans-Winters noticed:

Race-based conceptual frameworks and methodologies that focus on gifted education often fail to critically examine and interpret the multiple identities of Black female students thus, overlooking Black girls’ underrepresentation in gifted programs as well as their potential to thrive academically in these programs. (p. 22)

She also recognized “Black girls faced a double whammy socially, educationally, and professionally. They share issues of racism with Black and other non-White males and issues of sexism with White and other females” (p. 23). She discovered a number of studies dealing with resiliency and Black girls in gifted programs, and “resilient African American girls are more

likely to be engaged in community organizations such as a religious institution or afterschool programs” (p. 24). Having a strong Black female influence, has been a major factor in the success of Black girls in gifted programs. This type of positive role model is important for all Black girls gifted or not.

Evans-Winters (2014) noted “resilient Black girls can identify with at least one positive adult female in the school environment that encourages academic excellence” (p. 24). Although these “girls face racial and gender oppression, they still maintain a high level of gender and racial pride” (p. 25). High self-esteem can also be a high contributor to Black girls’ success in gifted education classes, and Evans-Winters considers “the conceptualization of giftedness should be expanded to include educational resilience” (p. 26). She suggested—

research and theoretical models that address racial inequities or gender disparities in gifted education often overlook the importance of the intersections of race, class, and gender on students’ school experiences. And, most gifted educators and advocates are not aware of the available literature on Black girls and women, such as literature in sociology, psychology, and women and gender studies. (p. 27–28)

Finally, Evans-Winters advised those promoting gender and racial inclusion within the gifted educational community should utilize structures that incorporate intersectional ideals that aim for equity through the most adequate ways of enrolling and maintaining Black girls in gifted programs. Practitioners, law makers, and researchers are strongly encouraged to take into account all aspects of Black girls when making decisions and rules for racial and gender inclusion in gifted programs. This slight detour here and below into gifted education is important as it is in gifted programs where students most often gain greater access to advanced mathematics courses and learning experiences.

Investigating the ways stereotype threat and perfectionism affects the educational achievements of Black girls and women, Anderson and Martin (2018) recognized the lack of literature focused on Black girls in mathematics and gifted education. The concept of “perfectionism is commonly associated with gifted females, yet little research examines perfectionism across racial groups” (p. 117). The idea of stereotype threat, created in 1995 by Steele and Aronson, refers to the danger of unfavorable labeling of a person or group based on race and gender in conjunction with academic talent and/or capabilities (Anderson & Martin, 2018). When juxtaposing perfectionism and stereotype threat upon race and gender, Black girls are often left out of the discussions. While “perfectionism discourse has increased in recent years, the literature on perfectionism is virtually nonexistent for gifted Black girls and women” (p. 119).

Gifted Black girls and women have been left out of research studies as well as gifted programs. Anderson and Martin found that “gifted Black girls are underrepresented in gifted programs nationally by almost 40%” (p. 119). This underrepresentation—

compounded with lack of relevant experiences and opportunities, some gifted Black girls may be unable to relate to their gifted peers and teachers and, in turn, are susceptible to negative, stereotypical, racist messages, both intentional and unintentional. In these educational environments, Black girls are consistently exposed to stereotypes about Black inferiority and, therefore, may have lower self-concepts and self-esteem. (p. 119)

Consequently “Blacks have been socially constructed as biologically, intellectually, and culturally inferior to Whites, and as a result, this construction has persisted” (p. 119). Because of these socially constructed ideologies about self, Anderson and Martin offered suggestions for practitioners and educators. Some suggestions include giving Black girls chances to demonstrate

success, provide different approaches to dealing with difficult situations, and making lessons culturally relevant and inclusive to help facilitate high achievement (Anderson & Martin, 2018). Finally, the researchers reiterate the importance for creating safe spaces for Black girls in schools so they will be inspired and appreciated which will aid with the stereotype threat stigma and perfectionist approach.

Many research studies have concentrated mainly on the behaviors of Black girls and the way their teachers view the way they act. Young, Young, and Capraro (2017), contended—

Black girls are uniquely resilient...their academic struggles are largely absent from the current literature. One popular adage of the Black community is that mothers “raise their daughters and love their sons.” By “raising” their daughters, this saying suggests that Black mothers better prepare their daughters for challenges of adult life while shielding their sons from the many eventualities. (p.71)

In their 2017 study, Young and colleagues, were “compelled to address the academic needs of Black girls, but in order to avoid the trap of gender or racial comparisons, [they] identify concerns specific to the mathematics learning needs of Black girls and provide a plan of action” (p. 71). In the educational community—

mathematics is unjustly identified as an inherently male domain; thus, female students are consistently underserved and unrecognized for their ability. Black girls are thus faced with “double jeopardy” because Black students can become stereotyped as academically challenged, given the persistence of the gender and racial achievement gap. (p. 70)

Even though stereotyping exists, Black girls can have a sound relationship with mathematics.

There are a number of ways Black girls’ mathematical identity is created. Their identity is shaped by their “belief about: “(a) ability to do mathematics, (b) the significance of mathematical

knowledge, (c) the opportunities or barriers to enter mathematics fields, and (d) the motivation and persistence needed to obtain mathematics knowledge” (p. 73).

Young and colleagues (2017) claimed “to develop the academic identity of Black girls and to prepare them for algebra in eighth grade, the implementation of the curriculum before eighth grade must adhere to the recommendations in the NCTM focal points” (p. 76). The NCTM focal points stipulates specific mathematical models that can help construct Black girls’ sturdy groundwork for high achievement in mathematics (Young et. al). Including images and examples of Black girls inside textbooks is vital to promoting a positive academic identity in mathematics (Young et. al). Although middle school is an important academic transition time for Black girls, “socializing agents must create a culturally responsive, strength based, and academically affirming nucleus to support the mathematics achievement and identity development of Black girls” (p. 75). Consequently, Young and colleagues understood having all of these things in place can help undo any statistics that reveal destructive academic norms for Black girls.

### **Womanist Theory: Race, Gender, and Class in Mathematics Education**

In sum, given the above literature survey of African American girls and women in mathematics, I believe that using womanist theory as my theoretical framework and methodology is a way to encounter, acknowledge, and reveal the intricacies of the race and gender intersection in the mathematics classroom. Evans-Winters and Esposito (2010) declare—

Girls of African descent are at the bottom of the social totem pole in society; thus, there is an urgent need for a theoretical framework that serves to expose, confront and eradicate race, class and gender oppression in our families, communities and schools. (p. 22)

For me, womanist theory does what Evans-Winters and Esposito deem important for research on

African American girls, and so much more. Womanist theory is derived from the expression womanism. Womanism “is a term that author Alice Walker coined to help define a way for African American women to be feminists in ways relevant to Black people” (Dickerson-Carr, 2005, p. 230). Dickerson-Carr asserts that in 1984—

Alice Walker posited the concept of Womanism to distinguish the struggles African American women have faced from those of the mainstream—that is, white—women’s rights movement, which has sometimes been oblivious, insensitive, or even hostile to African American women’s history and concerns. (p. 230)

Other methodologies and theories appear to only consider a few aspects of an African American girls and women’s whole self. In contrast, womanist theory accentuates the importance of examining race and gender intersections and positionalities, while at the same time recognizing their influences on the daily lives of African American girls and women (A. Walker 1984; Ogunyemi, 1985; Phillips & McCaskill, 1995). Ogunyemi (1985) professes, “Black womanism is a philosophy that celebrates black roots, the ideals of black life, while giving a balanced presentation of black womandom” (p. 72).

The womanist theory philosophy and core “ideal is for black unity where every black person has a modicum of power and so can be a ‘brother’ or a ‘sister’ or a ‘father’ or a ‘mother’ to the other” (Ogunyemi, 1985, p. 72). Womanist theory “is [also] a social change methodology that stems from everyday experiences of Black women and their modes of solving practical problems” (Lindsay-Dennis, 2015, p. 510–511). Phillips (2006) states that womanist theory—  
  
is a social change perspective rooted in Black women’s and other women of color’s everyday experiences and everyday methods of problem solving in everyday spaces, extended to the problem of ending all forms of oppression for all people, restoring the



balance between people and the environment/nature, and reconciling human life with the spiritual dimension. (p. xx)

Because womanist theory “does not emphasize or privilege gender or sexism; rather, it elevates all sites and forms of oppression, whether they are based on social-address categories like gender, race, or class, to a level of equal concern and action” (p. xx), I believe the womanist principles will provide the best theoretical framework and methodological approach to undergird my study on successful African American girls and women in mathematics.

While reviewing the literature, I found that other “culturally relevant theories and research methodology to study African American girls have lagged behind the research in this area” (Lindsay-Dennis, 2015, p. 508). Some of the other “goals of Womanism include using everyday people to solve problems, ending all forms of oppression for all people, restoring the balance between people and nature, and reconnecting humans with the spirit realm” (p. 510–511). Ford (2014) elaborates, “Black females have been whited out and blacked out, leaving their (our) stories and journeys often untold, misunderstood, and trivialized. However, when race and culture are added, our issues and needs are different” (p. 9). In the same vein, African American girls and women “face barriers to reaching their full potential with Black males, such as racism, deficit thinking, and under-representation in gifted education” (p. 9).

### *Conclusion*

Exploring the history of African Americans’ education in the United States sheds light on the lack of research that focuses on African American girls’ and women’s life and schooling experiences in general, and achievement and persistence in mathematics in particular. In 2012, Farinde & Lewis explain:

Race beyond the discussion of African American men and gender beyond the topic of White women reveal an often neglected, yet unique perspective, which, from a noticeable member of a historically marginalized race and sex, exposes subtle and at times blatant institutionalized barriers. (p. 422)

Through the support of this review of the literature, I was able to investigate the history of African American girls and women in education. I examined the positionality of African American women in mathematics, and the much researched about “achievement gaps” that exist in mathematics education. I analyzed the absence of educational research that spotlights the success of African American women in mathematics. I was also able to evaluate race, gender, and class in mathematics from a womanist theoretical lens.

Given that, historically, there has been a vast omission of exploring the schooling and the life experiences of African American girls and women in mathematics education research, it must be considered a critical focal group for mathematics education researchers. One major motivation and need “for the focus on high-achieving Black students is a belief that identifying factors that account for the high achievement levels of these students will provide invaluable insights for formulating initiatives designed to improve academic performance” (Conchas, 2006, p. 40) of Black girls. Recently, various educational researchers started posing questions as to why so many studies fail to examine African American girls and women as their own entity rather than grouped with others. Farinde and Lewis (2012) recognize, “internal and external constituents may ask the reason why researchers should focus on African American female students’ entry into STEM professions” (p. 421), including mathematics. They suggest, “the answer lies in the intersection of race and gender within a profession that could potentially

secure African American women ‘a seat at the table’ and gain them power, authority and influence through the obtainment of financial security” (p. 421–422).

Pinder and Blackwell (2014) observe, “from the early 1990s to the present, little focus has been placed on Black girls or the education movement has failed to adequately address the ‘Black girl turn’ in education” (p. 4). These current omissions are indicative of times in Black history where African American girls and women had to pick a side (Ricks, 2014). Historically, “Black women were asked to privilege identity...to support Black men in gaining their right to vote” (p. 14). Throughout the “women’s movement, Black women were...expected...to suppress the unique role their race or blackness” (p. 14) had in the struggle for gender rights. Both examples help to validate the numerous times that Black girls and women have to ignore the important parts that make them who they are.

Giving a platform for the stories of mathematics success allows “Black females to view themselves through a non-deficit lens; thus, we learn to embrace a style of learning, living, and being that we have been continually told is not valid” (Ricks, 2014, p. 15). African American girls and women and White girls and women over time have been positioned differently in and out of the education. Because of this enormous gap in educational research that speaks to gender and race in mathematics education, womanist theoretical perspectives assist me in highlighting achievement and persistence of African American girls and women in mathematics.

Having to be strong women throughout the movement, ignoring who they were at home, and disregarding what they wanted in life was very difficult and unfair. What they wanted as African American women is often put on the back burner and they often lose a part of who they are in the process. As African American girls and women, we all have “shared histories and stories that bear repeating” (Ricks, 2014, p. 15). I believe that through my research undergirded

with womanist theory, I produced a platform for the voices to these stories. I feel that I can be a sounding board, so to speak, for my mother and my grandmothers; in re-telling the stories of my participants, mathematical successful African American women, I am telling their stories.

## CHAPTER 3

### THEORETICAL FRAMEWORK

*If we accept and acquiesce in the face of discrimination, we accept the responsibility ourselves. We should, therefore, protest openly everything...that smacks of discrimination or slander.*

– Mary McLeod Bethune

#### Introduction

In this chapter, I discuss the theoretical framework that informs my research. Womanist theory features storytelling as a viable and legitimate systematic means to assess meaning and lived experiences. Given that my research is investigating the success and experiences of African American women in mathematics, womanist theory was the obvious theoretical framework for me. Here, I provide a discussion of the historical background of womanism and the theoretical and methodological appropriateness of womanist theory for the study. A comparison of womanist theory and feminist theory is then discussed as well as the relationship between womanist theory and under-served populations. I conclude with a discussion of narrative analysis juxtaposed with womanism and intersectionality.

#### Womanist Theory

Closing my eyes, I am taken back to Easter Sunday mornings as a little girl sitting in a chair in front of the stove getting my hair pressed by my mom. I tried hard to listen and absorb my mother's stories of her childhood as I squirm in my seat from getting my ear burned by the straightening comb. While smelling my hair burning from all of the grease that she put on my hair, I soaked up all of my mom's funny, sad, and suspenseful stories of growing up with her siblings as children of sharecroppers. My mom's stories shaped who I am and the way I experience life.

I realized later in life that the intimate conversations my mom and I shared during our “hair-fixing” moments away from my father and brother were extremely important to her. Hair time by the stove served as a perfect opportunity for her to openly communicate her stories without any interruptions or scrutiny from the guys. Hearing stories of finding her way from the cotton farm to medical school gave me the confidence to overcome any obstacle. At the core of her stories was the same common theme. The underlying premise was being “borne the brunt of the triple oppression of race, class, and gender” (Phillips & McCaskill, 1995, p. 87).

My mother and grandmothers were faced with these types of barriers when growing up and fighting for voter rights and equity in education. My grandmothers were not able to attend school, and my mom pushed herself to be an overachiever through grade school, high school, college, medical technology school, and theology school. She felt that she had something to prove to her family, to herself, and to her peers. I believe that is why she pushed me so hard. The women in my family had to be strong. They had to pull the weight when the men went off to war or to the fields to pick cotton as sharecroppers. My mother’s and grandmother’s experiences pushed me to continue their legacy of being a successful African American girl and woman.

#### *Historical Development of Womanist Theory*

Womanist theory originated from the expression womanism, which “is a term that author Alice Walker coined [in 1984] to help define a way for African American women to be feminists in ways relevant to Black people” (Dickerson-Carr, 2005, p. 230). As a theoretical framework, womanism “attends to the culturally specific complexities as well as the nationalistic ideologies” (Fischer, 2012, p. 87). A. Walker’s philosophies resulted in an “epistemology by which Black women in particular and women of color in general could (would) be(come) empowered to name

their life and life experiences in resistance to and in spite of prescribed and limited socio-economic-political perimeters and hegemonic constraints” (Johnson, 2007, p. 372).

Alice Walker felt that it was necessary to refashion the concept of feminism in order to embrace the wholeness of the Black woman. Womanism evolved into a “theoretical framework that focuses on the experiences and knowledge bases of Black women...[and] it both recognizes and interrogates...social realities of slavery, segregation, sexism, and economic exploitation...experienced during its history in the United States” (Beauboeuf-Lafontant, 2005, 436–445). Womanism theory is regarded as a “paradigm shift wherein Black women no longer look to others for their liberation, but instead look to themselves” (Floyd-Thomas, 2006, p. 1).

To preserve Alice Walker’s four-part definition of Womanist, I decided to include the definition in its entirety from her book *In Search of Our Mothers’ Gardens—Womanist Prose* (A. Walker, 1984):

**Womanist 1.** From womanish. (Opp. of “girlish”, i.e., frivolous, irresponsible, not serious.) A black feminist or feminist of color. From the black folk expression of mothers to female children, “You acting womanish,” i.e., like a woman. Usually referring to outrageous, audacious, courageous or willful behavior. Wanting to know more and in great depth than is considered “good” for one. Interested in grown-up doings. Acting grown up. Being grown up. Interchangeable with another black folk expression: “You trying to be grown.” Responsible. In charge. Serious.

2. Also: A woman who loves other women, sexually and/or nonsexually. Appreciates and prefers women’s culture, women’s emotional flexibility (values tears as natural counterbalance of laughter), and women’s strength. Sometimes loves individual men, sexually and/or nonsexually. Committed to survival and wholeness of entire people,

male and female. Not a separatist, except periodically, for health. Traditionally universalist, as in: “Mama, why are we brown, pink, and yellow, and our cousins are white, beige, and black?” Ans.: “Well, you know the colored race is just like a flower garden, with every color flower represented.” Traditionally capable, as in: “Mama, I’m walking to Canada and I’m taking you and a bunch of other slaves with me.” Reply: “It wouldn’t be the first time.”

3. Loves music. Loves dance. Loves the moon. Loves the Spirit. Loves love and food and roundness. Loves struggle. Loves the Folk. Loves herself. Regardless.

4. Womanist is to feminist as purple to lavender. (A. Walker, 1984, xi–xii)

A. Walker’s definition and explanation of womanist is “both historical and visionary, and...it represents conflicting political ideologies of nationalism, pluralism” (Coleman, 2013, p. 3) that provides “a way for black women to address gender oppression without attacking black men” (Collins, 1996, p. 11).

In short, “womanism can be defined as an epistemological perspective based on the collective experiences of Black women or other non-White women” (Jain & Turner, 2011, p. 77). Womanist epistemology is composed of a few interlocking scopes for evaluating Black women’s knowledge production. The four primary features are: “(1) concrete experience as a criterion of meaning, (2) use of dialogue in assessing knowledge claims, (3) an ethic of caring, and (4) an ethic of personal responsibility” (Banks-Wallace, 2000, p. 37). Each feature addresses distinctive aspects of my research on successful Black women in a mathematics classroom setting. These features are like the tenets of feminism.

First, womanist theory permits concrete experiences as a criterion of meaning. Banks-Wallace (2000) explains, “the importance of experience as a vehicle for developing and testing



knowledge is emphasized by womanist” (p. 38). Womanism accepts theory, practice, experiences, and wisdom as knowledge production and applicable in educational research. Wisdom from lived experiences leads to operating off of what is learned from past circumstances. Banks-Wallace declares, “having wisdom based on experience is seen as crucial to individual and collective survival in the midst of an oppressive environment” (p. 37–38). In order to empower and embody the wholeness of Black women, womanism takes control of what constitutes the creation of knowledge. Taking control allows for Black women being “engaged in the process of knowledge production that is most necessary for their own flourishing rather than being exploited for the enlightenment and entertainment of white psyches and male egos” (Floyd-Thomas, 2006, p. 2).

Second, womanist theory warrants the use of dialogue in assessing claims of knowledge. Dialogue is fundamental to effective in telling stories. Although storytelling has not always been an acceptable form of research methodology, womanism allows a way to provide a stage for the voices and validation to African American women and their narratives. Having opportunities to use dialogue helps to “provide a means of reflecting upon or sharing experimental knowledge with others...promote harmony and build connections” (Banks-Wallace, 2000, p. 39) with other people. These connections create networks with others in which “language conveys both the reality of ongoing struggle against racial oppression and the importance placed on nurturing a unique African American culture” (p. 39). Through singing hymns, traditional mythical tales, speeches at church, and regular discussions, narratives of the ongoing struggle are transferred mainly from Black women (Banks-Wallace, 2000). The transferal of knowledge encompasses much of the evidence that can be collected by researchers to document lived experiences and validate the declarations of success and struggle of Black women. Using womanist theory as part

of my research design will “facilitate dialogue, accompanied by reflection on and evaluation of ideas/theories generated through this process...[will] enhance an individual participant’s resources for making decisions” (p. 39).

Third, womanist theory employs an ethic of caring. The ethic of caring is a collection of three key personal elements: empathy, expressiveness, and emotions (Banks-Wallace, 2000; Beauboeuf-Lafontant, 2002). Empathy is having “a sense of concern or connection between the person making the claim and the individual evaluating the claim [which] is considered an essential part of assessing the claim’s validity” (Banks-Wallace, 2000, p. 40). Having emotion in discourse is another significant element of an ethic of caring. Personal “emotions are considered to be indicative of a speaker’s belief in the validity of her or his argument” (Banks-Wallace, 2000, p. 40). Having or showing emotion in research studies is thought to be taboo and “in direct contrast of Eurocentric male models that view emotions as antithetical/inferior to logical or rational thought” (p. 40). Womanism actually uses the emotional connections in the narratives as a way to show soundness in the experience declarations given by African American women. Expressiveness in personal dialogue is also a treasured part of womanist ethic of caring discourse. The soulfulness of the African American narratives is “rooted in African traditions that view each individual as a unique exemplar of the Divine Spirit which infuses and sustains all creations” (p. 40). Being expressive infiltrates every aspect of the storytelling, which confirms the individualities of the African American girls and women telling their stories just by looking at their appearance and the way that they talk (Banks-Wallace, 2000).

Lastly, an ethic of personal responsibility is the fourth characteristic of womanist theory. Ethic of personal responsibility “stems from the premise that all knowledge claims are grounded in concrete realities rather than mere abstractions” (Banks-Wallace, 2000, p. 42). Personal

responsibility relates to having high reliability and being dependable in the different aspects of life because the “views expressed and the actions taken by an individual are assumed to be derivatives of her or his personal core beliefs” (p. 42). The old adage “actions speak louder than words” seems to underscore the concept of personal responsibility. Evaluating African American girls’ and women’s declarations within a research study cannot be validated without examining her background (Banks-Wallace, 2000). Having high fidelity is vital to ascertaining authenticity of the research participants and the study itself. Womanist theory provides a space for personal responsibility in which “claims made by individuals considered to be morally and ethically connected to their ideas carry more weight than those offered by people not considered as respectable” (p. 42). Prior to this, power had historically been given to “Eurocentric...male models...role- or class-based authority in assessment of knowledge claims” (p. 42), which aided in marginalizing women of color and their experiences. Womanism as my theoretical framework will be useful as an empowering agent for African American women and other women of color and their empirical storytelling. Manuelito (2006) affirms—

The experiences of African Americans have been tragic and traumatic ever since they were inhumanely transported to the North American continent as slaves. They have suffered and continue to do so at the hands of the dominant white society in the United States, who perceived differences as inferior and intolerable. (p. 168)

My research will help authorize self-validation and confidence in the production of knowledge from lived experiences in mathematics education that is normally marginalized and undervalued by the dominant White culture. Just because students of color have somewhat a semblance of equivalent access to schools, does not mean that the circumstances are equal for all students (Manuelito, 2006). Manuelito (2006) points out that upholding this type of philosophy

undermines the responsibility that marginalization and humiliation had in preserving separation of races in society and specifically in education. These viewpoints also support the methodological appropriateness of using womanist theory for this research study.

