

AFRICAN AMERICAN WOMEN MAKING RACE WORK IN
SCIENCE, TECHNOLOGY, ENGINEERING, AND MATH (STEM)

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ABSTRACT

STEPHANIE NICOLE GALLOWAY: African American Women Making Race Work in
Science, Technology, Engineering, and Math (STEM)
(Under the direction of George Noblit)

African American women maintain distinctive social locations at the intersection of race, gender, and class (Crenshaw, 1991; Collins, 1986; 2000; Wing, 2003). However, their voices, interpretation of experiences, and concern with the use of formal education as a mechanism for racial uplift have not been priorities in feminist movements (hooks, 1981; 1989; Perkins, 1993; Smith, 1998; Spitzack & Carter, 1987). Alternatively, Black feminist thought (Collins, 1990; 2000) is a theory constructed by and for African American women. Given the consequences of pursuing formal education in the histories of African American women and the paucity of African American women represented in STEM fields, the purpose of this study was to (a) reveal how African American women conducting research in STEM disciplines accomplished their professional goals, (b) learn how the women negotiated their multiple identities (i.e. race, gender, and class), (c) link the history of educational experiences among African Americans with agendas for social justice, (d) understand how African American women in STEM align their personal accomplishments with broader agendas for activism in higher education, and (e) discover whether there is a collective identity that successful African American women in STEM share. Using Black feminist thought (Collins, 1986; 2000) and narrative analysis of semi- interviews with eight African American women

in STEM, the findings from this study revealed: (a) the women in this study described the challenges of pursuing a career in STEM from a feminist perspective, identifying gender as more significant than race; (b) the women in this study experienced more positive interactions with Black male, White female, and White male mentors than with Black female mentors; (c) the women in this study described the use of empowering strategies for overcoming obstacles in their academic pathways; and (d) their collective academic identities were formed by early interactions with members of their academic communities and early exposure to the cultural norms of their academic disciplines. These findings have implications for how Black feminist thought explicates the complex, assorted experiences of highly successful African American women in STEM and how the social construction of academic identities evolves during the course of formalized education.

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But they that wait upon the LORD shall renew their strength; they shall mount up with wings as eagles; they shall run, and not be weary; and they shall walk, and not faint.

Isaiah 40:31 (KJV)

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Wherefore take unto you the whole armour of God that ye may be able to withstand in the evil day, and having done all, to stand. Stand therefore, having your loins girt about with truth, and having on the breastplate of righteousness; and your feet shod

with the preparation of the gospel of peace; above all, taking the shield of faith,
wherewith ye shall be able to quench all the fiery darts of the wicked.

Ephesians 6:13-20 (KJV).

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LIST OF ABBREVIATIONS

AAW	African American Women
AAUW	American Association of University Women
BFT	Black Feminist Thought
CLS	Critical Legal Studies
CRF	Critical Race Feminism
CRT	Critical Race Theory
HBCU	Historically Black Colleges and Universities
NCES	National Center for Education Statistics
NSF	National Science Foundation
PWI	Predominantly White Institutions
STEM	Science, Technology, Engineering, and Math

CHAPTER ONE

PROBLEM STATEMENT

This study explored the academic and professional experiences of successful African American women in the disciplines of science, technology, engineering, and math (STEM). The theoretical foundation used to organize this study was Black feminist thought (Collins, 1986; 1997; 2000). To that end, I chronicled the life narratives of successful African American women conducting research and teaching in the STEM disciplines. The narratives of outstanding African American women are unparalleled since these women are established within academic disciplines that are dominated by White men. As such, the life narratives of the women in this study instantiate a generation-long effort to mitigate the “double bind”—the extraordinary cost of being a woman of color in the STEM disciplines (Blickenstaff, 2005; Malcom & Malcom, 1995; Ong, Wright, Espinosa & Orfield, 2011).