Historically, African American girls and women have been overlooked in educational research studies. African American girls and women have been clustered with other groups when addressing mathematics achievement. Campbell (2012) insists, “the intersectionality of race and gender magnifies the inequities in access to math” (p. 389–390). Much like society, there is a need for “policies and programs...addressing the underrepresentation of students of color...in more challenging [mathematics] courses...[which] provides opportunities for Black girls to contribute to society through innovation and discovery” (p. 400). Recognizing the need for more policies and programs geared towards underserved students of color, especially African American girls and women, has been the foremost influence for my research study employing womanism as my theoretical framework and methodology.

#### *Theoretical and Methodological Appropriateness of Womanist Theory*

Stories of persistence coupled with racial, gender, and class intersections told by African American girls and women are fundamental views embedded in the philosophy of womanist theory. I chose womanism as my theoretical and methodological framework for my research study on the success of African American girls in mathematics because of the depth of womanist principles. The stories of African American girls and women in mathematics are fundamental to my research study. Because storytelling is essential to my research, utilizing womanist theory helps to undergird the platform for the voices and provide additional “validation of Black women’s everyday experiences by Black women themselves within academic settings” (Phillips & McCaskill, 1995, p. 87).

Employing womanism as a theoretical structure and methodology for my research study supports “a redefinition...and expansion of what it means to be a woman...first for black women, and eventually for women of all backgrounds, to ensure that no woman...was left oppressed” (Coleman, 2013, p. 2). My qualitative research study on successful African American girls and women in mathematics paired with womanism permits the use of narratives for investigating and empowering the lived experiences of these women and other women of color. Beauboeuf-Lafontant (2002) confirms—

Womanists understand that oppression is an interlocking system, providing all people with varying degrees of penalty and privilege. Second, they believe that individual empowerment combined with collective action is key to lasting social transformation. Last, they embody a humanism, which seeks the liberation of all, not simply themselves. (p. 73)

Ford (2014) elaborates, “Black females have been whited out and blacked out, leaving their (our) stories and journeys often untold, misunderstood, and trivialized. However, when race and culture are added, our issues and needs are different” (p. 9). In the same vein, African American girls and women “face barriers to reaching their full potential with Black males, such as racism, deficit thinking, and under-representation in gifted education” (Ford, 2014, p. 9). These whited out and blacked out faces in mathematics education research are the basis of my study. My research study will follow “the goals of Womanism [which] include using everyday people to solve problems, ending all forms of oppression for all people, restoring the balance between people and nature, and reconnecting humans with the spirit realm” (Lindsay-Dennis, 2015, p. 510–511).

*Womanist Theory and Feminist Theory*

“Womanist is to feminist as purple to lavender.”

– Alice Walker (1984, p, xii)

Choosing a theoretical framework was a small challenge. During my search for a framework embracing Black girls and women, there were theories that I considered. In my quest to find the best fit for my research, feminism stood out as a possible theoretical and methodological structure.

In many ways womanist theory was birthed out of the feminist movement. When associating the two, womanism and feminism, “A. Walker says that both have certain similar features but are undisputedly different” (Das, 2014, p. 124), much like her comparison of the colors purple and lavender. Historically, orthodox feminists’ fundamental objective posed specific difficulties for African American women (Alexander-Floyd & Simien, 2006). Feminism has been regarded as a framework that excluded others and furthered the ideas of putting distance between women and men. Rather than embracing all, mainstream White feminism “operated on binary opposition like patriarchy, as it consisted of various forms of elitism and cultural imperialism which was seen in the white woman’s imposition of their norms on the rest of womanhood of the world” (Das, 2014, p. 123). In her book *Feminism for Everybody: Passionate Politics*, hooks (2000) reveals—

mainstream patriarchy reinforced the idea that the concerns of women from privileged-class groups were the only ones worthy of receiving attention. Feminist reform aimed to gain social equality for women within the existing structure. Privileged women wanted equality with men of their class. (p. 40)

Feminist theory separates the existence of race when addressing issues of gender

oppression. Manuelito (2006) contends, “white feminism is united in purpose: throughout its plurality, feminism has one obvious, simple and overarching goal—to end men’s systematic domination of women” (p. 169). More often than not, feminism only acknowledged the need for gender equality. Black girls and women deal with race and racism on a daily basis, and feminist theory does not account for the complex intersections of race and gender. Feminists manage to overlook Black women’s gender composition and the manner in which White womanliness is unlike Black womanliness (Carby, 1996). To acknowledge these differences means to acknowledge the roles of race. Race was also ignored: “[because] most white women participated in the inequities wrought upon African Americans throughout the centuries. They enjoyed their power, privilege, and comforts made possible through the inhumane drudgery of African Americans for the convenience of white society” (Manuelito, 2006, p. 169). Carby (1996) declares, “most contemporary feminist theory does not begin to adequately account for the experiences of black women [and] emphasize[s] patriarchy alone” (p. 62).

From its inception, the feminist movement has been regarded as the “white women’s movement” (Tally, 1986, p. 206) and Black women felt disconnected from the crusade for women’s rights. The core of feminist theory is based upon three main notions. The family, patriarchy, and reproduction are the “concepts central to feminist theory...that are problematic in their application to black women’s lives” (Carby, 1996, p. 63). In many ways White feminism promotes “elitism and cultural imperialism reflected in the imposition of white women’s norm upon the rest of womanhood” (Izgarjan & Markov, 2012, p. 306–307). Carby (1996) argues—

The experience of black women does not enter the parameters of parallelism. The fact that black women are subject to the simultaneous oppression of patriarchy, class, and “race” is the prime reason for not employing parallels that render their position and

experience not only marginal but also invisible. (p. 62)

Womanism is similar yet very different from feminism in that womanist desire to embrace men, namely Black men, rather than condemning them. Being inclusive is important rather than being “exclusively for women and, at worst, dedicated to attacking or eliminating men” (Collins, 1996, p. 11) like the feminist movement. Womanism also provides an avenue to confront male gender domination. Although “circumstances have not supported their adoption of traditional gender roles, they continue to recognize some elements as ideal” (Alexander-Floyd & Simien, 2006, p. 70). Womanist visualize a period where eventually all people of color can “coexist like flowers in a garden yet retain their cultural distinctiveness and integrity” (Collins, 1996, p. 11).

#### *Womanist Theory and Under-Served Populations*

Using womanist theory as my theoretical framework and methodology is a way to encounter, acknowledge, and reveal the intricacies of the race and gender intersection in the mathematics classroom for African American girls and women. Given that womanism exists as a “social change methodology that stems from everyday experiences of Black women” (Lindsay-Dennis, 2015, p. 510–511) and other women of color, its theoretical framework and epistemological ideals can also help to transform other under-served populations such as the Indigenous/First Nations People. Walker’s use of women of color in her definition of womanist, makes certain she “is not guilty of the discrimination the white feminist” (Torfs, 2007, p. 18) are guilty of when excluding the intersections of race and gender in their fight for equality.

Womanism is a concept that transcends the biases of White feminism. Native womanism is defined as a theoretical framework centered around Indigenous women, which is used in “restoring the female principle to challenge the prevailing colonialist and patriarchal denigration



of women and nature” (Jaimes-Guerrero, 2003, p. 67). Similar to African American girls and women, “American Indian women have often been difficult to locate within the discourse of U. S. feminisms” (Manuelito, 2006, 167). By the mere fact that they are “indigenous peoples to this land, American Indian...have experienced colossal invasion from European powers, genocide, and indoctrination through reorganization of their communities and personal lives” (p. 169). Similar to Black women, Indigenous women have been viewed as mediocre and regarded as second-class. Manuelito (2006) insists that Native American women must communicate their stories. To reify and regain power of self, stories of triumph have to be told in order to counteract the falsifications of their culture.

Alice Walker’s definition of “womanism provides connectivity to the constructions of indigenous womanism. The intersections described between [African American people] and Indigenous people demonstrate important similarities that pave the way for understanding concepts from another worldview such as the indigenous worldviews” (Manuelito, 2006, p. 181). In education there is a persistence in Indigenous communities of “miscommunication and alienation caused by the culture of power prevented dialogue from occurring in and outside of the classroom among students and among teachers” (p. 173). Isolation and miscommunication can be counteracted with “indigenous philosophy and epistemology [that] provides theory of women/womanism for each indigenous group. Indigenous philosophy and epistemology define the development and positioning of American Indian womanism” (p. 181). There is a divergence in the understanding...concepts of—

Mother/Othermother/Grandmother/Ancestor and Spiritual Guide. This divergence does not alienate African American womanism from American Indian women’s experiences and identity. Instead, womanism, as A. Walker utilizes the concept, provides a basic

framework of the experiences of women of color including indigenous women. (p. 181)

Womanism and native womanism have some similarities and differences that are permitted by the definition of womanism which allows for knowledge construction for all women of color. Both are important parts of the plight “in challenging the feminized subjugation...[and] broader scope of the issues concerning” (Jaimes-Guerrero, 2003, p. 68) women of color.

### **Narrative Analysis, Womanism, and Intersectionality**

Before African American women can flourish in undergraduate and graduate level mathematics, they have to navigate successfully through their K–12 educational experiences. For these women, the journey from kindergarten to twelfth grade is the foundation of either their mathematics struggle or mathematics triumph when faced with stereotypes, gender issues, and social identity on a daily basis from peers, teachers, and family. Consequently, identifying narratives dealing with intersectionality struggles within mathematics classrooms could be essential for empowering female African Americans.

#### *Narrative Analysis and Womanism*

Examining the relationship between narrative analysis and Womanism shows that the foundation of both frameworks is storytelling. Riessman (2008) contends “in everyday oral storytelling, a speaker connects events into a sequence that is consequential for later action and for the meanings that the speaker wants listeners to take away from the story” (p. 3).

Dr. Erica Walker (2006) explored the importance of exposing success stories of African-American high school students in mathematics. E. Walker, an advocate for departing from the normal discourse of K–12 mathematics curriculums, used her research to document student success. She explored urban communities to trace history of success and connections to academic triumph in mathematics. E. Walker exposed the stories of success that are often

masked by the negativity portrayed in the public. The research study by her was conducted in a New York City public high school with a small student population. The majority of the participants in her study were minority female top achievers in all mathematics classes and the goal was to acknowledge mathematics success, perceptions about mathematics, and “identify major themes relating to students’ mathematics experiences” (p. 54). The participants’ narratives emphasized “mathematics success[es] was due to a host of interrelated factors; no single relationship with peers, parents, or teachers was deemed solely responsible for student success in mathematics” (p. 56).

### *Narrative Analysis and Intersectionality*

Crenshaw (1989) argues, “because the intersectional experience is greater than the sum of racism and sexism, any analysis that does not take intersectionality into account cannot adequately address the particular manner in which Black women are subordinated” (p. 58). She further states “the continued insistence that Black women's demands and needs be filtered through categorical analyses that completely obscure their experiences guarantees that their needs will seldom be addressed” (p. 64). According to Crenshaw, African American females are—

regarded either as too much like women or Blacks and the compounded nature of their experience is absorbed into the collective experiences of either group or as too different, in which case Black women’s Blackness or femaleness sometimes has placed their needs and perspectives at the margin of the feminist and black liberationist agenda. (p. 64)

According to Damarin (2008), “the theoretical constructs developed through decades of feminist analysis and scholarship are largely absent from discussions of women, gender, and mathematics” (p. 101). Because of this profound absence in mathematics conversations, I believe

that it is important to highlight the small discussions of the intersections of race, gender, women, and mathematics. I agree that “rather than trying to straddle boundaries separating women from mathematics, mathematics from gender, mathematics from feminism, and so on, [the] goal is to reveal and employ (and enjoy) their confusions and to suggest responsible possibilities for bridging the divides” (p. 101).

Although much of the research neglects these intersections, Collins (2005) contends “that black women are uniquely situated in that they stand at the focal point where two exceptionally powerful and prevalent systems of oppression come together: race and gender” (p. 1).

Involuntarily, African American females are often placed into either a racial or gender category when participating in educational research studies. Because “there are common themes or core issues that all black women can acknowledge and integrate into their self-identity” (Collins, 2005, p. 4), womanism has been a theoretical and methodological concept that addresses black women’s intersectionality. According to Hudson-Weems (1989), “race and class biases are the key issues for non-Whites and must be resolved even before gender issues if there is any hope for human survival (p. 42), which womanist theory helps to address. Additionally, “society needs to deal with all aspects of the oppression of the Africana woman in order to better combat them” (p. 42). Moreover, “Womanism’s link to gender is the fact that the historically produced race/class/gender matrix that is Black womanhood serves as the origin point for a speaking position that freely and autonomously addresses any topic or problem” (Phillips, 2006, p. xxi). Often, “working through the interconnected nature of multiple systems of oppression and potential ways that such intersectionality might foster resistance becomes significant in moving quite diverse African American women forward toward Walker’s visionary term ‘womanism’” (p. 67).

Jean-Marie (2013) surveyed barriers that antagonize African American women trying to be successful principals. Because of intersectionality and “social construction of gender, race, and class in the United States, African American females are often susceptible to marginalizing experiences that seek to keep them in their place, excluding them as agents of knowledge” (p. 617). Many of the women in this study were confronted with barriers at every junction of their tenure as principal. Consequently, these African American women dealt with biases of age, gender and race while traversing educational leadership experiences by remaining grounded in their spirituality and faith. African American women often “face struggles due to racism, sexism, and age, ongoing support (mentoring) and professional development can help to cultivate their leadership capacity and prepare them to confront the biases they face” (Jean-Marie, 2013, p. 636).

### **Concluding Words on Theory**

Exploring the double threat of race and gender is central to womanism. Within my research, I recognize that “being both black and female, the black woman’s condition and sufferings transcends the plight of both the black males and white women” (Das, 2014, p. 123). Stories of liberation from my mom’s stories and the narratives of the other matriarchs in my family helped me understand later in life what the world would be like for me as a Black girl and later as a Black woman. Through the use of womanist theory my ancestors’ storytelling is validated as a technique for knowledge production. Survival became the mantra of Black women in my family situated in the union of race, gender, and class.

The days of me sitting in front of the stove getting my hair pressed while listening to my mom’s stories has long since passed, but her stories of success and struggle remain engrained inside me. Being immersed in her narratives of growing up still resonates with me on a daily

basis. These experiences have assisted me in adopting many of the characteristics of a womanist.

Womanist theory as a theoretical framework and methodology is appropriate for my research because it permits storytelling as valid in the production of knowledge.

Intersectionalities and positionalities of women of color are embedded in womanism and does not exclude or attack Black men.

As a mathematics educator in a predominantly Black high school, I had to adopt the tenets of womanist theory. With the help of hearing stories of overcoming obstacles from my mom, and experiencing my students' struggles in my math class, I embraced the three E's: empathy, emotion, and expressiveness. I realize now that these traits—empathy, emotion, and expressiveness—were at the center of my mom's stories. Having empathy for others, showing emotion when interacting with others, and displaying expressiveness when communicating assisted me to connect with my African American students, especially the girls. They were able to view me as a person that had genuine feelings while caring whether they were successful or not. These characteristics are important elements of womanism and important to my research.

## **CHAPTER 4**

### **METHODOLOGY**

*Black women by virtue of the role they have played in our society have much to offer toward the liberation of their people.*

– Shirley Chisholm

#### **Introduction**

This chapter provides a roadmap, so to speak, for my research study and outlines the basis of the methodology and methods that I used while conducting the research. I first describe qualitative science and the ways it is linked to womanism as a methodology. I then provide the problem statement of my research project and relate it to the guiding research questions. Next, I specify the research setting and the participants. A detailed description of the data collection, analysis, and representation are then specified along with the confidential and ethical execution plan. I conclude the chapter with the subjectivity management plan, probable limitations of the study, and some implications for further research.

#### **Qualitative Science**

Qualitative research is categorized as “learning how individuals experience and interact with their social worlds [and what] meaning it has for them, and where “the researcher is the primary instrument for data collection and data analysis” (Merriam, 2002, p. 5). Denzin and Lincoln (2008) suggest that qualitative research is a “situated activity that locates the observer [i.e., the researcher] in the world. It consists of a set of interpretive, material practices that make the world visible” (p. 4). Aspers and Corte (2019) also define qualitative research as “an interactive process in which improved understanding to the scientific community is achieved by

making new significant distinctions resulting from getting closer to the phenomenon studied” (p. 139).

For these reasons, I decided to use qualitative research methodology for my dissertation study. In 1974, the distinguished Shirley Chisholm contended, “the black woman’s role has not been placed in its proper perspective, particularly in terms of the current economic and political upheaval in America today” (as quoted in Daley, 2006, p. 132). I believe Chisholm’s synopsis still reigns true today. Qualitative researcher “uses a variety of methods, such as intensive interviews or in-depth analysis of historical materials, and it is concerned with a comprehensive account of some event or unit” (Asher & Corte, 2019, p. 146). My goal is to “produce [an] in-depth understanding of the processes of consumption and their consequences by directly involving and listening to research subjects” (Pickering, 2008, p. 7). Therefore, I hope that my qualitative dissertation study will be insightful, add understanding, and be emancipatory (Merriam, 2009) for African American girls and women in mathematics.

As the primary data collector and analyzer, I gathered questionnaires and conducted interviews of my African American women participants which are characteristics of narrative case study analysis. My participants’

interviews vary in terms of depth, focus, scope and degree of structure, but there is a common underlying idea that interviews produce indepth and complex knowledge of the human world by focusing on meanings and interacting with research participants and their life-worlds. (Meyer, 2008, p. 70)

Because the network of African American women in mathematics education is limited, I have assembled a response community over the past 15 years that help me “engage in...iterative processes, to inquire into, and to revisit field texts, and to address issues of personal, practical,



and social significance, and to inquire into new research puzzle” (Clandinin, 2013, p. 211). My community encourages me to “become awakened to methodological and theoretical possibilities, learn about ethical and responsive ways to be in relationships, and learn to listen again and again” (p. 211). My research study will be—

utilized to study a variety of issues, but it tends to focus on meanings and motivations that underlie cultural symbols, personal experiences, phenomena and detailed understanding of processes in the social world. In short, qualitative research centers on understanding processes, experiences, and the meanings people assign to things. (Asher & Corte, 2019, p. 146)

Given that there are limited research studies by academics examining the qualitative characteristics of African American girls and women in mathematics, I anticipated that my research study would improve the inadequate educational research in this space. I am optimistic that my research will help to counteract what Martin (2009a) has acknowledged as “the dominant story line...mathematics education policy reports dating back 25 years have explicitly labeled Black children as mathematically illiterate” (p. 31). Martin argues that these policy reports fail to bring light to the oppressive structure of school systems and the blockades of racism and gender marginalization which impede mathematics success.

### **Narrative Case Study Analysis**

For qualitative narrative analysis, Stake (2005) insists that the researcher should “place your best intellect into the thick of what is going on” (p. 449). This “into the thick” ultimately means being reflexive in your work as the researcher and be intrinsic when searching for meaning and understanding in the common themes throughout the narrative (Stake, 2005). Connelly and Clandinin (1990) recognizes—

Narrative is a way of characterizing the phenomena of human experiences and its study which is appropriate to many social science fields. The main claim for the use of narrative in educational research is that humans are storytelling organisms who, individually and socially, lead storied lives. The study of narrative, therefore, is the study of the ways humans experience the world. (p. 2)

To have a meaningful qualitative study, I had to be committed to the idea that “narratives not only help us to organize and make sense of experience through inspiring our lives with meaning, but also they help us to shape a narrative-based identity” (Varaki, 2007, p. 1). I agree with Yazan “readers need to know my identity as a researcher, my investment in this topic, and my intentions of this project” (2015, p. 135).

Given that there is a wide gap focused on the stories of African American girls and women in educational research, qualitative case studies methods are a great fit for my project. Narrative analysis allows for qualitative examinations through data collection that are splendidly illustrative through storytelling. I believe that the “purpose and usefulness of gathering and using narratives...[is having] the opportunity to engage in inclusive research that can have a transformational effect on all research informants, including the researcher” (Hardy, Gregory, & Ramjeet, 2009, p. 7). The beauty is that narrative “qualitative inquiry is not distant; it’s live and in person; it happens right now” (St. Pierre, 2008, p. 321). This type of data collection can be crystallized with other forms of documents that will add to the trustworthiness of the study and data collected. Although “crystallization does not validate the data as triangulation does...it provides room for multiple voices to be heard and acknowledges the voices that we are unable to hear and see” (Polsa, 2013, p. 77). Merriam (2009) contends that “researchers are encouraged to use more than one method of data collection as multiple methods enhance the

validity of the finding” (p. 12). Although, “Riessman argues that representation is ambiguous and hence open to multiple interpretations, [she] identifies five levels of representation that are present in the collection and analysis of data: attending, telling, transcribing, analyzing and reading” (Earthy & Cronin, 2015, p. 427). Along with crystallization, I followed these five levels of representation for my research study in order to satisfy my plan for my narrative case study analysis.

### *Problem Statement*

Over the years, educational research in mathematics has consistently neglected the stories of African American girls and women. Despite the ongoing success of African American girls and women in mathematics, issues confronting them are rarely addressed in research studies. I believe that there should be more research addressing gender and racial intersections of this marginalized group, because “a cursory examination of the ways Black children have been researched and represented in mainstream mathematics education research and policy...shows how Black children are devalued” (Martin, 2009a, p. 31). Habitually overlooking and omitting Black girls and women in mathematics educational research has negatively impacted their self-esteem and confidence and led to them being “unmotivated, inclined to disengagement, and lack in agency” (p. 31) of their abilities to succeed.

Year after year, educators and policy makers debate about student achievement in education and the factors influencing their success and failures. Discussions about student achievement are always controversial because of the racial and gender inequities seemingly ingrained in the institution of education. In the past, education was used as a tool for liberation and suppression for African Americans (Martin, 2000). White children’s successes and failures

in mathematics has become the norm and what all other groups are being measured by (Martin, 2009b).

Race and gender intersectionalities have dominated discussions of equity in education, but the conversations are geared toward the entire African American race rather than branching off with either African American men and women. While reviewing the literature related to African American girls and women in mathematics, I found that other “culturally relevant theories and research methodology to study African American girls have lagged behind the research in this area” (Lindsay-Dennis, 2015, p. 508) highlighting the influences of race and gender on Black girls’ success.

The purpose of this study was to describe and analyze the effect of dual race and gender on being successful in mathematics through the narratives of African American women. Through this research study, I wanted to determine the challenges African American girls and women face when navigating through their mathematics education experiences. People have failed to notice, however, that “other young black women who struggle to find voice, to overcome challenges and marginality, and to find their way in academic settings that have failed wholly to accept and include black girls” (Russell, 2011, 94). I also wanted the women “through telling their stories, [to] express their identity, relationships and emotions” (Priest, Roberts, & Woods, 2002, p. 38).

By rethinking our approach to equity in education, we can lessen the ostracism and oppressive educational environment African Americans/Blacks have become accustomed to dealing with when trying to navigate the educational system in the United States. Some may agree with the “neoliberal ideology argues that [says] merit, thrift, and hard work can bring socioeconomic success, which means that if one is poor, one must be indolent. In other words, poor individuals are the problem, not the system” (Day, 2013, p. 66). Although “womanist

scholarship has an explicit commitment to addressing the oppression of black women, womanist discourse is also concerned about all persons within black communities” (Day, 2013, p. 65).

### *Guiding Research Questions*

Research questions reveal the path in which the research study is going and integrates the significant viewpoints for a purer direction of the study (Roberts, 2010). Because “the qualitative research paradigm is characterized by the emergence of questions during the course of data collection and analysis” (p. 137), I realized that my questions would probably evolve throughout this process. For researchers, research questions “are usually targeted to a small number of events to study how relationships are formed and why” (Dooley, 2002, 339). I was constantly aware that “case study is an empirical inquiry that investigates the case or cases conforming to the abovementioned definition by addressing the “how” or “why” questions concerning the phenomenon of interest” (Yazan, 2015, p. 138).

Accordingly, the following questions were initially used as guiding research questions for my study:

1. What factors do mathematically successful African American women attribute to their success in mathematics courses in undergraduate and graduate school?
2. What did these mathematically successful African American women do inside and outside of the college mathematics classroom to cultivate and nurture success in college mathematics?
3. How did these mathematically successful African American women navigate their gender and race during their elementary, middle school, high school, and college matriculation in mathematics?

4. How did the life and schooling experiences of these successful mathematics educators influence (or not) their pedagogical philosophies and teaching practices in the classroom?

While conducting my interviews and more in-depth research, my questions did in fact change. My research questions eventually evolved to the following questions:

1. What factors do mathematically successful African American women attribute to their success in mathematics courses in grade school and in college?
2. What did these mathematically successful African American women do inside and outside of the mathematics classroom to cultivate and nurture success in mathematics?
3. How did these mathematically successful African American women navigate their gender and race during grade school and in college, and did this intersection influence their success in mathematics?
4. Who or what influenced the life and schooling experiences of these successful mathematics educators? Did these relationships influence (or not) their pedagogical philosophies and teaching practices in the classroom?

During the investigation, my “questions change[d] during the process of research to reflect an increased understanding of the problem” (Agee, 2009, p. 432). These modifications occurred from my power “to examine [my] own role and perspective in the inquiry process, especially how [I was] positioned in relation to participants” (p. 432). Changing my research questions made me nervous, because I had been married to them for a long time. Subsequently, I realized I was getting answers to different questions that evolved later during my data collection process.

### *Research Setting*

Once I prepared and refined my research questions, I started thinking about the setting of my research. My participants were from different parts of the United States and they work in diverse establishments; therefore, I picked neutral locations where the interviews took place. We came to a consensus of locations that were neutral and comfortable to them. There were multiple research settings due to the participants working in numerous sites in different parts of the city. Picking a comfortable “environment in which participants feel encouraged in participating and being part of the research team...is vital for applying narrative methodology” (Varaki, 2007, p. 5). Making sure that research conducted in an environment that the participants were accustomed to was advantageous for me as the researcher. If the participants are comfortable in their surroundings, they will probably be more enthusiastic about telling their stories. Collecting data for qualitative research in a place accustomed to the researcher is not normally recommended. Researchers should be cognizant of their surroundings and the participants always. Being in a familiar place may cause the researcher to be comfortable and not take notice of the little nuances in the environment. A researcher should also be attentive to any uneasiness displayed by the participant(s) in the research setting during the interview process.

### *Research Participants*

In narrative analysis, the researcher has to be careful and meticulous with who is chosen to participate in the research study. The participants in my dissertation research study are African American women that have graduate degrees in mathematics or mathematics education. They are retired or currently teaching mathematics in a middle school or high school setting. Initially, I informally contacted ten African American women mathematics educators by phone. These women were identified as successful by people I trusted in the educational community and by

me. The preliminary women were identified as successful using a number of characteristics. These identifiers include but were not limited to: number of years as a mathematics teacher, selected as Teacher of the Year, passage rates of students on standardized tests, selected as departmental chairperson, and/or level of college degrees earned. Because of my prior and current experiences in mathematics education settings, gaining entry and access to participants in different organizations with these backgrounds was not difficult for me. I was welcomed in the institutions because I understood and know the culture and language of middle and high school institutions (Feldman, Bell, & Berger, 2003). Reaching out to my peers, students, staff members for potential participants in my narrative analysis research study was not a difficult task given that I negotiate these spaces daily.

After the informal phone conversations, I was able to pinpoint six women that were interested and available to participate in my study. I mentioned to them how they were selected as potential participants, and the characteristics that deemed them successful African American female educators. I also explained the study and what participating in the study means. The six women were notified formally by email within two days of the phone call inviting them to be a part of my research study found in Appendix A. Due to unforeseen consequences, one woman had to discontinue my preliminary selection process, and she notified me by email. She did complete the initial questionnaire before dropping from my research study.

I interviewed five African American women between the ages of 35 and 70 who had been identified as successful in mathematics education. These women have completed their graduate studies in mathematics or mathematics education and have worked in the education field teaching middle school or high school mathematics for at least 10 years. My “participants...[will probably] pin inspirational messages, artwork, photographs, and more to re-present



commonplace images of Black girlhood, Black fatherhood, Black female relationships, Black female body image, and Black families” (Price-Dennis, Muhammad, Womack, McArthur, & Haddix, 2017, p. 10).

My obligation was to be clear to my participants my role as the researcher, and I did not take my role as researcher lightly. Although I may have a current or past personal relationship with the potential participants, I was explicit in my role and the methods of data collection within the consent form. I also reiterated these things to the participants as needed during data collection.

### *Data Collection*

Researchers employing narrative analysis methods should be equipped with the tools to attend to detail without bias (Clandinin, 2013; Roberts, 2010; Yin, 1981; Yin, 2009). My research questions were used to navigate through the data collected from the participants. Before starting the interview process, the participants signed a consent form that was approved by Georgia State University’s Institutional Review Board. The consent form can be found in Appendix B. Once the consent form was signed, the participants were given a questionnaire and reminded that their participation in the study was voluntary. The participants were also given information about the data that will be petitioned from them. The questionnaire used is located in Appendix C. The questionnaires were given back to me by the participants at a week before the first interview. Receiving the questionnaires back early helped me prepare for the interview process.

There were two phone interviews and one face-to-face interview with each of the four participants. My fifth participant was only able to complete one 45-minute phone interview and the initial questionnaire. The first interview was based off of Interview Protocol Part 2 which is

found in Appendix D. The information gathered from the first interview focused upon the participants' educational experiences from kindergarten to high school. We also discussed their initial acceptance into college, and the influence of their family on their educational journey. The second interview covered their experiences in college and teaching mathematics. The third interview covered more of their teaching experiences, successes in the field of mathematics education, and their views on African American female mathematics educators.

Face-to-face and phone interviews were my main source of data. The interviews allowed the participants to give an "authentic" voice to their stories, and storytelling is an essential component of my womanist theoretical framework (Banks-Wallace, 2000). Each interview, including the face-to-face interviews lasted about 45 minutes and were audio taped. The audio was saved on an USB drive, which was locked away.

For each of my participants, I kept a separate folder with the transcripts from my preliminary questionnaire, interviews, my participant notes, and any other significant information relevant to the participants in my research study. Throughout the data collection process, I also wrote notes in a personal journal that I kept locked away with the other collected data in order to preserve privacy and confidentiality for all parties involved. Immediately after every interview, I collected my thoughts and personal feelings about my experiences during the data collection in my personal journal (Bogdan & Biklen, 2007; Dooley, 2002; Hays, 2004). Because narrative analysis is evolving and malleable, I made sure to constantly conduct data assessments during the interview process to make sure I did not have to make any changes to the way my data will be analyzed (Dooley, 2002). As the "narrative researcher, how the research informant is introduced and inducted into the research process can affect the construction and usefulness of the narrative" (Hardy, Gregory, & Ramjeet, 2009, p. 11).

For my research, I used crystallization as:

an intriguing new approach in qualitative research that has emerged in recent years as a kind of three-dimensional data analysis strategy that welcomes the new lens that artistic thinking can bring to research, whether it is storytelling, painting, poetry-writing, metaphor, or photography. (Shagoury, 2011, p. 298)

Crystallization was used “to identify deeper and...more complex findings that still only reflect[ed] a partial, situated, constructed, multiple, embodied reality that is enmeshed in power relationships” (Polsa, 2013, p. 78). Ellingson (2008) emphasized that crystallization involves “a significant degree of reflexive consideration of the researcher’s self and roles in the process of research design, data collection, and representation” (p. 10).

#### *Data Analysis*

Once my data were collected, it was necessary that I had my data analysis plan solidified. My data analysis plan had clear characteristics for narrative analysis. Data collection and analysis happens concurrently in qualitative research studies (Merriam, 2009). Throughout my data analysis, “the idea [was] to discover essences and then reveal the essences with sufficient contest, yet not become mired by trying to include everything that might possibly be described” (Wolcott, 2009, p. 39).

Crystallization and corroboration have generated a more credible narrative analysis study based on multiple diverse knowledge bases (Clandinin, 2013; Ellingson, 2008; Richardson, 1998; Richardson, 2000; Roberts, 2010; Yin, 2009). Because multiple sources of information were gathered during the data collection phase, I had the opportunity to address a broader range of historical and behavioral issues that allows for the development of converging lines of inquiry, which is a process of crystallization and corroboration (Clandinin, 2013; Ellingson, 2008;

Richardson, 1998; Richardson, 2000; Roberts, 2010; Yin, 2009). I utilized a transcriber through Upwork.com. The transcriber was recommended by a reliable source that used the transcriber previously and was satisfied with his work. The transcriber was about 95 percent accurate. While checking for accuracy, I verified the transcriptions by listening to the recordings multiple times while double checking the transcriptions. As the researcher, however, I acknowledge “that no observations or interpretations are perfectly repeatable” (Stake, 2003, p. 148). Crystallization can be applied to “clarify meaning by identifying different ways the phenomenon is being seen” (p. 148). To crystallize and corroborate the data, the researcher must first follow steps for analyzing the data (Ellingson, 2008; Richardson, 1998; Richardson, 2000).

I employed a systematic coding using an excel spreadsheet to analyze the data collected from my participants. During this phase, “crystallization...involve[d] respecting those who are studied, and...thereby provid[ing] room for their voices” (Polsa, 2013, p. 78). My personal journals supported this stage of my research study. During this coding stage, I developed classifications of the data using excel and a method to sort through data using highlighters and underlining (Clandinin, 2013; Roberts, 2010; Yin, 2011). The excel spreadsheet was saved on a USB drive that was locked away with the collected data.

The coding process proved to be a tedious and difficult process, and everything did not always reveal itself in a concise theme (Clandinin, 2013; Roberts, 2010; Yin, 2011). I realized early in my coding phase that I did not have many data from my fifth participant, and I found it difficult to include her data throughout the process. Due to other obligations, she was not able to commit the time for two additional interviews or any follow ups I may have needed. She notified me by email and through a phone call. She told me that she was sad that she was not able to

finish the process, but she was supportive of my research. So, I ended up with four participants for my research study.

Finding themes and explanations in the data collected from my four participants was important to my interpretation and representation within the study (Clandinin, 2013; Roberts, 2010; Yin, 2011). Researchers must formulate and arrange, investigate and code, code to build description and themes, characterize and report, interpret the findings, and authenticate the truthfulness of the findings of the data (Clandinin, 2013; Roberts, 2010; Yin, 2011). Once these steps were accomplished, I as the researcher was able to search for unusual patterns, explain different marvels, formulate a hypothesis, and possibly develop philosophies (Glesne, 2010; Merriam, 2009; Yin, 2011). Each of these steps outlined were required; they are what I used for a valid and trustworthy qualitative narrative analysis research study.

Another component of the data analyzing phase was examining the legitimacy of the explanations that have been revealed during my analysis. This phase is called member checking which “is considered one of the most significant methods within qualitative research for establishing or strengthening the credibility of a study” (Doyle, 2007, p. 889). Member checking is used “to be a reasonable way of establishing that the findings and interpretations of a qualitative study are meaningful to the actual participants or group” (p. 893). This process allows the researcher to be reflexive of the interview process, and “the member check discussions [will enable] agreement to be reached between the participant and [researcher] on the meaning and preliminary interpretations of their personal experiences” (p. 905).

Ultimately, “the unique sharing and negotiation of the interpretive stance that potentially is being developed within the member check counteracts the risk of my interpretations of the participants’ reality being significantly different from their own” (p. 905). I sent the

transcriptions to each participant for member checking phase number one. Everyone sent their transcriptions back to me with minor corrections. I followed by sending my final narrative write-ups to my participants. The narratives were checked three times by each participant for accuracy and corrections. Each participant approved their final narrative corrections and updates.

Requesting colleagues to read drafts of my report was another way to help with my growth as an investigator. I found colleagues that assisted me with deciphering my discoveries to receive a diverse assessment of the findings (Glesne, 2010). Given that “narrative inquirers are always strongly encouraged to participate within a response community” (Clandinin, 2013, p. 210), I utilized my response community to add authority and validity to my narrative study. Clandinin (2013) states, “response communities are important spaces within inquiry, because they help inquirers to recognize how they shape both the experiences of their participants and their research puzzles” (p. 210). This community of my peers and colleagues are already an integral part of my study, because they are a community which consists of people I value and trust to provide responsive and responsible dialogue about my unfolding inquiry (Clandinin, 2013).

### *Data Representation*

Representations of the data from my dissertation study was communicated in multiple ways, and I present my “results honestly and objectively...[not] hiding negative results, engage in selective reporting, or omit conflicting data for deceptive purposes” (Roberts, 2010, p. 39). I represent my findings in narrative form with information organized into themes, categories, or patterns (Roberts, 2010). I have also included tables that complement and simplify large amounts of information, requiring thoughtful judgements about what is significant and meaningful in the data (Roberts, 2010). My data representations have taken many forms like a formal write up,

tables, charts, and/or a narrative summary which leads to a “well-balanced study...show[ing] ample evidence of attention to both the methodical results of analysis and the conjectural tasks of interpretation” (Wolcott, 2009, p. 30). My data are characterized in such a way to encompass and showcase the different themes that have been illuminated through my coding analytics which will help me take time to reflect on the results and implications of my study (Wolcott, 2009).

### *Confidentiality and Ethical Concerns*

In qualitative research, a researcher’s “ethical considerations are inseparable from your interactions with study participants in the field” (Schram, 2006, p. 137). Preserving confidentiality and high ethical standards while conducting narrative analysis research was critical to the success of my study. As the researcher, I was responsible for sustaining definite role responsibilities while upholding a cooperative and disarming rapport with the participants in the study (Schram, 2006). Although my role as a researcher constantly changed, upholding the core researcher functions and responsibilities while conducting the research study assisted me with remaining loyal to the principal objectives of my inquiry (Schram, 2006).

Being ethical when conducting my research project, meant allowing my participants to have full disclosure of the research study process. Providing the participants informed consent allowed for the participants the permission to leave or join the research study at their own free will. The participants were informed that I will confidentially preserve their oral narratives with pseudonyms in place of their real names (Glesne, 2010).

Using pseudonyms safeguarded the anonymity of the participants and to my trustworthiness as the researcher with the participants (Glesne, 2010; Yin, 2011). As pseudonyms, I used the names of my mother, two grandmothers, and great-aunt. These names were used as pseudonyms to acknowledge a few of the women that meant a great deal to me. My

heart overflows with love and compassion every time I read their names in my research study. I am grateful I am able to pay homage to them in this way and honor my mom while she is still here with me on earth. These women had a huge influence on my life much like the impact my participants had on their students' lives. Although my grandmothers and great aunt are no longer with us on earth, I feel their elegance and essence lives on through my dissertation.

Maintaining transparency throughout the research process was vital to upholding ethical practices and confidentiality with the participants (Clandinin, 2013; Glesne, 2010; Roberts, 2010; Yin, 2011). Transparency includes, among other things, that there are not any risks that could have potentially harmed the participants and the benefits must offset any conceivable hazards to the participants (Glesne, 2010; Yin, 2011).

#### *Subjectivity Management Plan*

In qualitative research studies, no lens is free of bias; every lens has subjective and objective qualities. In presenting my reflective self, the goal was to identify as many of my lens's qualities in as revealing a way as possible. Categorically, "the goal is to provide the audience with sufficient information that it can make its own assessment of the potential (desirable and undesirable) effects of my lens" (Yin, 2011, p. 270).

As an African American woman that majored in mathematics, my subjectivity evolved throughout the progression of my research project here that focuses on the narratives of African American women in mathematics. Some of my subjectivity "derive[d] from personal qualities that come into play prior to and through [my] interactions with events and people in the field" (Schram, 2006, p. 135). While investigating the success stories of these women in mathematics, my plan was to not only gain a deeper understanding of the phenomena being investigated and but also to acknowledge my own subjectivity as a part of the process (Darke, Shanks, &



Broadbent, 1998).

My subjectivity enhanced my research study and caused my roles to be reversed during the evolution of the data collection. My main purpose is to “increase knowledge and not pass judgement” (Vakari, 2007, p. 6), and as a researcher, I “must ensure that there is a strong, positive, and trustworthy feeling between [myself] and the research participants” (p. 5). I understand that narrative analysis “seeks to critically analyze the stories we tell, hear, and read in the course of our work in the forms of children’s stories, teachers’ stories, student teachers’ stories, and our own stories” (p. 6).

During the research process, I was cognizant of not being leading in my questioning and allowing the participants to tell their own stories. When addressing subjectivity, the major “issue is the question of how and to what extent personal qualities or attributes, such as emotions or personal sensibilities, influence, or should influence the research process” (Schram, 2006, p. 135). Although my experiences as an African American girl and woman may be similar to the participants, I made a concerted effort to not project my feelings onto them. While there were many common threads, everyone’s narratives were distinctly different, including mine. It was vital that I not dispense my bias onto the participants, because the purpose of my research study is to comprehend and appreciate their experiences as African American women in mathematics. I wanted to ensure that the participants authentic voices are heard.

Safeguarding and preserving African American women’s narratives “raises a number of issues that other educators have discussed, namely, that (Black) girls need spaces to speak and write from their own subjectivities; they cannot always authentically learn about/express themselves in subjective ways” (Henry, 1998, p. 166). I believe that my dissertation study provided African American women an avenue for expression through their stories.

When researchers deliberately engage and monitor subjectivity, they use their feelings and emotional responses as authentic points of departure, or cues, for inquiring into why they are perceiving and to what effects they are interpreting matters in a particular way (Schram, 2006, p. 136). Peshkin (1988) accepts that “untamed subjectivity mutes the emic voice” (p. 21). Initially, “researchers should systematically seek out their subjectivity, not retrospectively when the data have been collected and the analysis is complete, but while their research is actively in progress” (p. 17).

Within my study, I have included an acknowledgement of my personal subjectivity that will be introduced during the beginning section of the research process. I included a few personal narrative vignettes highlighting my background and educational influences in my life throughout the writing-up process. Inserting my personal narratives into my research study allows me to look for paradox that helps to expand the possibly narrowing impact of unexamined hidden agendas I might be carrying into my research (Schram, 2006). Given that “one’s subjectivity is like a garment that cannot be removed” (Peshkin, 1988, p. 17), I made sure to recognize its possible influence upon data interpretations and analysis.

### *Limitations*

There are limitations in any research study, and I realized as a researcher “choosing to write realist tales will have to persuade audiences with a different rhetoric than investigators adopting interpretive, feminist, constructionist, and other perspectives” (Riesman, 2008, p. 185). Acknowledging my “data will be limited to your interactions with a set of participants and their *self-reported* behavior, beliefs, and perceptions” (Yin, 2011, p. 132) was vital to a good qualitative researcher conducting a narrative analysis study. The location for my interviews and data collection could have provided a limitation for the participants. Yin proposes, “prior to

fieldwork, hypothesize what difficulties you may encounter in making observations while also taking good field notes” (p. 128).

Throughout the research study process some participants may have felt that I as the researcher was being invasive and some of the data gathered during the interviews may not be able to be used (Darke et al., 1998; Vakari, 2007). I tried to maintain good listening and uncovering skills, because lacking these skills could have been detrimental to the research study (Riesman, 2008; Vakari, 2007). Another possible limitation of my dissertation research could have been me. Sometimes the mere existence of me as the researcher giving the interview could cause the participants to give prejudiced answers to the interview questions (Darke et al., 1998; Riesman, 2008; Vakari, 2007). The participants’ prejudiced answers could also be incoherent (Darke et al., 1998; Riesman, 2008; Vakari, 2007), which could add another layer of limitations to decoding the data. Decoding and interpreting the data by the researcher might contribute to some of the limitations of the research study. There could be “difficulties in generalizing research results and the subjectivity of the data collection and analysis processes” (Darke et al., 1998, p. 287).

Audio-recording was the best way for me to capture the participants’ narratives, but they could possibly cause some issues for the researcher. Often, “the voice in its presentness, if there is such a thing, vanishes immediately, and our poor attempts to capture it on tape or in fieldnotes always fail” (St. Pierre, 2008, p. 320). The participants could be inarticulate when speaking and the audio data may prove to be hard to understand and decipher for transcribing (Merriam, 2009). During this process, the observer’s presence may also be unsettling to the participants, and the researcher must remember that it is her role to make the participants feel as comfortable all possible in all aspects of the research process.

### *Implications and Future Directions*

Unless we change the negative perceptions of African American girls and women in mathematics within the educational community, we will continue to have trouble with the oppression and marginalization of underrepresented groups in educational institutions. Conducting this qualitative dissertation research study hopefully highlights the gaps in the literature and research studies focused on African American girls and women in mathematics. Because my narrative analysis “relied heavily on the researcher’s interpretation of events, documents, and interview material” (Darke et al., 1998, p. 278), I had to make sure to be clear in my writing style and be cognizant of accuracy and care in matters of theory and method all the while including sufficient evidence to support the findings (Darke et al., 1998).

Research studies conducted without African American girls being classified with other groups are few and far between. My goal for my dissertation study was to give my participants a platform for their voices to be heard who may otherwise be overlooked and marginalized due to race and gender and “much of what we ‘know’ in education comes from telling each other stories of educational experience” (Vakari, 2007, p. 6). Because there is a lack of educational research specifically geared toward mathematics and African American girls and women, there is an important space for my research to influence policies and practices regarding encouraging success of African American girls and women.

For this dissertation study focused on African American women in mathematics, I employ qualitative narrative analysis research methods. Qualitative narrative analysis methods coincide with the premise behind womanist theory. Narrative analysis research methods that are consistent with African American women’s ways of knowing are more likely to be successful in promoting behavior change amongst this population. Furthermore, research designs grounded in

culturally consistent epistemologic frameworks may offer opportunities to integrate healing and scholarly inquiry consciously (Banks-Wallace, 2000, p. 34). Because each narrative is a phenomenon, Merriam (1998) affirms that with narrative analysis methods “the researcher aims to uncover the interaction of significant factors characteristic of the phenomenon...which focuses on holistic description and explanation” (p. 29).

S. Williams (1986) reveals that “womanist theory, is by definition, ‘committed to the survival and wholeness of entire people,’ female and male, as well as valorization of women’s works in their varieties and multitudes” (p. 304). I believe that using narrative analysis methods with womanist theory helped preserve the wholeness and narratives of African American girls and women. I consider that womanist theory is similar to narrative analysis’s “value...lies in facilitating appreciation of the uniqueness, complexity, and contextual embeddedness of individual events and phenomena” (Schram, 2006, p. 107). Narrative analysis for research “is seen, from such a perspective, as a mutual and collaborative endeavor between a researcher and participant to produce a story which is authentic...[and] such a collaborative work demands the voice of the researcher too” (Vakari, 2007, p. 4). My plan was to examine each participant in my dissertation research study as their own distinctive case.

As I mentioned before, there is very little research on African American girls and women in mathematics. While “Black girls continue to experience marginalization, oppression, and ‘chilly’ classrooms, there is an obvious failure on the part of researchers to examine and conceptualize the integrated issues of race and gender” (Ricks, 2014, p. 10). Hopefully, one day I can be considered a womanist scholar and this dissertation research study will contribute to the emancipating process and self-empowering of African American girls and women in

mathematics education. The essential “intent of A. Walker’s construction and definition of the term Womanist was meant to empower Black women” (Johnson, 2007, p. 373).

Floyd-Thomas (2006) stresses, “as intellectual revolutionaries, womanist scholars undertake praxis that liberates theory from its captivity to the intellectual frames and cultural values of those which cause and perpetuate the marginalization of Black women in the first place” (p. 2). With narrative analysis research methods, addressing the ontological and epistemological implications embraces a host of disciplinary methodologies. Ontology and epistemology ideals shape the “researchers’ views about the nature and production of knowledge, their epistemological bent in brief, underlie the inquiry project they conceptualize and operate” (Yazan, 2015, p. 136). Beliefs inspire the practice of research studies. Some methodologies addressing the basic set of beliefs include psychological, historical, and ethnographic techniques (Schram, 2006). The “womanist epistemologic framework [is one] that can undergird the development of intervention research to assist African American women in incorporating health-promoting behaviors into their lives” (Banks-Wallace, 2000, p. 34). Doyle (2007) states, “an epistemology is described by Crotty as a way of defining the nature of knowledge and as providing a philosophical foundation for deciding what kinds of knowledge are possible” (p. 888). I used these epistemologic methodologies within my narrative analysis research as an approach to generate significant outcomes for the lived experiences of the African American women participating in my research study.

Narrative details are a major component of my research study. Throughout the study, ontological and epistemological principles were revealed from my participants and from me within our rich storytelling. For my project utilizing womanist theory along with “case studies produce[d] context-dependent knowledge-essential to the development of a field or discipline.

Rather than operate from rules, experts operate on the basis of detailed case knowledge” (Riessman, 2008, p. 194). Case studies focus attention on narrative detail (the “little things”). Important insights can unfold from “the many-sided, complex, and sometimes conflicting stories” (p. 194). Telling stories of their experiences exposed the participants’ beliefs about their mathematical journey. Stake (2008) posits, “storytelling as cultural representation and as sociological text [that] emerges from many traditions, but nowhere more strongly than oral history and folklore, and is becoming more disciplined in a line of work called narrative” (p. 133) analysis.

### **Concluding Words on Methodology**

Qualitative research has always been my focus since I entered the doctoral program. Being able to narrow down the methodology based on my ontological and epistemological ideas has been a great experience. Given that it is a “process of gathering information through storytelling” (Vakari, 2007, p. 2), narrative analysis methods allow me the freedom to highlight lived experiences through the colorful narratives of my participants in the study here. I am excited about the possibilities of conducting this type of qualitative research study, and that narrative analysis research methods have slowly been accepted in the academy.

Giving a platform to the voices of African American girls and women in mathematics is my inspiration. Their stories portray the knowledges they have gained through their lived experiences and the narratives of their ancestors. Knowledge construction through “storytelling as cultural representation and as sociological text emerges from many traditions” (Stake, 2003, p. 144). Although knowledge could “dwell on objects and events...knowledge is gained from experiences with them, experience with propositions about them, and rumination” (Stake, 1978, p. 5).

Throughout this process, I realize that some of my voice is also communicated within the research study. I understand that people display “a unique individuality and agency that makes the subject of all narrative inquiry quite singular, his/her status as a socially situated and culturally fashioned being makes him or her a part of a more or less local or global community” (Vakari, 2007, p. 2). Given that I acknowledge my subjectivity; I maintain transparency in my research for the readers. Preserving a transparent rapport throughout my writing assists in adding to the validity of my analysis and interpretations of the data collected from my participants, recognizing “that we are storytelling organisms” (Vakari, 2007, p. 3).

Giving successful African American women a platform is crucially important to me and “voice is an important aspect of narrative. There are many voices inside of each story including those of narrators, authors, researchers and of critics” (Vakari, 2007, p. 4). Because these women have been a disregarded group for so long in mathematics education research, I feel the time is right to hopefully influence policy and procedures that promote academic success in mathematics. Over the years, “Black women have experienced a barrage of political assaults that traverse a litany of social institutions, including policies that directly impact Black women’s health, economic security...family autonomy” (Rousseau, 2013, p. 3) and education.

Renegotiating gender racialization and knowledge production in different environments was covered throughout my educational research study. Rousseau (2013) contends—

patriarchy differentiates women from men while privileging men, racism simultaneously differentiates people of color from Whites and privileges whiteness. These processes are distinct but intertwined. Like any structuring of power, the racializing of gender is a process that always needs to be renegotiated. (p. 3)



## CHAPTER 5

### FINDINGS AND ANALYSIS

*Every great dream begins with a dreamer. Always remember, you have within you the strength, the patience, and the passion to reach for the stars to change the world.*

– Harriet Tubman

#### Introduction

The purpose of this study was to bring the accomplishments of four African American women mathematics educators to the forefront by exploring their life stories using narrative analysis methodology and womanist theory. In particular, I investigated and analyzed the effects of dual race and gender on being successful in mathematics through the stories of African American women. I highlighted the challenges African American girls and women face when navigating through their mathematics education experiences. This chapter, supported throughout with data, examines how these four women were able to effectively navigate challenges to become successful mathematics educators and to appreciate their experiences as African American women in mathematics.

Employing Braun and Clarke's (2008) thematic analysis "which is a method for identifying, analyzing, and reporting patterns (themes) within data" (p. 79) partnered with womanism as my theoretical framework, I first provide the narratives of my participants independently. Individually each narrative is separated into the subsequent sections: introduction, educational experiences from grade school to college, reflections of success in college mathematics, successful experiences in teaching mathematics, and summative remarks. The participants—Elizabeth, Ibbie, Louise, and Mattie—each have their narratives represented in the findings section. I follow their narratives with a thematic narrative analysis discussion supported by womanist theory. Throughout the analysis process, I realize that the participants "efforts,

achievements, struggles and challenges...might have never been voiced” (Abkhezr, McMahon, Glasheen, & Campbell, 2018, p. 18). Therefore, I included explicit quotes from my participants to emphasize their “voices” throughout the narratives. I agree narrative analysis “is especially suitable for research that focuses on the lived experiences of marginalized groups, such as racial and ethnic minorities and women, whose histories were often disregarded by the dominant group” (Patterson, Mickelson, Hester, & Wyrick, 2011, p. 274). Lastly, I conclude each narrative analysis with the participants’ summary linked to thematic evaluation supported by the narrative data.

### **The Mover and Shaker: Elizabeth**

#### *Introduction*

To say Elizabeth is a mover and shaker is to say the least. She is a fifty-year-old light skinned African American woman with naturally curly hair that comes to the middle of her back when straightened out. Standing almost 5 feet and 9 inches, Elizabeth knows how to command the attention of a room, and her pearly white smile is contagious. She is currently working in the United States in a southeastern school district as a Digital Learning Specialist.

Elizabeth is married with two boys, and has been an educator for over 23 years. Before working as a Digital Learning Specialist, she was the mathematics teacher, science teacher, mathematics department chairperson, online mathematics teacher, online department chairperson, and online professional learning instructor. She also worked as a science interpreter and college professor. She graduated college with a Bachelor’s of Science in Mathematics with a Physics minor, and she has her Masters of Education Degree in Secondary Mathematics. Most recently she earned a doctorate in Educational Leadership with a focus on Instructional Technology. Elizabeth attributes her success as a mathematics educator to her parents and their

push for her to excel at everything.

### *Educational Experiences from Grade School to College*

Due to growing up in a middle-class military household, Elizabeth and her family moved around a lot. Her mom was an elementary school teacher and her dad was a Sergeant Major of the United States Army. Elizabeth attended at least 12 schools from elementary school to high school growing up as a self-proclaimed “army brat.” Moving around from Germany to Florida to Virginia to Georgia did not affect her academic performance but it was hard socially, because she was always the new girl. She mentioned that on the military bases where her family lived “there weren’t a lot of girls and there were not a lot of black people in my...classes. Oh, my gosh! It’s crazy because you would never think about it. But to be in a classroom full of people and you’re the only female, that was crazy” (Interview 1). When asked if she had any black female mathematics teachers she mentioned that she did not have any until college:

That is amazing! Never processed that I never had a black female math teacher—until college before you asked this question. It makes me sad to realize that I didn’t have any black female math teachers growing up. (Interview 3)

Moving to Georgia was the only time that she felt she needed to play catch up because the southern accents initially confused her. Although she ended up making straight A’s, she actually thought she was going to fail all of her classes. Elizabeth’s parents were serious about education. Education was a priority in her household mainly because her mom was a teacher and her dad was an officer in the army. Elizabeth stated, “on my mom’s side, education is what they do. They’re educators. I would say things changed, but for me, it was A’s and B’s if you want to keep living.” She went on to add that her mom “focused on math and reading. That is the closest

thing I had to a black female math teacher” (Interview 2). Elementary school for her went up to sixth grade:

when I was going to seventh grade, I remember my dad sitting me down and saying, ‘I’m out.’ Specifically, about math. He said, ‘I haven’t gone higher than this,’ because I was going into pre-algebra. He said, ‘I can’t help you out anymore, so you’re on your own.’  
[LAUGHTER] (Interview 1)

While she was always good at it, Elizabeth’s love for mathematics did not grow until her Geometry class. She did not enjoy pre-algebra due to the initial introduction of letters into the equations, and algebra in ninth grade was fairly easy because it was a repeat of pre-algebra. In tenth grade, one of her teachers really made geometry fun for her and the other students in her class. She stated “we had this older white dude. He was cracking stale jokes. He tried to make the class fun as well as the math” (Interview 1). By the time Elizabeth completed high school, she was a National Merritt Scholarship semi-finalist and had already finished all of the advanced mathematics courses through Advanced Placement Calculus.

Once she graduated from high school, Elizabeth’s plan was to be a writer or a journalist when she started college at a Historically Black College and University (HBCU). She initially went to college as an English/Communications major, but when she took Calculus her first semester she really fell in love with mathematics. She changed her major to mathematics with a minor in physics. When discussing college, Elizabeth shared the following experiences:

College was fun, especially freshman year when I had regular classes...but even then, because I had Calculus. I remember I couldn’t always play and party with everybody. I did give in, but not as much as my friends. College was a lot of studying for me. Going from high school where you didn’t really have to study, you know what I’m saying? You

just did what the teacher wanted. For college... and then you're a math major, I'm pretty sure I declared it early, like my first semester I switched. It was a lot of studying, although I did, my sophomore year, started working the first semester along with my classes just because my dad wasn't sending me money for school. If I did want to go party, I needed some funds. But it was good college experience. It could be the HBCU piece, too. You've got to throw that in there. (Interview 1)

Elizabeth was good at math and loved it, however, she did not consider herself naturally gifted in math. When reflecting about some of her mathematics courses in college she disclosed:

I won't say math was easy in college because it wasn't. I'm talking about when you have one problem and you start on page one and you're still writing on the back of page two, and you finish on page three. You know what I'm talking about. People don't understand. People just don't understand. (Interview 2)

She really enjoyed taking the theoretical upper level math courses. Elizabeth felt really successful in these types of college mathematics courses, because the courses involved a lot of logic and felt like learning another language.

#### *Reflections of Success in College Mathematics*

Elizabeth attended a HBCU located in the southeastern part of the United States. She attended this HBCU because she had a full scholarship and one of her best friends was also going there. Elizabeth was fortunate to get a mathematics tutoring job so that she could compensate for the incidentals her parents were not covering. She was able to cross-register and take mathematics courses at other schools in the same area of her HBCU. When asked how she prepared for her college mathematics courses and exams, Elizabeth explained:

A lot of redoing problems, reworking problems, and making sure I understood the concept. I didn't really think about this, but vocabulary was really important in math. You had to understand what they were asking you in the general problem so you can solve it. (Interview 2)

Elizabeth realized the importance of—

Getting familiar with just understanding that it was a process, a hustle and flow that you had to go through for different concepts and not being afraid of it. Because a lot of times, once you start throwing in decimals or fractions, you ramp up the difficulty of a problem. I'm a get-down-and-dirty-doer kind of girl. I notice that I over study because I like to know is A happening? Will I find A? Will I find B? What if I can't use C? Remember math books where they used to have the A-problems, the B-problems, and the C-problems? I liked knowing how to do the A-problems, the B-problems, and the C-problems. I'm not satisfied with just doing the basic problems. How are you going to make this harder? Let me work out some of those problems, too. (Interview 2)

Working through problems in multiple ways helped Elizabeth build up her assertiveness with her mathematics problem solving skills. Elizabeth spoke about genuinely enjoying college, and she recalled that having confidence was paramount for her being successful with mathematics.

Elizabeth was confronted with one major obstacle in her undergraduate college career that could have derailed her confidence and success. She remembered taking a mathematics course at a Predominantly White College (PWC). The class was one of the last math classes she had to take before graduation, and she “was the only female in the class—and only one of two Black students in the class” (Interview 1). Elizabeth recalled:

It was a horrible experience from blatant discrimination from the professor, to the weirdness of being the only female, to the insane level of difficulty—but many of the other students had past homework assignments, quizzes, and tests—with answer keys and wouldn't share with the two black students. (Interview 1)

While reflecting on the situation, Elizabeth revealed how uncomfortable she felt in that classroom environment. Elizabeth opened up about being “in a classroom full of people and you're the only female, that was crazy” (Interview 2). She observed that on tests and during classroom discussions “all the references were dude references. You know what I'm saying? If we did a report of the class or use examples, everything was geared towards guys” (Interview 2). In hindsight, Elizabeth wished that she had the courage to speak out during that course. She affirmed the classroom situation was problematic because—

It wasn't a good experience, Katrina, and I'll tell you this. Don't ask me why I did not record it and how it was said. But somehow the math teacher, professor, made it known that he did not like black people. (Interview 1)

The tough situation at the PWC left a resounding effect on Elizabeth's life, and the experience ultimately affected her pedagogical approach to teaching mathematics leading her to being a successful mathematics teacher. This experience made her be more cognizant of how she treated students in her mathematics classes. Elizabeth made sure that she made her mathematics lessons and tests inclusive and culturally relevant. This caring and comprehensive approach helped her to build significant relationships with her students, which led to her students' success in mathematics and her success as a mathematics educator.

### *Successful Experiences in Teaching Mathematics*

Elizabeth believes that mathematics is a beautiful component of everyday life. She knows

that in order to be successful at teaching in general one has to genuinely like children and enjoy working with them. Being overlooked and undervalued as an African American and as a woman in the mathematics classroom environment in college caused Elizabeth to constantly evaluate her pedagogical practices once she started teaching mathematics. When asked if her experience at the PWC directly influenced the way she treated her students, Elizabeth declared: “Most definitely! Even if it was on a subconscious level. I made sure that my students never felt the way that I felt when I was in that class” (Interview 2). Reflecting on her teaching experiences, Elizabeth revealed that she got so much joy from showing students they could do well in math, especially those that have not done well in the past. She recognizes that as an educator she has “a huge responsibility to be able to touch young lives and help shape their futures” (Interview 3).

Elizabeth expressed that to be successful as an African American female mathematics teacher she had to be “caring, understanding, authentic, genuine, empathetic, and flexible” (Interview 1). She considers these characteristics essential for fostering connections and having successful teaching and learning experiences with her students. With regards to building meaningful classroom relationships with her students, Elizabeth commented:

I made sure that I got to know my students. I had “Get to Know You” questionnaires where I collected information on them, including their likes, activities/sports they were involved in, and other targeted questions aimed to tell me more about them. I also had classroom roles they could volunteer for... eraser cleaner, board cleaner, call out answers to the homework, pass out papers, greeter for people entering my classroom, ‘mini-mes’ who also explained how to do concepts, etc. I also did a lot of group work. (Interview 2)

Showing compassion for students, Elizabeth affirmed:



While it was “all about the math” in my class, high schoolers love to talk about issues besides math! I learned a lot just by letting them be themselves. Also, if something important happened at the school (i.e., a student died in a car accident, there was a shooting in someone’s neighborhood, the football team won the state championship) it was going to be discussed! (Interview 2)

Describing how experiences in her math classes growing up also influenced her math teaching style, Elizabeth replied:

I think I went back to my teachers who made math class fun. Like I said, I distinctly remember that geometry teacher making math class fun, and even my AP calculus teacher. Even though he couldn’t really relate to us, he still tried to make class fun with little stale jokes, corny jokes. I almost want to throw in an element of caring there. I think that influenced the way that I taught math. (Interview 2)

Elizabeth revealed “the older I get, the more I think that math is life and life is math, and the more I appreciate the beauty of math...math is everywhere” (Interview 1).

#### *Summative Remarks on The Mover and Shaker*

Elizabeth is an African American female mathematics educator that attributes her mathematics success in the classroom to being “caring, understanding, authentic, genuine, empathetic, and flexible” (Interview 3). Despite not having any African American female mathematics teachers growing up, she believes it is important to encourage other African American women to pursue mathematics education as a career path. She posits:

Children need a visual to know that they can do something, if that makes any sense. I don’t know how, looking back, that I had any for-real Black math teachers who were female, even, and not even male, girl, that I thought I could do math. When a kid is

thinking about what they want to be when they grow up, it's something that they saw on TV or someone that they met in real life. But if I've never had a Black or a female math teacher, then how do I know I can do that? (Interview 3)

Eventually, Elizabeth came around to the idea of being a mathematics teacher. Despite the fact that she did not have anyone pushing her toward the education profession, she knew she enjoyed mathematics. Elizabeth proclaimed:

We can't fight destiny. There were people who knew I didn't want to be a math teacher. I mean I knew I didn't want to be a teacher because I knew my dad didn't want me to become a teacher, but I love kids. I love math. I love kids. Why not put them together? (Interview 1)

Elizabeth's love for mathematics later manifested into an affinity toward technology. She started out as a graduate assistant working in the computer labs at her college. Then during her first year of teaching mathematics, she was also teaching other teachers how to use the computers and the programs. After reflecting on her own educational experiences and her teaching experiences, Elizabeth admits that her thoughts on education have evolved. She initially became like a stuffed bird entertaining kids, cracking jokes, getting to know the kids, while infusing real life with the math. Her evolution led her to "practice with my kids, modeling, talking it out while I'm solving the problem, but throwing in decimals and fractions because I told them that these are numbers" (Interview 2). Elizabeth's educational experiences and evolution have all led her to being a successful African American female mathematics educator.

### **The Influencer: Ibbie**

#### *Introduction*

Ibbie, a 68-year-old caramel skinned African American woman, is a positive influencer

whose personality is like a magnetic force to those around her. She is roughly 5 feet and 5 inches tall and has black and brown wavy hair that caresses her cheek bones. Ibbie's wavy bangs hug the top of her eyebrows and barely touches her black square framed prescription glasses that complement her look. Whenever you are around her, Ibbie has a way to make you feel warm and safe, and she is known for her motivating elegance.

Growing up in the southern part of the United States, Ibbie described her parents as lower class laborers that did not have much time to spend with their children because they had to work so much. Her mom was a cook and had a sixth grade education. Her dad's highest level of education was fourth grade, and he worked as a truck driver. She has two sisters and one brother, and they often stayed with their extended family due to their parents' work schedule. Her parents' expectations were set from the beginning when it came to being responsible and with their education. Despite the fact that family time with her parents was scarce, Ibbie specified "when they were with us, it was good quality time" (Interview 1).

Ibbie has been an educator for over 48 years, and she is married with no children. She currently works as a Professional Learning Facilitator and college adjunct professor. At 20 years old, Ibbie acquired her first job teaching in a junior high school, and she has been working as an educator ever since. She has always been a go getter. She has worked in numerous capacities including mathematics department chairperson. From finishing her undergraduate degree in three years to paying her way through her master's program, Ibbie is the poster child for dedication and determination.

### *Educational Experiences from Grade School to College*

Growing up in the United States during the 1950s and 1960, Ibbie observed racial turmoil in the segregated south. Elementary school was a lot of fun for Ibbie, and she grew up in an area

where there was no crime and everyone was African American. Everyone got along in her town. Due to segregation, elementary school was kindergarten through sixth grade, and high school was seventh grade through twelfth grade. Since elementary school was essentially held in one large room, each grade level had its own teacher that taught every subject.

Ibbie specified:

We went straight from elementary to high school. I think elementary may have been from first to sixth grade. Then once you got into seventh grade, you went on to high school.

This was during the segregation time. (Interview 1)

Race impacted her mathematical experience in elementary through high school. Ibbie affirmed

I was [in elementary and high school] during a time when it was segregation. I think it impacted me in that my math teachers and all of my teachers were getting me ready for a time that segregation was going to go away. They worked hard because we had to better. They always felt that we had to be better. That's why I had such good teachers, period, in high school because they went above and beyond because they knew what was waiting for us out there. (Interview 2)

Ibbie did really well in elementary school in all of her classes especially mathematics, so her transition to high school was almost seamless. The path to high school was made easier because she was the youngest child of the family and everyone knew who she was. Ibbie revealed: "It was easy because I was the baby girl. By the time I got to high school, everybody knew my sisters, and so everybody knew me. They paved the way. No problems there" (Interview 1). Reflecting on being educated during the segregation era, Ibbie recalled:

From first to sixth grade, we were all in one class. The teacher taught us math. They taught us everything. Once we got to seventh grade, that's when we actually started

changing classes. We started going from the English teacher and the math teacher and science teacher and so forth, but the math classes were easy. They were easy for me. I had no challenges. (Interview 1)

High school for Ibbie was very similar to elementary school. Ibbie excel in all of her classes, especially mathematics. She was awarded top math student, top English student, and top science student. She also won the STAR student award. She remembered:

It was easy for me and I had good teachers, too. Now, I'm not saying the kind of teacher that just says, "Here's the book." But they came in and they taught. Once they taught it, they did a good job. I was able to get it. I was not like that in every course, but I was like that in math. (Interview 2)

Aside from not having any African American female math teachers, high school proved to be a great foundation for her entrance into college. Ibbie acknowledged that she had great African American male mathematics teachers in high school:

I was probably my third year in college when I actually started seeing things that I had not seen before. It was really, really easy for me that first year because everything was just a repeat. My high school math teachers really, really got me ready. (Interview 2)

### *Reflections of Success in College Mathematics*

Having amazing teachers in high school eased any apprehension for Ibbie when she graduated and went to college. Ibbie attended a HBCU and all of her classmates were African American. Her parents did not urge or hinder her from pursuing college. Ibbie proclaimed:

We were poor and it would have done them all the good in the world if I had just not gone on to college and went and worked in a factory or something, and started bringing

more money in immediately. Education was not on their radar. They just didn't see it as being the way out. (Interview 1)

When reminiscing about her experiences in college, Ibbie stated:

College was great. College was when I came out. Because my parents, even though they worked and then we had extended family, we knew what was expected of us and they were very strict. Once I got on that college campus, it's like, 'I'm free!' (Interview 1)

In hindsight, Ibbie recalled that everything her parents and grandparents taught her stayed in her heart and mind. When she left for college, she knew exactly how to act because "I knew I had to go out there and do what I was supposed to do, but I had a good time." (Interview 1) In spite of growing up in a strict household, Ibbie met a lot of friends in college that she will have for the rest of her life. During this time, she majored in mathematics, she pledged a sorority, and she had a wonderful time being involved in campus activities. Ibbie viewed earning her mathematics degree as a way out of poverty, and she did not plan on going back home after college. She reiterated:

I say so often it was the vehicle that the good Lord used to bring me really out of poverty because we didn't have much. With my interest in mathematics and being able to go to school and get a job and all that, mathematics was my vehicle out of poverty." (Interview 1)

Ibbie's love for mathematics followed her to college, and the love helped her be successful in her classes. She valued basically all of the mathematics courses she had to take in college and all of her mathematics teachers were African American men. Her interaction with her African American male teachers was very limited other than being a student in their classes. Granted, she did not care for the other classes like history and science but, she did really well in

them as well. To Ibbie, the other required courses were stepping stones for graduation. She confessed: “I know what’s expected of me, so I better go on and do it. Although, they were not hard courses. I just didn’t enjoy them” (Interview 1).

Ibbie did not have to study or prepare much for her mathematics courses. She learned the math and remembered it. It was almost like she had a photographic memory when it came to mathematics concepts. She declared:

Once I learned the concept, I didn’t have to do a lot of preparation for that because there was no memorization. It’s just something that I understood. Now my other courses like science and history, I had to spend some time and even work in groups because there was so much I had to remember. Just facts, not understanding, but just facts. (Interview 2)

While Ibbie did not care for any of her college classes other than mathematics, she performed very well across all subjects. She earned her bachelor’s degree in mathematics in three years by overloading on courses and going to school every summer. Ibbie specified “You know how you go in and some people take 15 hours. I was always taking from 18 to 21 hours to try to hurry up and get out so that I could come back” (Interview 2) to help out my family. While taking an overload of classes, she also worked. Ibbie recalled, “even though I was on a scholarship in college, I found some work to do so that I would have money, and I’ll be honest. I would send money home instead of them sending money to me” (Interview 1). Ibbie went above and beyond to exceed her goals, because she was so determined to succeed. Once she started teaching mathematics, her drive for success translated into her pedagogical style of teaching.

### *Successful Experiences in Teaching Mathematics*

Ibbie started her first mathematics teaching job at 20 years old at a junior high school. She paid her way through her master’s degree program when she first started teaching. Even as a

little girl, Ibbie knew she wanted to be a teacher. She recalled

I always wanted to be a teacher. The first Christmas my mom bought me a blackboard. When she bought me blackboard, I played on it and my father always gave me puzzles and questions about math. “How much is this? How much is that?” That was his favorite subject. Even though he didn’t get far in school, he liked math, so I think I got that from him. (Interview 1)

A combination of a love for mathematics and awesome elementary and high school teachers influenced Ibbie’s teaching style. When asked about her pedagogical philosophies and teaching style in the classroom, Ibbie affirmed:

I don’t teach by example, but I try to teach by concept. If I can get the kids to learn the concept, then any problem that they see and if they can apply the concept, they can do it. I’m a true believer that mathematics has a language of its own. I make sure that we speak the language. I don’t like them using pronouns in my class like it or that, move it over here, that type of thing. (Interview 2)

Ibbie mentioned: “I like for them to use the language. If you speak the mathematical language and you speak it enough, you’ll understand the concepts” (Interview 1). She goes on to say that while teaching she finds ways to—

Use the language all the time. That means in teaching, you have to use the language all the time. They have to hear you say it and to make them read it. When I first started teaching, students acted like they’d never heard of a math notebook. We don’t take notes in math. Are you kidding me? (Interview 1)

She could not understand how times had changed with students no longer taking notes in math class. Ibbie worked hard to change the dynamics in her classroom. Because Ibbie knows she is an



auditory learner, she acknowledged the importance of having students talk about the mathematics and practice a lot. Being raised in the midst of segregation unquestionably impacted her teaching style and practices. She reminisced:

Growing up during segregation, being made to feel second rate, made my generation place high expectations on ourselves. We felt that we had to be twice as good to even be good enough in our field. This attitude spilled over into my teaching practices.

Expectations and responsibilities for my students were very high. I wanted to challenge my students but never to defeat them. Since I expected so much from my students, I expected much from myself to help the students to master the math objectives. (Interview 2)

Ibbie enjoyed her work as a mathematics educator, and she takes pride in being able to influence students' lives. While teaching mathematics, Ibbie stressed, "I always put forth my best efforts in everything that I do and doing everything to the glory and honor of God" (Interview 3).

Ibbie loves teaching because it allows her to possibly change students' views on mathematics. When asked how she has maintained longevity and success as a mathematics educator, Ibbie emphasized:

I was blessed with good teachers who showed me the real beauty of mathematics. I also wanted to touch lives just as my teachers had touched mine. Bottom line, I entered a profession that I loved and enjoyed. So teaching math never felt like a job for me. This is why even now I am still teaching mathematics. (Interview 3)

The good mathematics teachers she was blessed with were all African American men, which was alarming for her in hindsight. Ibbie talked about how African American women were persuaded to not pursue mathematics careers including mathematics education. In her community,

mathematics was seen as a subject for males which was a huge disservice to African American girls and women. Because of this disservice, Ibbie continues to be relevant in a mathematics classroom. She continuously evolves with each new wave of mathematics students. She initially started out teaching like her teachers taught her in the 1950s and 1960s. Ibbie later realized that all of her students were not like her, and their learning styles were different. Because their learning styles were different, she had to present lessons in different ways using different techniques for each topic.

### *Summative Remarks on The Influencer*

At an early age, Ibbie recognized her love for mathematics growing up during segregation. Although being raised during the 1950s and 1960s was very difficult, Ibbie understood the benefits of education. Growing up, Ibbie was known in her school as the person who wanted to help everyone. She knew that getting a good education was her ticket out of poverty. Reminiscing about her childhood teachers, Ibbie recalled:

I had excellent math teachers, however, I also feel robbed. There were no role models.

Women were told that the field of mathematics was more suitable for males. I had only one Black female math teacher in college and no White female math teachers ever.

(Interview 3)

Ibbie worked extra hard when she went off to college at an HBCU, and she had a lot of fun. Pledging a sorority did not hinder Ibbie from completing her undergraduate degree in three years. She went to work right away as a mathematics teacher after graduation from junior high school. Ibbie remembered “back in my day, women were discouraged” (Interview 1) from pursuing a career in mathematics. Because there was a lack of role models that looked like her, Ibbie decided to become a mathematics teacher and be a role model. Because of her calming

personality and amazing teaching style, Ibbie has been able to positively influence those around her. She attributes her success as an educator to being dedicated, determined, and having confidence. Her love for children and for mathematics are also contributors to her success as an educator.

Ibbie views mathematics as “the queen of all sciences” (Interview 1), and as an avenue for students to learn how to think, reason, and come to conclusions. As a successful African American female mathematics educator, Ibbie declared:

Every year that I taught was like my first year because every year I had learned something different about the kids and tried to do everything. You know how your first year you say, “I learned this from last year and I’m going to try something new this year?” It was that same way because all students are different and all generations, and you can see I’ve been through some decades here. (Interview 3)

Now, working with high school students that are in dual enrollment programs, she has learned that she has to evolve and change every year. Although Ibbie has been a mathematics educator for over 48 years, she continuously reinvents her teaching style in order to stay relevant and influential to her students and peers.

### **The Changer: Louise**

#### *Introduction*

Changing other’s lives has been a goal for Louise for as long as she can remember. As an African American woman in her mid-40s, Louise was raised in a working class Jamaican family. Growing up, Louise lived with her mother and grandmother in New York and she attended private school until high school. Standing close to 5 feet and 6 inches, Louise has medium length hair that she keeps braided into natural styles. She has smooth honey brown skin that appears to

be sun kissed by the sun and a smile that is electrifying.

Louise, an educator for over 21 years, is divorced and mother to three children. She has always loved mathematics, and she worked hard helping others understand mathematics. Her mother's highest degree was an Associate's degree and her father's highest degree was a Bachelor's degree. Louise's mother worked as an administrative assistant and daycare worker, and her father worked as a computer consultant. Louise describes her family as working class, and her family had high expectations for her and her education.

### *Educational Experiences from Grade School to College*

Louise always had high placed upon her by her Jamaican family. They all put education on a high pedestal, and everyone was expected to strive for the best. Because Louise's mom was an advocate for being successful in school, she enrolled Louise in private school. She did not trust the public schools where they lived, and felt it was worth spending the money on private school to get the best education for Louise. When reflecting on her schooling, Louise affirmed

I went to private schools until ninth grade, and then I went to [a school], which actually had a STEM program. But when I entered, I missed the deadline, so I entered into the liberal arts program. But one of my teachers recommended me for the engineering program. But being a 14-year-old, I didn't want to leave my friends, and so I did not join that program. (Interview 1)

Louise proclaimed

My mom was always strict about grades. I couldn't get less than a B, and I barely got low Bs. I understand now that I see how much private school costs, so I got a scholarship to go. But I know she still had to supplement, so I know she struggled to keep me in those schools. I switched schools a lot, because if they raised the tuition, then she just found me

another one. I spent eighth grade in Florida with my aunt because there was a school out there that was more affordable for my mom, and so I spent eighth grade in Florida.

(Interview 1)

Switching schools put a lot of pressure on Louise, because she did not want to let her mom down by not having good grades. In second grade when she attended a Lutheran school, she was given a math test. The results from the math test prompted the administrators to let Louise skip from second grade to third grade. While taking the test, she remembered “them being surprised that I didn’t count with my fingers. It’s funny that I remember that because I thought that was ridiculous, like what was the big deal?” (Interview 1) Louise was identified as gifted, and she recalls everything came easy to her.

Louise was serious about her mathematics classes. She enjoyed math tremendously, and stated, “I always did my math homework and I always kept impeccable notes” (Interview 1). She used to study a lot for her exams. Her mother also took part in helping with her study habits. She mentioned:

In elementary school, my mom used to have me make flashcards to memorize formulas and stuff. I remember one of my fifth grade teachers telling my mom to stop it because she was enabling me, telling her that I didn’t need all of that and to let me be. That’s how I studied, just doing problems. (Interview 1)

In middle school and high school, Louise took pride in her school work much like she did in elementary school. Her earliest memory of any specific mathematics classes was when she was in high school. Although, she did not remember any of her mathematics middle school teachers’ names, she recalled that she only had White teachers. When asked if she had any Black teachers from kindergarten to high school, Louise recalled:

I had a Black English teacher, a Black male in high school. In elementary school, I had no Black teachers. None of those private schools had a Black teacher. We had a Black lunch lady, Miss Emma. I'm thinking about it now and I'm really wracking my brain like oh, my gosh! I had no Black teachers growing up. Then in high school, I had a Black English teacher. (Interview 1)

In high school, Louise went to an all-Black school in Harlem, New York. Louise remembers

In high school, I went to a Black high school in Harlem and still didn't have any Black math. My principal was Black. We had a Black dean. The gym teachers were Black.

There was a Black biology teacher, Miss White. I had a Black biology female teacher and a Black male teacher who did English, Mr. Frye. I think everybody else was White.

(Interview 1)

In high school, "there was one Black math teacher, but she wasn't my teacher. All my teachers were White. Growing up, I didn't have any Black math teachers" (Interview 1). Reminiscing, it was startling to Louise reflecting about not having any Black women mathematics teachers. She suspects not having any Black women mathematics teachers may have unconsciously been the driving force behind her future career decisions.

### *Reflections of Success in College Mathematics*

When Louise first went off to college she was not very focused. She recalled

My first year at college I was 17. I just left my strict mom and went to a college that had no supervision. It was a White institution. I pretty much slept through my classes, and then was happy when I got a 1.18 my first semester. (Interview 2)

She was a bit distracted when she went to college, and she seemed to not be totally sold on being a college student. She went to undergrad at the same college her brother attended, she chose a

city college later for their engineering program, and she chose another college for their actuarial science program. Louise knew she loved mathematics, but had yet to figure out how to navigate her college career. Her mother eventually pulled in the reins and in many ways gave Louise an ultimatum. Louise acknowledged:

I failed calculus because I didn't go, so my mom threatened me and I kind of buckled down the second semester, and I ended up with a 3.48. I realized that calculus wasn't really difficult. It's just that my absences were so much. When I came in one time in the middle of integration, it looked like Spanish to me. But when I actually went through the class from start to finish, I easily got a 4.0. I got an A in that class. Then that was my freshman year of college. My mom made me go to the city college for the next year. My average was so low that I didn't even transfer it with me. I just started all over again.

(Interview 2)

Once she realized that it was imperative for her to be serious about school, Louise made the conscious decision to start college all over again to preserve her grade point average. Her fire was fueled by running out of financial aid and having to pay for school out of her pocket. During this time, she met her ex-husband and had two kids while staying at home. Louise's initial plan was to use her mathematics courses and degree toward her dream of becoming an actuary. Louise was successful at being a mom of two kids and making good grades in her college courses. Her determination catapulted her from not being focused to earning her bachelor's degree.

Some of Louise's mathematics teachers in college were African. She also had a few Asian and Jewish mathematics teachers too. She did not have any Black women mathematics college professors. Because she had two young children while in college, she did not have the

opportunity to build relationships with her college professors. She stated, “I had two babies in college, so I kind of went to class and came home” (Interview 1). Louise never noticed if her race or gender impacted her college experience. She revealed, “I never felt like my professors picked on the boys more” (Interview 1). In college she experienced—

a lot of professors [that] were foreign, so kind of hard to understand. I remember I had a lot of professors. In fact, I went to school with the transparency days where they used to roll and write and roll and write. You really had to keep up. We didn’t have recording devices back then.

Although Louise did not have the new age technology devices that students have currently, she was still successful in her mathematics courses. She realized that to be successful in her mathematics courses she had to be organized and work through numerous problems. She is the type of learner that has to actually work through examples, and she believes if you see it then you have to do it. Practice is the key to her accomplishments in college. Those skills became the foundation of how she started teaching her students.

### *Successful Experiences in Teaching Mathematics*

Louise has been a mathematics educator for over 21 years, and she was recently named Teacher of the Year for her high school. She has been dedicated to helping her students be successful in her mathematics courses. When speaking about what made her teach, Louise remembered:

I liked it. I did like it at first to teach a child. I had ideal students. They were all Asian. My very first teaching job, the teacher went out on paternity leave because his wife worked for Sony and made so much money it made better sense for him to stay home with the baby. He had a cushy schedule. I had honors kids. He worked in the



programming office. I thought teaching was great. I was still young, so I didn't mind having to do homework problems at night to teach. It was actually fun for me. I tell people it's like that first high people say, "That's how people become addicted because they can't find a high like that first high." I still think I'm looking for that job like my first job that I liked teaching. Then I started teaching in these urban schools, whew!

(Interview 1)

Because she always took impeccable notes, Louise would use her notes as an example for her students. She acknowledged:

I used to have my notes. I used to show some of my students when I first started teaching to show them what a math notebook should look like. Because although it came easy, it wasn't without any work, any effort at all. (Interview 2)

She wanted the students to understand that they had to put in work to be successful in mathematics and their other classes. As a mathematics educator she has strong beliefs about mathematics. Louise declared:

Math, to me, is not just about the numbers, the problem solving. I try to explain to my students, "If you can do math, you can do so many things logically." I think there are math people and there are not math people. We're two different entities. Anybody who could logically go through math to me normally has common sense. It's just we think logically. I'm definitely left brained when it comes to that. To me, math is the basis of everything. If you could work your way through math, then you could probably work your way through any other subject. (Interview 2)

Although her plan was initially to be an actuary, being a mathematics educator seems to have been her calling. She realized once she started teaching how much she really loved mathematics.

Louise—

realized that I didn't truly understand math until I started teaching, because a lot of things that I did there, I just did because I knew how to do it. I didn't know why I was doing it. I didn't know how it worked. I didn't know how the topics tied into each other. I learned all of that from teaching. (Interview 1)

While attending a college in Georgia for her Master's, Louise had a few revelations about teaching and mathematics. She began to think differently about mathematics. Louise realized that she had a gift and she "start[ed] teaching with more steps. [She] stop[ped] assuming that people knew some things that I thought they should know" (Interview 2). She also understood that math is "not something that everybody just gets" (Interview 2).

#### *Summative Remarks on The Changer*

Being a successful black female mathematics educator did not come easy for Louise. She had to deal with a number of obstacles, but she was able to figure out the best path to take with the help of her strict mother. Although she did not have any African American female mathematics teachers, she found a way to navigate a predominantly male mathematics field. Because she was a mathematics and engineering major she did remember having any African American women in her classes. She recalled:

I very well could have been one of the only ones. I went to private school a lot where I'm used to being the only Black girl or Black person. Things like that didn't really register in my mind. If there were Black women in my classes, they probably would have been my friends. (Interview 2)

She believed that it takes passion and determination to be a successful mathematics educator. Because she did not have any African American female mathematics teachers growing up, she “feel[s] that [her] job is more important now” (Interview 3).

Louise said her success as an African American female mathematics educator is attributed to the “ability to connect with my students, being a life-long learner, and my love for mathematics and the profession” (Interview 3). Louise believed that although she is a procrastinator in many facets of her life, she is a hard worker who puts her all energy in trying to help each student learn “math as well as life skills” (Interview 3). She claimed that as an African American female educator she is making positive strides for females of color “since there’s a shortage. I think we’re doing better. I think it’s important to have [that] career path” (Interview 3). Initially Louise was not pursuing a career in education, and she said “it wasn’t something I grew up thinking about. It might have been because of the underrepresentation of people that looked like me going in” (Interview 2). She understood that educators do not get the respect that they deserve and those that are outside of the education community do not know what all it takes to educate a child. She went on to about how educators take on a lot of roles: mom, dad, mentor, rule enforcer, counselor, teacher, sister, brother, confidant and so much more. She recognized that her role as an educator is more important now than ever.

### **The Runner: Mattie**

#### *Introduction*

For most of her life, Mattie ran from what she felt was her calling to have a career as a mathematics educator. She was determined to go into any other career but education. A married mother of three children, Mattie has always been solidly committed to her family. Mattie has hazel eyes and flawless golden brown skin. She is about five feet and four inches with a sandy

brown short pixie haircut that has blonde highlights. Mattie is often seen as the quiet storm because she takes time to relax, be quiet, and observe her surroundings. She is certainly a force to be reckoned with due to her spunky attitude, amazing leadership skills, and loving demeanor.

Mattie grew up in a working class family where her mom was a teacher and her father was a business owner. Her parents were sticklers for her getting a good education and pursuing a degree that will help her be successful. Both of her parents went to college, and she felt that her parents always had a plan laid out for her to follow in their footsteps. Ultimately, Mattie realized she did not really have a choice but to pursue a college degree. Her parents' encouragement and influence gave Mattie the extra push to eventually become a successful mathematics educator.

#### *Educational Experiences from Grade School to College*

Mattie was raised in a small town in Georgia where everybody knows everybody. Growing up, her “town was 70% white, 30% black, but [she] was fortunate in that most of [her] teachers early on were [her] neighbors as well” (Interview 1). Mattie’s community was the epitome of a tight knit; everyone was like family. Mattie recalled:

my mom was a teacher, so I grew up in a neighborhood of teachers. It really was that neighborhood feel, where if you got in trouble at school, you would get in trouble at home. That was real. [LAUGHTER] My momma knew whatever happened to me at school before I got home. (Interview 1)

She knew that she could not get away with anything because her mom taught at the junior high school, and everyone knew her mom and knew her. Mattie laughed—

when I got to junior high, my mom taught at junior high. She taught math. Middle school and junior high were catwalks, so we went to school outside. You walked outside to get to your class. It was what’s called a catwalk where it’s a covered pathway, basically. If

you're sitting in one classroom, you can look out the window and see the next bank of classrooms across from you. If you got in trouble and the teacher in front of you, the classrooms in front of you could see you sitting outside because they would put you out. They would see you sitting outside. Of course, all the teachers there knew me. If I got in trouble and I was in trouble with all of them. It was that kind of upbringing.

[LAUGHTER] (Interview 1)

Thinking back about her elementary, middle, and high school experiences, Mattie identified that she only had two African American female teachers in elementary school. She did not have any African American female teachers in junior high or high school. Mattie performed well in her mathematics classes in elementary and junior high school. She was labeled and tested as gifted, but once she entered high school, she started to struggle. Mattie affirmed—

because I struggled in high school, like I didn't score well enough on the AP exam when I took it to exempt any classes, but I did score well enough on the placement exam. I was placed directly in calculus. I aced Calculus I, II, and III [in college] because I'd already taken Advanced Placement Calculus. I understood it far better than I thought I did. I just wasn't able to translate that on the AP exam, but it was good until we got to all that abstract mathematics where you're trying to prove  $1 + 1$  don't equal 2. [LAUGHTER] I hated that. (Interview 2)

She commented that although she was labeled gifted, she had to study excessively to be successful in her classes, including mathematics. Mattie believed that she sometimes over prepared for class and her exams. Her groundwork and study habits certainly prepared her for success in college, however.

*Reflections of Success in College Mathematics*

Mattie was so excited about having the opportunity to go to college. Mattie spoke fondly about her experience when she was going through the college application process:

I only applied to two colleges. My momma told me I could apply to any college I wanted as long as it was a Black college. [LAUGHTER] But I had a job and she wouldn't pay for my application fees. And, of course, I couldn't get a waiver because my parents made too much money. They were right there on the line. I had to pay for my college fees, and so I guess I didn't manage my money well because I only applied to [HBCUs]. I was accepted to both, but I applied for a scholarship at [one HBCU]. My dad and I had gone to the bank, and my momma called the bank and was like, "Come home. This man called the house and offered you a scholarship." (Interview 1)

Mattie was ecstatic! She no longer had to worry about where the money was coming from to pay for her to go to college. Mattie was able to earn her bachelor's degree and a master's degree through a five-year program that offered a full tuition, 5-year scholarship. When talking to the professor who offered her the amazing opportunity, he told her she had to major in mathematics in order to be accepted for the full ride. She told him "oh I'm good in mathematics!" (Interview 2) From that moment on, Mattie's voyage on the road to being a successful African American female in mathematics was well underway.

While attending an HBCU, Mattie had mathematics classes with mostly all females and everyone was African American. Although her classes were made up of mostly all girls, surprisingly all of her mathematics teachers were male. She recognized

When I got to [my HBCU], one thing about [the school] was they were really good at that 5-year program. Because when I walked in, my advisor....handed me a sheet of paper, a

little package, and he said, “These are the classes that you need to take in order to finish your program in 5 years.” He basically laid it out for me, all the classes, a space where I could record my grades, and then I had the support of upperclassmen who would be like, “Look, the catalog you came in with is your bible. Don’t lose your catalog. You need to record all your grades. Make sure you keep track of your grades and make sure you can calculate your GPA.” They would just really support us in every way. Any question I had, they would answer. I was set up really well at [my school]. Their goal was for you to succeed, period. Even their belief that I could go to [a PWI] and get a Ph.D. in pure mathematics, they were all about you succeeding. (Interview 3)

The encouragement and support that she received as an African American woman at her HBCU was unmatched. She believed that this type of support and the support from her parents made a huge impact on her choices and success as a mathematics major. Mattie was amazed reminiscing about how much her school and her mom influenced her college and career choices. She realized that guidance catapulted her to new heights within herself and within her classroom.

#### *Successful Experiences in Teaching Mathematics*

Mattie is a runner in a few aspects of her life. She physically runs for exercise. She ran from her educational calling. She tends to also run from leadership opportunities that would be perfect for her. While she was in school simultaneously getting her bachelor’s and master’s degrees, her mother encouraged her to take some education classes. She recalled a conversation with her mom: “My momma was like, ‘You need to take some education classes.’ I was like, ‘Momma, what are you talking about? I don’t want to teach’” (Interview 1).

Mattie elaborated:

And I didn't [teach] and I went to work first as an accountant, which was awful. Awful. I hated it. I've never hated accounting so much in my life. I took some accounting classes so I could understand what was going on or whatever, but I hated the classes. It just wasn't me. It wasn't my thing, so I ended up in logistics, which was awesome. I love logistics. But anyway, the company started laying off. They had 180,000 employees worldwide, but they laid off 65% of their workforce. And I was one of them. Then I went to work for [a cell phone company] doing the same thing, basically logistics. Within four months, I was laid off from there. On the news, I found that I was being laid off.

(Interview 1)

She was very distraught because since she was now 6 months pregnant and out of a job. Mattie mentioned to her husband of 18 years that she really wanted to stay home with the baby once she had him, and her severance would carry them through most of the pregnancy. Her mom once again told her "You need to teach" (Interview 1). Mattie finally took her mom's advice and found a teaching job.

After the layoffs, Mattie started off teaching college at a technical school part-time and that is where her teaching career took off. She realized teaching at the collegiate level comes with some roadblocks especially if you do not have a doctoral degree. She acknowledged

I did a lot of adjunct, but adjunct doesn't pay a lot and you have to work at a whole bunch of schools to have any type of income. I went back to working, but I worked in education. I just didn't teach. Then I ended up at [another technical school] doing an adjunct position with the department chair. It was the department chair. He was like, "What are you going to do with your life?" I was like, "What do you mean?" [LAUGHTER] He goes, "I'm looking at your résumé and it's all over the place." He's like, "You've been



there, here. You've been there." He's like, "You've done this thing. You've done that thing." He was like, "You need to go get your Ph.D." He said, "[This school] is going to become a 4-year institution here soon." He said, "A lot of us are getting older. We're getting ready to retire." He said, "Go get your Ph.D. and come back here. You could take one of our positions." That's what I ended up doing. But when I went back to [the school], they didn't hire me. [LAUGHTER] (Interview 3)

That hiccup in her plan to work at the technical college full time did not deter her from running again.

Mattie applied and got accepted in a mathematics education doctoral program, and it was not easy:

It was hard on my family with me being in school, and I had a baby in the middle of my Ph.D. program, and my husband had done a lot to support my family while I was at school. I didn't want to put them through that again with me being stressed out and halfway present trying to make tenure, whatever. It just wasn't anything I was interested in, so I started praying about it. (Interview 2)

Mattie ultimately ran toward a job in a high school! Once Mattie started praying, she felt God sent her to her current school district. Mattie received a phone call and job offer the day after she applied. She had only been teaching for only 3 years when she was named Teacher of the Year! Mattie could not believe it. She exclaimed:

In my third year! I know, right? Exactly, but for me, it was nothing but confirmation. The Lord had been saying to me, "Girl, I've been trying to push you in this direction all this while." I've been running. It really was confirmation. (Interview 3)

Mattie expressed the adoration she has for teaching high school mathematics. Her love

for teaching students is so apparent. She specified—

I love the light bulb moment for the students. I love it when I've been teaching a concept, and then all of a sudden, they're like, "Oh, wait a minute. I get it." I love that and I love that I'm able to teach my Black babies because I feel like they've been neglected for so long. (Interview 2)

In reference to the classroom setting, Mattie stated:

even now as a teacher, if I am kind of shaky on a concept, one thing I do to prepare for my classes is I work through the problems, and I think in my mind all the potential questions that a student might ask. I want to be prepared for those questions, and so I work through the problems and I start thinking as a student like, "If I do this, then what might a student ask? If I approach the problem this way, then what might a student ask?" When I'm working through problems, I'm thinking to myself, "What questions would the student ask?" because I want to be ready for them. I don't want to be caught cold like, "You know what? I don't know." I don't like that. I want to be ready to answer those questions for the students. That, to me, builds confidence. It builds the students' confidence in me. Because if they feel like I don't know the material, then they won't feel like it's possible for them to learn the material. I guess the approach I have now is the same approach I had when I was in college. I just worked through a whole lot of problems. (Interview 2)

Mattie believed that she developed her beliefs about teaching from her experiences in school:

I was the only little Black girl in the gifted mathematics class and afraid to raise my hand because I didn't want them to think that I didn't belong there. That's where I developed my teaching philosophy that no question is a stupid question because I always felt like

they would think I was stupid if I raised my hand. I wanted to make it comfortable for my students in my classroom. That's why that's one of my mottos, I guess. (Interview 3)

It appeared that Mattie not only ran from being a mathematics classroom teacher, but she was also running from going into leadership. She reflected—

Coming out of the classroom—I get it. I have a couple of ladies at the school who are like, “I don't want to go into administration because I love teaching.” I get it. I really do. People started telling me “You've got a Ph.D. You won't be in the classroom long.” Next year, I will only be teaching four classes. I will have four planning periods. I actually just interviewed for the department chair position, and I got it! One of those planning periods is for department chair duties, and the other planning period is to start scheduling for the school! (Interview 3)

The opportunities for Mattie's educational growth seems to be overflowing. Her knack for inspiring her students and her peers is amazing. She does a great job of pulling greatness out of everyone she comes in contact with as a leader or a teacher.

#### *Summative Remarks on The Runner*

Finally, Mattie was running in the right direction. Her hard work, dedication, and love for mathematics put her on the path to educating students, earning prestigious awards and accepting leadership positions. While she ran from teaching and from leadership for a number of years, Mattie found her way to being a successful African American female mathematics educator.

If her mother was not a teacher, she does not know where she would have ended up. Mattie believed that mathematics is the gateway to other subjects and other careers. Mathematics is Mattie's language, and she has always loved numbers. She—

feels like some of our Black babies who are disenfranchised with mathematics get a bad taste in their mouth really early on either through teachers who don't believe in their abilities and don't cultivate their love for mathematics early on. (Interview 3)

Her mission is to dispel the bad taste for African American students, because she wants them to be taken care of and not treated differently. Mattie said that she is like many of her students that cannot take tests cold turkey. She has to study and wants to really understand the concepts. She explained:

I feel like if a student can understand the why, then it makes more sense to them why we're approaching a problem the way we're approaching it and just what it means. I think it's easier for a student to then connect all the dots from one course to the next. (Interview 2)

Mattie proclaimed that it is her job as an African American woman to empower her African American female students. She declared

I think that it's important for us to show them that we believe in their abilities. Because I feel like my Black teachers did that for me in elementary school. When the teacher across the hall came to my class and was like, "Send me your smartest child." And my teacher sent me.... It's things like that and situations like that where you can spark something in a child where they understand what their abilities are. I was only eight. Eight years old and I still remember that. (Interview 1)

Instances like this pushed Mattie toward a path to greatness, and she hopes that she can be as influential on her students as others have been for her. Mattie has finally stopped running from her destiny as successful mathematics educator. She realized she has long promising career ahead of her in which she can be an amazing leader and positively affect students' lives.

## **My Story – The Researcher: Katrina**

### *Introduction*

To talk about my story is to know that my journey is probably not unique. I am an African American woman in my early 40s, and I stand about 5 feet and 4 inches. I normally like to keep my black curly hair in a slicked back bun when it is not straightened, and I love wearing my royal blue glasses. I grew up in a close knit, two-parent household in a small town in Georgia, and my parents were sticklers for us attending church almost every day of the week. My brother is 2 years younger than I am and we are extremely close. We are like twins because we complete each other's sentences, and laugh at our corny jokes. My childhood would not have been complete if he was not in it.

My parents were very strict, but they were very loving. Growing up, I did not have much freedom at all like my friends did which felt so unfair. It was tough knowing my friends were hanging out having fun, while I was at home reading a book or watching television. My brother and I were not allowed to sleep over friends' houses, or attend many parties unless they were with church friends. Looking back now, I realize I had an awesome childhood. We were able to participate in trips with church, 4-H, Girl Scouts, Boy Scouts, and school. My parents provided us with everything we needed, and we took at least two family vacations per year. Although I was sheltered, I now understand why my parents were so protective. They wanted what was best for us while safeguarding us from the evils of the world.

Both of my parents went to HBCUs and majored in Biology and Chemistry. They had it tough because they were essentially alone in a big city. They were both adamant about leaving the sharecropping life behind and freeing themselves of the burden of the farm. Even though their parents were devastated when they left, they were supportive of my parents' dreams of a

better life. After undergraduate school, they both went to medical school. My mom became a medical technologist and worked at a Veterans Affairs Hospital (VA). My dad became the second Black dentist in our town, which was newsworthy when he opened his dental office in the 1980s.

Over the course of my life, I have worked in many different places. My parents stressed the importance of us being responsible because they had always been hard workers. When I was little, I started working in my parent's dental office cleaning on the weekends with my brother. I transitioned from working at the county library to a grocery store to a small movie theater and then to a bank. I actually worked at the bank throughout undergrad. After college, my career path evolved into being in the education field for over fifteen years. I started out teaching mathematics at a predominantly Black high school, and after 8 years, I transitioned into a mathematics Instructional Coach role. I next worked as an Instructional Technology Specialist, which was an amazing job. I am now a high school Assistant Principal. I was destined to be an educator.

### *Educational Experiences from Grade School to College*

I have always loved school! Church and school were my second and third homes. Because my parents were so strict, school and church were my only outlets. My main opportunities to be with my friends were either at church or in school. Not only did I love school because I could interact with my friends, but I genuinely loved school. I loved everything about school. The way my school looked on the outside and how the school smelled when walking through the front door on the first day of school was so intriguing. I loved sitting in the classroom, looking at how beautiful the room was decorated, and picking out my favorite desk. The anticipation of finding out the teachers I was getting at the beginning of each school year

was exhilarating. Every teacher I had was my favorite teacher. I loved the way the chalk sounded on a chalkboard and the feel of the chalk in my fingertips when I was picked to clean the chalkboard erasers outside. Banging the erasers together while watching the chalk puffs gave me so much peace. I recognized early that being in school was in every fiber of my being.

Growing up, I aspired to be in the medical field in order to follow in my parents' footsteps. Because of my original passion for medicine, I patterned my class selections for this purpose. I was on the fast track in elementary school, because I was always in advanced mathematics and science classes. Starting in elementary school, I was a part of an advanced mathematics class in which we were doing mathematics a year ahead. There were only three Black girls including me in the advanced tracked program. We took all of our classes together, including advanced science and English. The three of us became extremely close during the process and we are still genuinely good friends today.

Feelings of separation from my classmates started in middle school. I was on the fast track in middle school by taking advanced classes. In middle school, students were separated into teams by ability level. Grouping and tracking practices flourished during this time. Grouping or tracking

is the process by which students are placed into higher or lower subject-specific courses such as math or science sometimes as early as elementary school—based on their perceived abilities. This practice prohibits many students from accessing high level courses (Miller, 2018, p. 903).

All of the students knew which classes they were in and began to say “Oh, you are in the smart classes” or “You are in classes with all of the White folks.” With regards to grouping or tracking

“research shows that students are tracked along racial and class lines rather than on ‘ability’”  
(Miller, 2018, p. 903).

I took Algebra I in eighth grade so that I could start Geometry in the 9<sup>th</sup> grade. By doing so, I would be able to free up space in my schedule to take quite a few Advanced Placement (AP) courses during my 11<sup>th</sup> and 12<sup>th</sup> grade school year. I learned over time courses such as Advanced Placement (AP) and honors classes have become indispensable for applying to college, but under a tracked system, if students do not take advanced classes in middle school, they will likely not be able to take advanced courses before graduating high school (Miller, 2018, p. 903).

My classes in middle school were selected so that I would be on pace to take AP courses in high school. When I took the advanced classes, my peers often ostracized me. Feeling like an outcast amongst the girls and boys that looked like me was hard. Often “tracking causes both academic and psychological harm to students in lower tracks, and the opportunities students in higher tracks receive, as opposed to their innate intellectual abilities, are what cause them to succeed” (Miller, 2018, p. 903). Having a strong upbringing in church helped me with my self-esteem. I was teased about just about everything including my hair and my clothes. They often said that I was trying to act White, but that was not the case. I just loved school, and I enjoyed being in advanced classes.

### *Reflections of Success in College Mathematics*

Although I have always been good mathematics, I still had my struggles. I did not struggle with mathematics in elementary, middle, or high school. After high school, I went to a junior college, and I majored in Nursing. Because I was still following in my parents’ footsteps, I planned to become a pediatric nurse. I was on the fast track to finish undergraduate school and nursing school in about three years. I initially registered for an overloaded course schedule,



because I planned to finish school quickly. I remember enjoying my mathematics and science courses—but my first nursing class, that was a different story.

The first nursing class that I attended was a total shock to me. Although I periodically worked around blood in my parent's dental office, I was not ready for the things the instructor said we would have to do as a nurse. I figured working around teeth my entire young life would have prepared me. Our nursing instructor showed a video to the class of some of the things we had to do as a nurse. Sitting in that course seeing blood and needles on the video, I realized I was not mentally ready for the job duties. Working in nursing homes or providing care for patients in hospitals was not what I expected. I quickly realized that nursing was not me. I knew that I wanted to work with people, but not in the medical field. I vividly remember getting up out of my seat before the presentation ended. I walked out of class with all of my nursing books, and returned them to the college bookstore. Nursing was not for me.

I was terrified! How was I going to tell my parents that I wanted to totally change my program of study? What were they going to say? Were they going to be upset? Were they going to be supportive? I had so many emotions rushing through my head. I could not think straight. My first instinct was to call my brother, and his reaction was exactly what I thought it would be. He was so supportive, and he managed to turn the situation into a huge joke. He laughed so hard when I described feeling like I was going to throw up watching the videos about needles and blood. Grier truly knew how to help me put my worries at ease. He told me to never be scared to talk to our parents, and to make sure I had a plan when I contacted them. Therefore, when I called my parents I was prepared!

My parents were so understanding once I got the nerve to call home. I explained to them what happened, and they got a good laugh at my expense. I spelled out my entire plan for

graduation and my career ideas. I decided that I would complete my two years at the Junior College and graduate with my Associates Degree. Talking to my advisor helped me understand by graduating with my Associates Degree, all of my credits would transfer to the university I eventually planned to attend as a transfer student. Having my Associates Degree allowed me to start off my junior year at the university, and not have to take any of the core courses they required at that school. My parents were ecstatic that I already had everything mapped out. They understood my yearning to help people, but they understood the medical did not fit my personality. I received their blessing, and their support.

I immediately changed my major to Teacher Education, and my transition to the Department of Education at the Junior College was very smooth. I took quite a few upper level mathematics courses as well as educational courses to complete my Associates Degree, and I was. It was very important to my parents and to me that I complete my Associate's Degree before transferring to a university. I was given the opportunity to transfer all of my classes without having to take any course courses required by another university. This allowed me to start my junior year as a mathematics major and stay on track for graduation in two years.

Mathematics at the university proved to be quite challenging but fun at the same time. I found some amazing classmates in just about every course that I took, and we built a community of support for each other. We all became study partners and eventually lifelong friends. My mini mathematics community included two Black women, one White women, and one Black man. In many ways, we served as our own academic advisors. We started arranging our schedules so that we all could be in the mathematics courses together like Modern Algebra, Graph Theory, and/or Mathematics Statistics. We talked about which courses to take, the best times to take classes and which teachers were the best.

Surprisingly, I did not have any Black women as a mathematics teacher at my university. When I cross-registered for two mathematics courses at a HBCU nearby, I was also astonished that I did not have any Black women as my mathematics teacher. I was amazed that my normal was to not have any women of color as my teacher in mathematics. I would later learn the impact this observation had on my career choices.

### *Successful Experiences in Teaching Mathematics*

After graduating from college with my Bachelor's Degree in Mathematics, I did not immediately start working as a teacher. I worked as a Personal Banker and as a salesperson for an Insurance Company. I initially thought that I was putting my mathematics degree to good use in both of these jobs. Unfortunately, I could never get promoted out of the Personal Banker position, and I realized after a year that I was not good at sales. Although I really enjoyed these positions, I felt unfulfilled and unsettled. I meditated and prayed for a few months before I decided to make that leap into being an educator.

Searching and asking finally led me to a job fair in one of the most popular counties in Georgia. I was so nervous walking through the doors of the room where the fair was being held. A portfolio with ten copies of my resume on special paper and ten copies of my transcript was in my arms as I walked around the room contemplating which table I was going to approach first. In my mind, this decision was going to dictate my career path for the rest of my life. Because I had a pure mathematics degree, I knew that I could teach either middle school or high school. So—I walked up to a table of a high school that was relatively close to my house. I handed my resume and transcript to the principal and my heart started beating so fast. She asked me a few questions, and then handed me a contingency contract to hire me on the spot! I could not believe it!

I was hired as a mathematics teacher in April 2005 and I started teaching August 2005. I was so nervous starting a new adventure, but I was also excited at the possibilities. Over the course of 8 years at the same high school, I taught everything from Algebra I to Advanced Placement Statistics. I coached Varsity Girls Track Team, Varsity Cheerleading, and Varsity Volleyball, and I was the Junior Class sponsor. I was a mentor, advisor, and so much more. I also became a part of a group of educators in the school that were influential to many of the students. We were a group of seven teachers that taught science, mathematics, foreign language, and special education. Similar to my church experience, we all were at school from Monday to Monday. We became each other's support system and biggest cheerleaders, and we coined ourselves the TT Crew. Even years after everyone ventured to different schools and positions, we still come together to encourage each other. This type of comradery was priceless and aided in my success as a mathematics teacher.

During my first year of teaching, I was diagnosed with breast cancer and I was pregnant. It was so hard starting a new job, being pregnant, and getting devastating news. My colleagues and my principal were so supportive while I was going through chemotherapy and multiple surgeries. My principal also held my position while I was out on medical leave. Because I just started teaching, I was told by Human Resources that she was not obligated to do hold my job! I am forever grateful for my principal saving my mathematics position, because I was able to come back to a job that I already loved so much. I already built a good relationship with my students before going out on leave so when I came back to work I was welcomed with open arms.

As a classroom teacher, I planned hands-on and technology filled lessons for my mathematics classes that were meaningful and based off the standards. I always wanted my

students engaged and hoped they grew to enjoy mathematics as much as I did. I yearned for students being successful in my mathematics classes, and I believed in giving students every opportunity to flourish by offering them multiple tries on quizzes, tests, and other assignments. I have always been a proponent of students mastering the mathematics content, and my drive to be successful in this feat was unwavering. Focusing on concept mastery helped me to build meaningful relationships with my students, because they were able to see that I truly cared about their education and well-being as a whole human.

My educational career evolved after teaching mathematics at the same high school for 8 years. My love for teaching teachers and technology took me on a fun journey as Mathematics Academic Coach at the high school and later as an Educational Technology Specialist in a large school district in Georgia. In the midst of these job transitions, I went back to school and earned my Masters in Mathematics Education and Specialist in Educational Leadership degrees. I also enrolled in the doctoral program. Taking these new roles and degrees allowed me to touch more teachers and students. My influence now stretched beyond the four walls of my mathematics classroom, and I could positively affect student achievement.

I was able to make numerous connections attending conferences and being a member of the leadership team for the school. These connections afforded me the opportunity to interview and be hired as an Assistant Principal at the high school in which I graduated from. I could not believe that I had the opportunity to make a difference in the community I grew up in! Transitioning from a technology support role to an administrative role was seamless, because I had an amazing Black female principal as my mentor.

### *Summative Remarks on My Story – The Researcher*

Although my position in education has evolved from teacher to academic coach to technology specialist to administrator, I am still a mathematics educator at heart. My journey from being a high achieving mathematics student to being a successful educator included a supportive group of people that provide constant encouragement and constructive feedback. While my race and gender influenced my educational experiences from grade school to college, my parents and brother helped me stay focused, motivated, and loved. My brother and I had a strict upbringing, but our parents allowed us to participate in almost anything we wanted as long as it was with our church or school. Finding enjoyment in school was ingrained in my soul.

I loved every aspect of school including being picked to answer questions at the board to cleaning chalkboard erasers. Because of this love, I wanted my students' feelings toward mathematics to be positive, and I was a cheerleader for Black girls in mathematics every chance I got. Over the course of my life, I had some strongly influential Black women that impressed upon me as positive role models. These women, including my mom, aunts, and grandmothers, gave me encouragement and advice. While navigating racial and gender obstacles as a mathematics educator, I looked to the strong Black women in my life like my first mathematics department chairperson for guidance and understanding. Having a support system assisted me being successful in mathematics and in leadership.

### **Discussion**

In an effort to encapsulate the factors that contributed to four African American women's experiences in mathematics and as mathematics educators, I collected their narratives through interviews. My aim was to authentically capture their "voices" by composing their stories of success using a womanist theory lens. I used narrative case study analysis as a way to investigate

their journey and find commonalities between their narratives. Elizabeth, Ibbie, Louise, and Mattie were all participants in my research study. As specified earlier in the findings section, these women were successful African American women mathematics educators (see Table 1).

Table 1  
Participant Summary

Participant	Graduate Level	Degree	Profession
Elizabeth	Doctorate	Mathematics Education	Digital Learning Specialist for Mathematics
Ibbie	Masters	Mathematics	Professional Learning Facilitator & College Mathematics Adjunct Professor
Louise	Specialist	Mathematics & Educational Leadership	High School Mathematics Teacher
Mattie	Doctorate	Mathematics Education	High School Mathematics Teacher & Department Chairperson

My goal was to uncover the factors mathematically successful African American women attributed to their success in mathematics classes in grade school through college and as mathematics educators. I wanted to reveal whether or not race and gender had an effect on their matriculation from grade school through college, and if this intersection influenced their success in mathematics. I was also curious about who or what influenced the life and schooling experiences of these successful mathematics educators, and whether or not these relationships influence their pedagogical philosophies and teaching practices in the classroom. Although the participants came from unique backgrounds and live different lifestyles, their paths all led them to mathematics education (see Table 2).

Table 2  
Summary of Participants' Family Characterizes

Participants	Marital Status	Children	Siblings	Mothers Highest Degree	Father's Highest Degree	Parent's Social Status
Elizabeth	Married	2	4	Bachelors	Masters	Middle
Ibbie	Married	0	3	6th Grade	4 <sup>th</sup> Grade	Lower
Louise	Divorced	3	8	Associates	Bachelors	Working
Mattie	Married	3	4	Masters	Military	Middle

During my inquiry and analysis of the four successful African American women's narratives, three common themes were identified. Making these connections also allowed me to analyze the data through womanist lens because "womanism provides women of color with the opportunity to recognize the uniqueness of African American women's experiences and those of other women and explicitly address the important bond between African American women" (Packer-Williams, 2009, p. 53). The initial theme was that they all had at least one strong African American woman and/or parental influence in their lives that pushed and encouraged them to be successful in mathematics. The second theme was that although they had a strong African American woman influence in their lives, they did not have any African American women mathematics teachers which influenced how they navigated their own race and gender as mathematics students and mathematics educators. Finally, all these women believed building strong insightful relationships with their students assisted them to be successful mathematics teachers. These relationships have also influence their pedagogical philosophies and teaching practices in the mathematics classroom. Each of these themes are reviewed in the following sections.

*Strong African American Woman Influence*

During data analysis, the first theme identified was the influence of strong African



American women in my participants' lives. Packer-Williams (2009) suggests, "African American mothers continue to be a dominant influence in the lives of their children and the African American community" (p. 52). Having these women in their lives helped reinforce many of the characteristics the participants already had. In our society "black women especially know fear—how to live despite it and how to metabolize it for our children so that they're not consumed by it" (McClain, 2019, p. 15). This metabolism of fear is an example of what fueled the strong Black women's rearing style which echoed throughout the four participants' narratives.

Womanism suggests that a mother is "a nurturer whether or not she is ever a biological mother. The powers to nurture and hold things together are sacred properties" (Baker-Fletcher, 1995, p. 194). Baker-Fletcher acknowledged there is a transmission of "the wisdom of Black Women's cultural heritage from mother to daughter" (p. 183). The writings of "Black Women [also acts] as a preserver of cultural codes which are [also] passed from mother to daughter" (p. 184). In conjunction with nurturing and transmission of wisdom from mother to daughter is knowledge creation. Dingus (2008) specifies, "knowledge is generated, assessed, and transmitted across generations of Black women with traditions of 'mothering the mind'" (p. 364). Along with knowledge generation, "Black women attend to the development of younger generations based on their collective and individual experiences with oppression" (p. 364).

Trotman (2011) writes, "in order to understand some common threads of black maternal influences, it is important to view how some of the daughters, mothers, and foremothers of African America see each other" (p. 35). Womanist theory acknowledges "the intensity of the African American mother/daughter connection [and] our culture recognizes the regal strength of black women" (Trotman, 2011, p. 36). Their fortitude and power was often exhibited within their

jobs because African American women “have always worked. We were brought to this country to be workers and breeders of workers” (p. 36).

One strong African American woman that influenced my participants’ lives was their mother and/or grandmother. McClain (2019) states, “black women have had to inhabit a different understanding of motherhood in order to navigate American life” (p. 15). These women could have not “merely accepted the status quo and failed to challenge the forces that have kept black people and women oppressed, then [they] participated in [their] own and our children’s destruction” (p. 15). All of the participants had a strong Black mother that guided them through their lives. McClain affirms:

Black mothers...are scared not of talk of race, but of the impact of racist oppression.

We’re scared because we have no choice but to release our beloved creations into environments—doctors’ offices, hospitals, day-care facilities, playgrounds, schools—where White supremacy is often woven into the fabric of the institution, and is both consciously and unwittingly practiced by the people acting in loco parentis. (p. 15)

For these reasons, mothers and grandmothers helped the participants make major decisions in their lives, and provided sound advice “as a buffer and translation between them and the world” (p. 16). Black “mothers are viewed as a source of comfort, strength, power, respect, creativity, and continuity (Packer-Williams, 2009, p. 50). Many Black mothers also express “the importance of their daughters not allowing negative stereotypes and perceptions associated with their race or gender to serve as barriers to their accomplishments” (Brown, Blackmon, Rosnick, Griffin-Fennell, & White-Johnson, 2017, p. 181).

Elizabeth grew up with guidance from a strong African American woman who was her mom. She remembers as a little kid in Germany being inside their apartment reading and writing while her friends were outside playing. Elizabeth recalled:

I was not happy! But my mom chose books I liked, and I got to write about fun things, like making up a story about a butterfly. I became a voracious reader and a very good writer as a result. I always had a book in my hand—and still do! When I graduated from high school, I went to college to become a writer or a journalist. But fell in love with the beauty of math. (Interview 3)

She added, mom was a most perceptive mom:

My birthday is in December and I started kindergarten a year early. For some reason, my mom kept me back in kindergarten! Yes, kindergarten. I'll never know why because my father doesn't remember why. I do remember thinking that second year of kindergarten was the best thing ever in life! Everything was so easy! I was helping other students out! One of my aunts mentioned that it was because she thought I wasn't socially ready to move on, which makes sense because I was always a "nerd" in school making all A's or A's and B's, so it doesn't seem like it had to do with academic ability. (Interview 3)

Ibbie had a close relationship with her mother, aunts, and grandmothers. The best advice she received from her mother was to "love and trust God!" (Interview 3) In speaking about these women, she remembered her relationships:

All three, my mother, my grandmother, and my aunts, spent most of the advising on being a Black girl. The conduct of a Black girl in a world full of Black and White men was to realize that I was behind before I ever got started, meaning a super work ethic and a top-notch self-esteem was a must to just keep up. They always told me that I could do

anything I worked hard at doing. I was told to consider consequences in my decision making and to learn to play the game of life fairly, but with mastery. (Interview 3)

Ibbie's mother "provided her support and her extreme delight when she saw me doing well. She never criticized my weaknesses" (Interview 3). While her mother did not have a significant impact on the college she chose, Ibbie affirmed "our family followed the school offering the most money" (Interview 3). Her mother was very supportive, and was her biggest cheerleader. When talking about her experiences with her strong African American mother, grandmother, and aunts, Ibbie acknowledged:

They were my heroes. No one can love a little Black girl like the people that she herself loves so dearly. They were all very proud women who put forth their best in whatever they did. Each one played an important part in my upbringing. (Interview 3)

Ibbie's mother purchased a chalkboard to help foster learning mathematics earlier in her life. That gift from her mother set her on a path to teaching and learning. Mother's know what their babies need, and African American women are no exception.

Louise grew up in a household with both her mother and grandmother. They were very influential on the decisions that Louise made in her life. Although she was not initially interested in school, she made good grades because her mother made her. When asked what was the best advice she received from her mother growing up, Louise stated "to be myself" (Interview 3). She said, "I only got good grades because my mom made me" (Interview 3). Louise was eager to please her mother, and she felt that she disappointed her mom because she did not want her to become an educator. Louise's mom initially wanted her to attend college for engineering. From kindergarten to twelfth grade, Louise's mom paid for private school and she was an advocate for her succeeding in school.

Mattie's mother had a strong impact on her life and her decisions growing up. Mattie's mom was a mathematics educator, and she went to her often for guidance. She said, "I'm not sure how I would have turned out if my mother wasn't a teacher or whatever" (Interview 1). Although her mom did not speak with her directly about her race or gender, Mattie watch how gracefully her mother handled situations that were directly influenced by race and/or gender. Her mother taught her how to empower African American students that "are disenfranchised with mathematics and get a bad taste in their mouth really early on either through teachers who don't believe in their abilities and don't cultivate their love for mathematics early on" (Interview 1). Mattie's mother had a very prominent presence at her elementary school. She recalled—

I grew up in a neighborhood of teachers. It really was that neighborhood feel, where if you got in trouble at school, you would get in trouble at home. That was real!

[LAUGHTER] My momma knew whatever happened to me at school before I got home. My mom taught at the junior high school. The way our school was set up was it was K-5, and then everybody went to what we called middle school, which was sixth and seventh grade. Then we went to junior high, which was eighth and ninth. Then high school was tenth through twelfth. (Interview 2)

Mattie remembered—

My mother was very serious about my education. It was mandatory that I put forth my best effort. I remember getting a C in Geometry at midterm. She put me on punishment until the next grading period. It was my one and only C in secondary school. (Interview 3)

Mattie's mom taught at the junior high school she attended, and the middle school and junior high were constructed with an open concept right next to each other:

Middle school and junior high were catwalks, so we went to school outside. You walked outside to get to your class. It was what's called a catwalk where it's a covered pathway, basically. If you're sitting in one classroom, you can look out the window and see the next bank of classrooms across from you. If you got in trouble and the teacher in front of you, the classrooms in front of you could see you sitting outside because they would put you out. They would see you sitting outside. Of course, all the teachers there knew me. If I got in trouble and I was in trouble with all of them. It was that kind of upbringing.

[LAUGHTER] (Interview 2)

The influence from Mattie's mother was undeniable. Her mother encouraged her to take certain mathematics classes in college and to major in mathematics. Once she completed her mathematics degree, Mattie's mother told her that she should teach. It seems that Mattie's mother knew her daughter was destined to be a success mathematics educator.

One central factor that the mathematically successful African American women in this study attribute their success in mathematics courses in grade school and in college was having a strong African American woman influence in their lives. Trotman (2011) notes—

successful African American women have often used their mothers and foremothers as guides to their development, which allow them to unfold in harmony with their feminine selves and to experience the cyclical nature of life not as limitation, but as a vehicle for individuation. (p. 39–40)

Similar to my participants, my mother played a crucially important role in me choosing mathematics and mathematics education when I decided to change my major from nursing. My mother knew that I really enjoyed mathematics from grade school through high school, and she found out there was a shortage of mathematics teachers. My mother valued education, and she

would always say: “They are going to always need math teachers. So, you will always be needed and valued.” Much like my participants, my mother’s wisdom resonates with me throughout my entire life.

### *Lack of African American Women Mathematics Teachers*

The second theme that was identified from the participants’ data was an absence or scarcity of African American women mathematics teachers. Beasley and Fischer (2012) “identified an increasing problem in the United States: a critical underrepresentation of women and minorities in the sciences” (p. 428), including mathematics. Although the participants did not have African American women mathematics teachers in grade school or in high school, they still acknowledged the importance needing more African American women mathematics teachers. They believed having an African American woman educator as a role model and mentor is important for African American girls in mathematics.

The four African American women in this research study discussed not having an African American woman mathematics teacher all through grade school, and one participant had one African American woman mathematics teacher in college (see Table 3). A couple of my participants acknowledged they never thought about this phenomenon until I asked them questions about their experiences. During my interviews, I thought about my experiences in my mathematics classes from grade school through college. I realized the only African American woman mathematics teacher I had was in high school.

Table 3  
Number of African American Women Mathematics Teachers

Participant	Elementary	Middle/Jr. High	High School	College
Elizabeth	0	0	0	1
Ibbie	0	0	0	0
Louise	0	0	0	0
Mattie	0	0	0	0

Elizabeth reflected on her experiences from grade school through college, and she was shocked when she thought about not having any African American women mathematics teachers. She talked about the importance of having strong role models growing up and looking to her teachers for guidance:

It’s amazing that I did not have any female math teachers that were Black! Never processed that I never had a Black female math teacher before you asked this question. It makes me sad to realize that I didn’t have any Black female math teachers growing up.  
(Interview 3)

She continued—

Another good question is that with all of my fifty million schools, why not. I attended so many schools being an army child. Why didn’t I have a Black female math teacher, or a Black teacher period. My mom was an elementary school teacher and she focused on math and reading. That is the closest thing I had to a Black math teacher. (Interview 3)

Scrutinizing the idea of not having an African American woman mathematics teacher, Elizabeth theorized—

children need a visual to know that they can do something, if that makes any sense.



Looking back, had I had any for-real Black math teachers who were female, even, and not even male, girl, that I thought I could do math—I would have been even more successful in school. (Interview 3)

She continued, reflecting:

when a kid is thinking about what they want to be when they grow up, it's always something that they saw on TV or someone that they met in real life. But if I've never had a Black or a female math teacher, then how do I know I can do that? (Interview 3)

The multiple schools that Elizabeth attended had no African American women mathematics teachers. Growing up in different schools, Elizabeth did not think much about not having African American teachers. She realizes now that having African American mathematics women teachers could have a huge impact on students' career choices in the future.

Although Ibbie grew up during segregation when all of her teachers were African American, she did not have any African American mathematics teachers who were women. All of her mathematics teachers were African American men. The following excerpt of the interview revealed Ibbie's experience with only having male mathematics teachers:

**Katrina:** Did you have any African American women teachers in elementary school?

**Ibbie:** Yes, I did. Wait, I did not. All of my math teachers were Black males.

**Katrina:** In high school?

**Ibbie:** In high school. I think I had only one Black math teacher in undergrad and no Black female teachers in graduate school. They were all male. Every math teacher I've had has been a Black male, except for one.

**Katrina:** Wow!

**Katrina:** That's very interesting. You would think that attending school during segregation you would have had at least one African American mathematics teacher that was a woman.

**Ibbie:** Back in my day, women were discouraged.

**Katrina:** You're not taking math.

**Ibbie:** Yes—You don't know any math. And—you're not taking math. Math was for men.

**Katrina:** Do you think your race or gender impacted your mathematical experiences?

**Ibbie:** My race did not but my gender did, because women were not encouraged to be in mathematics. Most of my math classes, when I was getting my master's, there were more men than women in that class. The men got most of the attention. They really did. I remember professors saying, "Look at her. She has to go in her purse to get what she needs," and that type of stuff.

**Katrina:** Wow! How did that make you feel?

**Ibbie:** It made me angry and I started to go and report him, but I didn't. I stuck it out. But they were not encouraging at all. But you couldn't make me hold my head down. I had been through too much. You grew up quick back in those days, and so I was grown.

[LAUGHTER] (Interview 2)

Through her dialogue, Ibbie expressed feelings of discouragement and anger. Her experiences growing up in the segregated South proved to be somewhat difficult. During the era when African American empowerment was on the rise, African American women like Ibbie were faced with disapproval while pursuing their dreams of being mathematics educators. Luckily, Ibbie knew her worth and had a strong will to pursue her goals.

Louise grew up in New York, and she went to schools that were taught by mostly all White teachers. The schools that Mattie attended in elementary and middle school were very small private schools with about eight students per class. Louise expressed:

Growing up, I didn't have any Black math teachers. My teachers in elementary and middle school were White. I was in private schools for elementary and middle school and I did not have any Black teacher at all. Oh—We had a Black lunch lady. High school, the same thing.

Now my high school, as far as the student population, we were 90% Black. (Interview 3)

Louise elaborated:

In high school, we were really close-knit. My principal was Black. We had a Black dean. The gym teachers were Black. There was a Black biology teacher. And, I don't think they treated us any different because we were girls or boys. There was one black math teacher, but she wasn't my teacher. I did not have any Black female mathematics teachers. All my teachers were White. (Interview 3)

Even when she attended a predominantly African American high school, she did not have any African American mathematics teachers that were women. Louise further stated, "I'm thinking about it now, and I'm really wracking my brain like oh, my gosh! I had no Black math teachers growing up. Then in high school, I had a Black English teacher" (Interview 3). She also did not have any African American mathematics professors in college that were women. Reminiscing, Louise realized that she did not remember having any Black friends in her classes. She was used to being the only Black person, and many things concerning race and/or gender did not register to her until a year later.

Mattie recognized mathematics is the pathway to countless jobs and other subjects of interest. She went on an international trip recently with students from her school, and Mattie said

she had the time of her life. While on the trip, she was relating everything to mathematics. Mattie realized experiences like these help shape students for a lifetime, and reinforces the importance of her being a mathematics educator.

While Mattie did not think much about not having African American mathematics teachers growing, she knew it was important to have role models that looked like them in the classroom. While discussing her journey from grade school to college, Mattie talked about not having any African American women mathematics teachers:

I did not have any African American women mathematics teachers in elementary school, middle school, or high school. Then college, none. They were men. I think they were all African American men. No. I shouldn't say African American, because some of them were African. (Interview 2)

She was asked if she remembered how she felt during that time not having African American women mathematics teachers. Mattie's response—

**Katrina:** How did you feel not having any African American women math teachers?

**Mattie:** I did not feel any type of way, I don't think.

**Katrina:** Why?

**Mattie:** Well, my mom was an African American math teacher, and we had a Black principal in middle school. So, I saw a representation of Black people who were doing well. Our schools were mini communities where everyone knew everyone. So—we had positive influences all around us.

**Katrina:** Do you think it's important to encourage other African American women or even girls that you teach to pursue mathematics education as a career path?

**Mattie:** Absolutely, sometimes Black girls are shy, especially in math class. I feel it's our job to empower them! (Interview 3)

Although most of the women in this research study did not have African American women teachers with the exception of one, they were all destined to be successful and purposeful by giving every child a chance to be successful in their classes. Similar to the participants in this research study, my contact with African American women mathematics teachers in grade school through college was limited. I had one African American woman mathematics teacher that attended my church. She taught at my high school, but I was not fortunate enough to have her as my actual teacher. She did tutor many of the students at my church, including me. In addition to seeing her for tutorial sessions, I went to her to get ahead in my upper-level mathematics classes. I remember wishing that I had her as my teacher, but I knew I was lucky to have her in any capacity. Although I did not formally have her as my teacher, she had high expectations for her tutorial sessions. She would also be a mentor and advisor to all of her students. I enjoyed watching her teaching style and teacher-student interactions. Watching her in action caused me to emulate her style once I started teaching.

### *Building Strong Insightful Relationships*

The third theme that resounded for all of the participants is building strong insightful relationships with their students, peers, and family. Beauboeuf-Lafontant (2002) identified the way womanist teachers “within their cultural construction of womanhood...profoundly embraced a maternal image. Based in their lives and experiences outside the classroom, the maternal served as a relational compass for their teaching” (p. 75). This maternal instinct permits relating and caring for their students with grace. Historically—

African-American women did not rely on the school's appropriation of the maternal to

circumscribe their own desire to relate to students in a familiar, maternal way. In fact, these teachers saw their maternal qualities and the mother-child relationship as *central* to their resistance to domination, both patriarchal and racial. (p. 76)

For womanist teachers, “womanism provided an interpersonal base for social action in education” (Beauboeuf-Lafontant, 2002, p. 77). They often view themselves as beings that used their “maternal lens they brought to their practice [as a link that] powerfully connected their personal relationships with students to an active engagement with social reality” (p. 76). As womanist teachers, the participants in my study agreed, “trust, commitment, and respect were the three main characteristics used to define a meaningful, serious relationship” (Packer-Williams, 2009, p. 59). Although “the dominant narrative is that we’re poor, draining public coffers, and so a blight on society,” studies have shown, “black girls grow up with a sense of empowerment and possibility that girls of other races don’t necessarily see modeled at home or in their communities” (McClain, 2019, p. 18). African American women “also incorporated messages of self-determination, self-pride, racial pride, spirituality, and acceptable behaviors in male-female relationships” (Brown, Blackmon, Rosnick, Griffin-Fennell, & White-Johnson, 2017, p. 181). These examples of internal characteristics along with a love of mathematics influenced the four African American women participants in this research study to build meaningful relationships.

Elizabeth worked diligently to construct relationships with her mathematics students. She believed building a strong foundation with students makes them willing to listen and learn. Elizabeth built relationships with her students by persistently making mathematics plain. She explained—

I “broke down the break down”; explained problems in a variety of ways; had an authentic “open door” policy where it was understood there were no bad questions—which is huge in high school where students can be mean. (Interview 2)

Elizabeth explained her teaching style:

I wasn’t always the “Sage on the Stage”—we did group work and also went to the board to explain how to do problems to the class. I remember there was a lot of laughter and learning. I was shy in high school, and I was afraid to get up and ask questions. So, I wanted to make sure that my students had a safe space to learn. I think building relationships with students was about my positive attitude and how I treated the students in a caring manner as much as it was how I taught math. (Interview 2)

Ibbie has been an educator for over forty years. She said one of the keys to her longevity and love for teaching mathematics was her ability to build good relationships with her students. She made sure to make good phone calls home to her students’ parents or guardians. Doing so demonstrated the compassion she had for her students, and parents were appreciative of receiving good news about their child rather than always hearing the bad. Ibbie stated making those positive phone calls had parents on her side from the beginning of the school year, and she was able to boost students’ confidence in her as a teacher that wanted them to succeed in mathematics. Ibbie “felt that good students deserved as much attention as those who were not putting forth as much effort” (Interview 3).

Ibbie was accustomed to seeing students struggle with mathematics concepts, and she worked tirelessly to keep the students encouraged throughout the learning process. Ibbie emphasized—

I like teaching the language and the concepts, which is hard to get over to the students these days. They don't understand why math would have to have that. Then they don't understand the reason why you even have to have it. (Interview 2)

Ibbie elaborated—

That's why I talked earlier about the logic, the reasoning, the creative thinking, and the critical thinking. Those skills of building math, that's what I tell them about. We are in that type of generation where they want to know why. (Interview 2)

Ibbie talked about how her teaching and relationship with her students has evolved over forty years of her tenure as a mathematics teacher. She has noticed that she is now teaching a generation of students that really want to know why and how. She mentioned:

They've been wanting to know it, but really they really want to know why, when, where and the purpose. I think that should be true to any math classes. Those are some of my experiences. I also believe in practice, practice, practice. (Interview 2)

Using the tools of inclusiveness and positivity has helped Ibbie be successful at building relationships with her students in her mathematics classes. She was also an advocate of providing her students every chance to succeed by giving them opportunities to practice and master mathematics content.

Louise has been an educator for over twenty-one years, and earning Teacher of the Year was additional proof that she is a successful mathematics teacher, and that she loves being an educator. She is a master at forming good relationships with students in her mathematics classes. Like Ibbie, she was deliberate in making parental phone calls that were positive in nature, and she constantly found ways to give praise to help boost students' mathematical confidence. By boosting students' confidence, students were encouraged to participate and learn in class. Louise



noticed students being more apt to turn in their assignments and attend after school tutorials as a result of boosting students' confidence.

Louise found creative ways to get to know and remember student names:

It was important to me to know all of my students' names within the first couple weeks of school. My students could not believe that I learned their names so fast, and I could tell by their expressions that it meant a lot to them that I remembered. I never revealed to the students my tricks to learning their names, but seating charts always helped. [Laughter]  
(Interview 3)

Louise connected with her students by—

telling them stories about me. This allowed students to relate to me. They know that I am a real person, and I that had some struggles with learning math. Having constant dialogue with my students kept me informed with their struggles in the classroom and in their lives. Students always comment that they cannot believe that I did not always understand math. (Interview 3)

She built good relationships with her students by “being attentive to them and showing genuine concern when they seemed troubled” (Interview 3). Louise mentioned, “I made myself available during class to listen to students' concerns. I wanted them to view me as someone who genuinely cared about their wellbeing as students” (Interview 3). Louise continued—

I believe that I am a very compassionate person, and have a special place in my heart for students. I know that building relationships with students helps break down many barriers to learning in the classroom. It helps tremendously with classroom management. I am a mother, and I want my students to feel that I am a caring and loving teacher. I want all my students to understand and love math as much as I do. (Interview 3)

Building relationships in the classroom demonstrates the level of respect Louise had for all of her students.

Mattie was dedicated to building relationships with her mathematics students as well. Every day she made sure she was overly prepared for her classroom instruction while simultaneously thinking about potential mathematics questions her students may ask. Anticipating what her students needed was a high priority for Mattie. She understood being prepared helped to build trust between her and her students. Mattie wanted her students to understand that any question asked in her mathematics class was valuable to the learning experience. She constantly told her students, “No question is a stupid question” (Interview 1). Mattie believed students can be successful in mathematics with—

Repetition. I teach IB math. One thing I’m learning is that the IB wants the students to understand the concept, why it is, how it’s used. Why do you take the first derivative? Why do you take the second derivative? How is it used? (Interview 2)

Mattie continued—

That’s one thing teaching IB classes has taught me to teach the why in my other classes. I feel like if a student can understand the why, then it makes more sense to them why we’re approaching a problem the way we’re approaching it and just what it means. I think it’s easier for a student to then connect all the dots from one course to the next. That’s one thing I like about teaching math. (Interview 2)

Mattie believed that African American women mathematics educators can be catalyst by enlightening students and helping them comprehend and recognize their mathematical talents. She was like her mom in many ways when it came to her teaching style and relationship building. Mattie stated, “My mother never put limits on me. The same way she didn’t put limits

on me, I never put limits on my students” (Interview 3). She worked hard to make sure her students were comfortable in her class and feel like they belonged.

From the beginning of my mathematics education career, I realized building teacher-student relationships was essential to being a successful teacher. Students’ confidence and trust in me as their teacher helped thrive in the positive environment. I was successful at building relationships with students and even colleagues by displaying the genuine care and concern for others. I tried to keep an open door for students and my colleagues whenever they needed to talk. Being available for the students and colleagues proved to be most important to them.

### **Concluding Words on Findings and Analysis**

In this chapter, I explored the journeys of Elizabeth, Ibbie, Louise, and Mattie. I investigated their strength and fortitude as successful African American women mathematics students and mathematics educators through the lens of womanist theory and narrative analysis. From the analysis of the data, I identified three themes: the participants had at least one strong African American woman influence, the participants understood there was a lack of African American women mathematics teachers, and the participants worked hard at building strong insightful teacher-student relationships.

First, the participants had at least one strong African American woman influence in their life. From the enslavement of Africans, African American “women have always worked and were viewed as having a sense of regal strength. Messages about employment and their role in the family were passed down to African American women from their mothers and grandmothers” (Packer-Williams, 2009, p. 53). Often, “messages and attitudes that African American women gain about education, career attainment, gender roles, and marriage are passed down from mothers and foremothers” (Packer-Williams, 2009, p. 50). The mothers,

grandmothers, and aunts played a pivotal role in the lives of the participants while impressing their wisdom upon these successful women.

The second theme consistent with each participant was the acknowledgment of a lack of African American women mathematics teachers. Elizabeth, Ibbie, Louise, and Mattie recognized the importance of the role they had as African American women mathematics teachers because of the shortage. The participants expressed the need for African American mathematics teachers who are women, and they all believed they could help encourage minority girls and women to pursue careers in mathematics education.

Finally, the participants worked diligently building meaningful relationships with their students. They discussed the importance of good relationships to foster a nurturing classroom setting where students felt safe and secure while learning mathematics. They all accredited their teaching styles or educational philosophies to good relationships with their teachers growing up. Their caring and womanist nature led to students being successful in their mathematics classroom.

The data and analysis in this research study revealed how four African American women mathematics educators navigated their success as mathematics students and mathematics educators. Their narratives of success presented evidence explaining their pedagogical philosophies and teaching practices in the classroom. Additionally, the information gathered during the research study indicate evidence for implications and suggestions for further research. These suggestions for further research can potentially lead to changes in practices and policies. In the final chapter, I end with a discussion about the limitations of the research study. I also discuss some implications of the study and provide future research suggestions.

## **CHAPTER 6**

### **CONCLUSIONS AND RECOMMENDATIONS**

In this closing chapter, I revisit different elements of the research study. I begin the chapter with a brief summary, reviewing the purpose, the research questions, the related literature, and the methodological and theoretical frameworks. I outline implications and make recommendations for the community of mathematics educators as well as policy makers and lawmakers, and anyone devoted to the success of African American girls and women in mathematics. I also provide suggestions for future research.

#### **Summary**

African American girls and women are either omitted or included holistically in mathematics education research studies examining African American students. Comprehensive research studies on African American students often disenfranchised African American girls and women, and minimized the intersectionality of race and gender. Too often, research studies chronicling the stories of successful African American girls and women in mathematics and mathematics education are limited and have been overlooked by researchers (Bullock, 2012; Gholson, 2016).

The purpose of this research study on African American women in mathematics was to explain and investigate the influence of race and gender on being successful in mathematics through their narratives. Reflecting on the United States' unbridled story of racial and gender oppression and inequality, I wanted to explore and reveal the challenges African American girls and women encountered when navigating through experiences in their mathematics classes and as mathematics educators.

Bullock (2012) states, “our goal as mathematics education researchers concerned with issues of equity is to investigate ways to provide quality mathematical experiences for all children” (p. 32). Using narrative case study analysis accentuated with womanism as my theoretical approach, I investigated four African American women mathematics educators who were successful in mathematics classes and as mathematics educators. I explored how these women navigated their educational experiences from elementary to college, their success in college mathematics, and their experiences being successful teachers of mathematics. The following research questions guided the study:

1. What factors do mathematically successful African American women attribute to their success in mathematics courses in grade school and in college?
2. What did these mathematically successful African American women do inside and outside of the mathematics classroom to cultivate and nurture success in mathematics?
3. How did these mathematically successful African American women navigate their gender and race during grade school and in college, and did this intersection influence their success in mathematics?
4. Who or what influenced the life and schooling experiences of these successful mathematics educators? Did these relationships influence (or not) their pedagogical philosophies and teaching practices in the classroom?

For the purpose of this study, I utilized narrative case study analysis, which “seeks out how people make meaning of their experiences, and recognizes that meanings are multiple and context dependent” (Etherington & Bridges, 2011, p. 12). Narrative case study analysis takes into account—

a ‘curious, not knowing’ position and focuses on questions that help the storyteller address cultural context; their embodied engagement in the events, their senses, feelings; thoughts, attitudes and ideas; the significance of other people; the choices and actions of the teller: based on values, beliefs and aims; historical continuity; and metaphors, symbols, and creative, intuitive ways of knowing which create pictures that capture vivid representations of experiences. (p. 12)

During my research study, I used interviews and questionnaires to gather the stories of the African American women participants. The initial questionnaires opened up dynamic dialogue that produced opportunities for more in-depth questioning during the interviews. I conducted three interviews with each of the participants at their selected locations during an 8-month timespan. These interviews produced rich conversations detailing their experiences in mathematics classes and as mathematics teachers. In Chapter 5, I recounted the discoveries of their case studies. To speak to my subjectivity, I incorporated my story as a mathematics student and mathematics teacher throughout. Incorporating my story also provided background as to why I was inspired to conduct this research.

Using womanism as a theoretical framework alongside narrative case study analysis worked for my research study because they both acknowledge the storyteller and their narratives as fundamental data sources; it also provided me opportunities to explore the intersectionality of race and gender. In other words, I was able to examine the African American women’s experiences and narratives in using womanism as a caveat (A. Walker, 1984; Connelly & Clandinin, 1990; Lindsay-Dennis, 2015). Womanist theory supported qualitative research methods because it is partial to participant storytelling as a primary data source—the participants’ voices were the primary focus. Merging womanist theory and narrative case study

methods and analysis permitted prioritizing African American women's stories of success as mathematics students and educators.

### **Implications and Recommendations**

There are a number of implications from this research study regarding African American women who are successful mathematics educators. These implications have the possibility to inform policies, practices, and further research not only on African American girls and women but also on other marginalized students. Bullock (2012) states—

by placing the well-being of marginalized children at the foundation of our research decision making and doing what we can as researchers and scholars to equip ourselves to make appropriate methodological decisions, we can be sure that we are conducting good equity research. (p. 32)

I agree that research data and interpretations are vital to generate proper decision making that will be inclusive of all students' educational needs. Bullock acknowledges: "Equity in mathematics is a complex issue. Addressing this issue within mathematics education research is equally complex and begins with the acknowledgement that existing approaches are not bringing about desired improvements for marginalized students" (p. 32). Being comprehensive in the approach to focusing on the needs of students that are underrepresented in mathematics education policies and procedures is necessary to address equity issues.

The intention of this research study is to help adjust and eliminate negative stereotypes, inequities, and perceptions of African American girls and women in mathematics classrooms. To eliminate societal stereotypes and negative internal perceptions for African American girls and women "requires looking at marginalized students, their lived experiences, and their mathematical experiences in different ways" (Bullock, 2012, p. 31). This elimination also



requires other modes of access for African American girls and women to be successful in mathematics. Consequently, some recommendations are as follows: (a) provide African American women mathematics educators mentors for African American girls and women interested in pursuing mathematics degrees and/or careers in mathematics; (b) allow more opportunities for African American girls and women to tell their educational stories in mathematics; (c) build the capacity of African American women educators in mathematics, and (d) ensure mathematics resources and classes are available for African American girls and women. These recommendations are a direct reflection of this research study, and implicate suggestions for future research.

Mentoring is a process that I believe can and will work to thrust African American girls and women toward success in mathematics. I believe that there is merit in helping students strive to the next level, especially when they do not have much support in their everyday lives.

Mentoring is also—

the agency that each of us has to treat others as our own; the obligation we have to understand as fully as we can the world around us; and the responsibility we have to make sure that our actions contribute to the larger human goal of freedom for all.

(Beauboeuf-Lafontant, 2002, p. 84)

Mentoring allows more opportunities for African American girls and women to tell their educational stories in mathematics while acting as a corridor on the pathway to building the capacity of African American women educators in mathematics. Growing the number of African American women educators in mathematics is important because—

women's advocates argued that their under-representation in school administration and in mathematics...teaching does not only reflect inequities in employment, it also affects

female students negatively. It affects female students' efforts to excel in mathematics and their interest in the field because they lack appropriate role models and same-sex mentors that will encourage their pursuits in non-traditional fields. (Catsambis, 2005, p. 232)

Now as an administrator, I can help develop and implement policies and procedures to give teachers, administrators, and other leaders in the mathematics education community “the opportunity to develop positive relationships” (Dingus, 2008, p. 371) that can help “foster leadership skills and interests across generations of Black women” (p. 368). This development and implementation can be a “mentoring network” model for my school and community (Dingus, 2008) that could be utilized in other districts to build the capacity of African American girls and women students and educators who love and succeed in mathematics. The network of mentors can also help advocate and lobby for mathematics resources and class availability for African American girls and women.

### **Suggestions for Future Research**

After conducting this research study, I became fully aware of opportunities for future research. I found that there were significant gaps in the literature with limited studies focused solely on African American girls and women in mathematics. More times than not, researchers have African American girls and women grouped into other minority categories. I suggest more research studies that “ungroup” minorities. Ungrouping is imperative to properly investigating the effects of the intersectionality of gender and race on African American girls and women in mathematics.

I also suggest researching the positive effects of mentoring on African American girls and women in mathematics. I believe there is a “strong need for some women to reach back and pull someone else along” (Smith & Crawford, 2007, p. 257), and this assistance helps to

facilitate a cycle of success among them. Whether someone is handpicked to be a mentor or being watched from afar, the African American women in my research study felt that success and confidence is linked to having support and a positive role model or mentor. Smith and Crawford (2007), however, found that “mentoring in the traditional definition did not impact the career choices and development of the women in the study” (p. 261). Finding evidence to support what types of non-traditional efforts are effective will help open the door for more mentoring opportunities for girls and women in need of additional support to be successful in mathematics.

Educators’ main responsibility is to be encouraging vessels for all students no matter what achievement level. From my experiences and the experiences of the participants in this study, I believe future research should address mentoring and support for African American girls and women in mathematics education. Educators, researchers, policy makers, and lawmakers need to find ways to put an end to inequities in education and reverse the effects of negativity and underrepresentation. The key to understanding African American girls’ and women’s participation and success in mathematics classrooms is to explore the link between manipulations of the mind through race, gender, and oppression.

### **Conclusion**

To conclude, the purpose of this study was to feature the narratives of four African American women mathematics educators. I investigated their stories of success as mathematics students and mathematics teachers. Their experiences spanned their educational experiences from grade school through college and encompassed their experiences with the strong influence of African Americans in their lives. Using womanism with narrative case study analysis afforded

me the opportunity to be a part of an important dialogue about the participants' mathematics experiences.

Educational experiences and intersections of identity too often influence African American girl's and women's self-worth and contribute to their success (or lack thereof) as mathematics students and educators. My hope is to bring awareness to the effects of negative stereotypes and low self-assurance in mathematics for African American girls and women. Due to my personal experiences as an African American woman mathematics educator (and researcher), I noticed too many minority girls in my classes having low self-esteem. Over the course of my many years in the classroom, I observed how intimidated too many African American girls and women were in mathematics courses. Some were apprehensive when they were asked mathematical questions, and others put a wall up or declined to enroll in advanced course offerings.

The purpose this study, therefore, was to highlight the achievements of four African American women mathematics educators through a womanist vantage point utilizing narrative case study methods as a means for data collection and analysis. The research questions that guided the study were inquiring about whether (or not) race and gender had an effect on their matriculation from grade school through college, and if this intersection influenced their success in mathematics. I also inquired about who or what influenced the life and schooling experiences of these successful mathematics educators, and whether (or not) these relationships influence their pedagogical philosophies and teaching practices in the classroom. Three common themes were identified in the participants narratives: (a) they had at least one strong African American woman influence; (b) they did not have any African American women mathematics teachers growing up or in college; and (c) they believed building strong insightful relationships with their

students helped them to be successful mathematics teachers. The data, analysis, and commonalities informed further research and opportunities for dispelling negative stereotypes and apprehension toward African American girls and women in mathematics.

Due to the nature of the research study, my story as an African American woman mathematics educator connected to the participants' stories of success. I believe telling the participants' stories of success can help influence educational policies and change attitudes that some African American girls and women have toward mathematics. I hope that a shift in policies and attitudes can open up new avenues for more African American girls and women to achieve success in mathematics and beyond. My philosophies about education have certainly evolved. My mission is to encourage more African American girls and women to pursue careers in mathematics education and inspire them with more stories of success!

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## APPENDICES

### APPENDIX A

#### Recruitment Email

Katrina Elizabeth Stanfield  
Doctoral Candidate – Mathematics Education

STUDY TITLE: Yes, We Like Math Too! – African American Women Mathematics Educators' Stories of Success

Dear (Participant's Name):

My name is Katrina Stanfield, and I am a doctoral candidate in the Teaching and Learning with a concentration in Mathematics Education degree program at Georgia State University. I am conducting my study on African American women mathematics educators.

I am passionate about my research on the experiences of African American women mathematics educators—as I too am an African American woman mathematics educator. I have been in education for over 14 years, and I taught high school mathematics for 12 years. It is my hope that my research will help inspire other African American women to follow the path of mathematics education. Your experiences could potentially help encourage others who love mathematics to pursue similar dreams.

I need about eight participants for my research study, and you have been identified as a successful African American woman mathematics educator. Due to your background in education, I am seeking your valuable input for my doctoral study. Considering the United States' tumultuous history of racial and gender oppression and inequality, the plight and contributions of African American women mathematicians has often gone unrecorded and uncelebrated. The primary purpose of my study is to examine the experiences of successful African American women mathematics educators, and I want to bring your accomplishments to the forefront by exploring your stories.

If you decide to contribute to my research study, you will initially be asked to complete a consent form for participation and a demographics questionnaire that should take about 20–30 minutes to complete. You also will be asked to participate in three interviews that will be audio-recorded. Each interview will last roughly 45–60 minutes. The entire process should require about 4–5 hours of your time.

Thank you so much for your consideration. If you have any questions or concerns about participating and/or about my research, please do not hesitate to contact me by phone or email.

Sincerely,  
Katrina Elizabeth Stanfield  
(404)427-2600 [kgodfrey@student.gsu.edu](mailto:kgodfrey@student.gsu.edu)

## APPENDIX B

### Consent Form

#### INFORMED CONSENT FORM

Georgia State University  
Department of Middle Secondary and Secondary Education  
Informed Consent Form

**Title:** Yes, We Like Math Too! – African American Women Mathematics Educators’ Stories of Success

**Principal Investigator:** Dr. David W. Stinson

**Student Investigator:** Mrs. Katrina Elizabeth Stanfield

- I. Introduction and Key Information:** You are invited to take part in a research study. It is up to you to decide if you would like to take part in the study. The purpose of this study is to investigate the experiences of successful African American women mathematics educators. Your role in this study will last about five hours over the span of four months. You will be asked to participate in three interviews and a questionnaire. Participating in this study will not expose you to any more risks than you would experience in a typical day. This study is not designed to benefit you. Overall, we hope to gain further information about the success of African American women mathematics educators.
- II. Purpose:** You are invited to participate in a research study. The purpose of this study is to investigate the experiences of successful African American women mathematics educators. You are invited to participate because you are an African American woman mathematics educator. A total of 8 participants will be recruited for this study. Participation will require approximately five hours of your time during January 2019 until April 2019.
- III. Procedures:** If you choose to participate, you will initially be asked to complete a demographic questionnaire that should take about 20-30 minutes to complete. You also be asked to participate in three interviews that will be audio-recorded, and they will take place either in person or by phone with your permission with the student principal investigator, Ms. Katrina E. Stanfield. The in-person interviews will be at a convenient location for you. Each recorded interview will last roughly 45-60. The entire process should require approximately five hours of your time. The recordings will be used to transcribe the interviews, and your name will not appear on the written record of the interview. The records will be kept in a locked file cabinet at the student investigator’s house. You will also receive a transcribed copy of your interview. You will have the opportunity to make any changes or corrections to the interview transcription. You will not be identified personally, and each participant will have a pseudonym (alternate name) instead of your actual name in the study.

- IV. Future Research:** Researchers will remove information that may identify you and may use you and may use your data for future research. If we do this, we will not ask for any additional consent from you.
- V. Risks:** In this study, you will not have any more risks than you would on a normal day in life.
- VI. Benefits:** Participation in this study may not benefit you personally. Over all we hope to gain information about your success story in order to help inspire other African American women to follow the path of mathematics education.
- VII. Alternatives:** The alternative to taking part in this study is to not take part in this study.
- VIII. Voluntary Participation and Withdrawal:** You do not have to be in this study. If you decide to be in this study and change your mind, you have the right to drop out at any time. You may skip questions or stop participating at any time. You may refuse to take part in the study or stop at any time. This will not cause you to lose any benefits to which you are otherwise entitled.
- IX. Confidentiality:** We will keep your records private to the extent allowed by law. Only Dr. David W. Stinson and Mrs. Katrina E. Stanfield will have access to the information that you provide. The records will be stored in a locked file cabinet at the student investigator's house. Information may also be shared with those who make sure the study is done correctly (GSU Institutional Review Board [IRB], the Office for Human Research Protection [OHRP]). Your name and other facts that might point to you will not appear when we present this study or publish its results. The findings will be summarized and reported in group form. You will not be identified personally, and each participant will have a pseudonym (alternate name) instead of your name in the study.
- X. Contact Persons:** Contact Dr. David W. Stinson at 404-413-8409 or [dstinson@gsu.edu](mailto:dstinson@gsu.edu) if you have any questions, concerns, or complaints about this study. You can also contact Mrs. Katrina E. Stanfield at 404-427-2600 or [kgodfrey@student.gsu.edu](mailto:kgodfrey@student.gsu.edu). You can also call if you think you have been harmed by the study. Call Susan Vogtner in the Georgia State University Office of Research Integrity at 404-413-3513 or [svgtner1@gsu.edu](mailto:svgtner1@gsu.edu) if you want to talk to someone who is not part of the study team. You can talk about questions, concerns, offer input, obtain information or suggestions about the study. You can also call Susan Vogtner if you have questions or concerns about your rights in this study.

**XI. Copy of Consent Form to Participant:** We will give you a copy of this consent form to keep. If you are willing to volunteer for this research, please sign below.

\_\_\_\_\_  
Printed Name of Participant

\_\_\_\_\_  
Signature of Participant

\_\_\_\_\_  
Date

\_\_\_\_\_  
Principal Investigator or Researcher Obtaining Consent

\_\_\_\_\_  
Date

APPENDIX C

**Interview Protocol**

**Part 1**

Questionnaire Instrument

1. Name \_\_\_\_\_
2. Address \_\_\_\_\_
3. Phone Number \_\_\_\_\_
4. Email Address \_\_\_\_\_
5. Birth Year \_\_\_\_\_
6. Current/Past Occupation(s) \_\_\_\_\_
7. Do you have any children? If so, how many? \_\_\_\_\_
8. What is your mother's highest level of education? \_\_\_\_\_
9. What is your mother's current/past profession? \_\_\_\_\_
10. What is your father's highest level of education? \_\_\_\_\_
11. What is your father's current/past profession? \_\_\_\_\_
12. How would you describe your family's socioeconomic status while you were growing up? Upper Class, Upper-Middle Class, Middle Class, Working Class, or Lower Class?  
\_\_\_\_\_

**Educational Data**

13. What is the name of your elementary school(s)? What state/country?  
\_\_\_\_\_
14. What is the name of your middle school(s)? What state/country?  
\_\_\_\_\_



15. What is the name of high school(s)? What state/country?

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16. What math classes did you take in middle school and high school?

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17. Did you take advanced/gifted classes? \_\_\_\_\_

18. What grade/age did you start taking advanced/gifted classes? \_\_\_\_\_

19. Name the advanced/gifted classes you took:

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20. Did you receive any awards in middle school/high school? If so, please list them.

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21. What university/college did you attend? \_\_\_\_\_

22. Why did you choose this particular university college?

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23. Please list the mathematics courses that you remember taking in college.

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24. Which mathematics course(s) did you enjoy most in college?

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25. Which mathematics course(s) proved to be most challenging for you?

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## APPENDIX D

### Interview Protocol

#### Part 2

#### Sample Interview Questions

1. Please tell me about yourself.
2. Tell me about your family life growing up.
3. How did your parents feel about education?
4. Describe your experiences in school from elementary school to high school.
5. Describe your mathematical experiences in elementary school to high school.
6. Describe what mathematics means to you.
7. How would you define mathematics?
8. Describe your mathematical experiences in college.
9. What was college like for you?
10. What was your mathematics courses like in college?
11. How did you prepare for your exams in your mathematics courses?
12. What do you feel it takes to be successful in a mathematics course?
13. What is your mathematics learning style?
14. Describe your experiences teaching mathematics.
15. Once you started teaching, did your experiences in your mathematics classes growing up influence your mathematics teaching style?
16. How many African American women were in your mathematics courses in college?
17. Did you have any African American women mathematics teachers in elementary?  
Middle School? High School? College?

18. Were you able to build a relationship with your mathematics professors in college?
19. Did your race impact your mathematical experience in elementary through high school? If so, in what way?
20. Did your gender impact your mathematical experiences in elementary through high school? If so, in what way?
21. Did your race impact your mathematical experience in college? If so, in what way?
22. Did your gender impact your mathematical experiences in college? If so, in what way?
23. Do you think it is important to encourage other African American women to pursue mathematics education as a career path? Why or Why not?
24. Did your parents/family encourage you to pursue a career in mathematics education?
25. Did you have any other influences that encouraged you to pursue a career in mathematics education?

## APPENDIX E

### Member Checking Letter

Dear [Insert Name],

Thank you for your continued participation in the study. I have transcribed both interviews and would appreciate your review of each transcript in preparation for my analysis. I have labeled each interview and they are attached.

While you are reading each of your transcripts, please highlight anything that you feel best reflects your responses to the questions from our interviews. You may do this using the highlighter or underline feature in Word.

Also, you may edit, delete, elaborate, and/or clarify anything you communicated in the transcript. You can use the comment and tracked changes features found under "review" in Word. If preferred, you may also make a note of the line number(s) and provide a comment in a separate document.

If you are satisfied with the transcript, do not feel that you have to make any edits. You do not have to "correct" filler words or grammatical issues because I will be analyzing your overall narrative.

Please let me know if you have any questions or concerns at 404-427-2600 or [kgodfrey@student.gsu.edu](mailto:kgodfrey@student.gsu.edu)

I appreciate your time and look forward to hearing from you. I will contact you by phone in order to discuss this further.

Thank you!

Katrina E. Stanfield

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Moldavan, A. M. (2018). "Navigating Reform in Mathematics Teacher Education: Teacher Educators' Responses to edTPA and Professional Organizations' Initiatives."