The collected works of several scholars contributed to the justification for this body of research (e.g., Charlotte Hawkins-Brown, Ida B. Wells, Barbara Smith, Adrien Katherine Wing, Kimberlé Crenshaw, bell hooks, Angela Harris, Deborah Gray White, Joanne Kilgour Dowdy, Patricia Hill Collins, and many more). Moreover, the scholarship of these women inspired the development of my research questions and my methodological approach to this study. By authenticating the voices and interpretations of African American women’s social reality, Black feminist thought provides realistic insight on the intersection of race, class, and gender explicated by African American women. Importantly, Black feminist thought

empowers all African American women to name the injustices perpetuated by multiple forms of discrimination.

Because social justice and activism served a particular function in the history of education among African American women, Black feminist thought is an appropriate framework for theorizing the dialectical relationship between activism in education and the individualized experiences of African American women. Bridging activism in education and the particularized experiences of African American women insinuates the fact that these women occupy complicated, uncharted shared locations in society. Stated more concretely, African American women, along with their multiple identities, dwell within matrices of domination that perpetuate subjugation. Thus, recognizing the particular experiences and histories of African American women calls for unconventional philosophies that link the contestation of power and oppression (i.e. the particularized) with broader social problems with the intention of social change (Noblit, Flores, & Murillo, 2004).

Black feminist thought advocates empowerment, self-definition, and the social construction of knowledge (Collins, 1986; 1997; 2000). By highlighting the experiences of African American women and connecting their experiences to broader social issues, Black feminist thought endorses identity politics, without positioning one race over another. In other words, Black feminist thought makes the intersection of race and gender for African American women the center of analysis in order to illuminate new possibilities for understanding other contentious social spaces. Given this potential for social change, the core themes reflected in Black feminist thought include: (a) underscoring the history of struggle in the lived experiences of African American women, (b) producing knowledge for and by African American women, (c) challenging traditional and positivistic knowledge

validation processes, (d) recognizing that African American women hold distinctive perspectives on their personal experiences within the interlocking mechanisms of power and domination, and (e) acknowledging that the shared experiences among African American women vary according to their personal interpretations of racial, social, economic, and gendered locations.

Using Black feminist thought to organize this study, I appreciated the assertion made by Collins (2000) that oftentimes, African American women are not aware of the full spectrum of themes that may emerge from their separate experiences. Thus, I attempted to provide thick descriptions and reinterpretations of the narratives shared with me by the women in this study. I wanted to obtain rich details from the respondents in this study to reveal multiple interpretations of similar experiences.

Problem Definition

W. E. B. Du Bois (1903) predicted that the problem of the 21st century would be the problem of the color line. Essentially, Du Bois (1903) was correct, given the fact that the experiences of African Americans remain enmeshed within political, historical, and racial discourses. However, the issues of race and education for African American women were largely obscured by the feminist and civil rights movements. It was only after the social and political circumstances were revolutionized for White women and Black men that African American women and the affronts to them by social injustice became central to petitions for justice and equity.

African American Women in the Academy

African American women negotiate their self-perceptions, beliefs and identities trying to gain entrance into the academy. Collins (2000) and hooks (2000) argued that affirmation

of self-worth and knowledge construction is instrumental for dismantling stereotypical images of African American women. When it comes to the social construction of knowledge and education, African American women have aimed to join their individual and collective experiences with intellectual and personal values that articulate their particular social realities. Given that African American women have often faced a barrage of material and structural obstacles, connecting personal experiences and intellectual thought was an attempt to promote their own set of ethics and moral standards.

When I consider the social context of education and its imprint on African American women in the academy, I feel certain that Black feminist thought is a befitting theoretical framework for retelling the narratives of African American women. I hope this study expands the discourse on African American women in higher education, particularly in STEM. Furthermore, it is my hope that this study will reveal possibilities for change in higher education policy that will facilitate academic and professional success for more African American women in STEM.

Through this body of research, I want to highlight the accomplishments of African American women in the academy because the topography of academic life separates their experiences from other African American *men* and White women, who benefit from a set of privileges not afforded to African American women (i.e., Black men hold gendered power and White women possessing racial authority). Moreover, Berry and Mizelle (2006) suggested that life in the academy is less about privilege for African American women and more about negotiating a field of land mines, including multiple identities assigned to African American women. Given this unwieldy state of affairs, negotiation is a prerequisite

for African American women seeking academic and professional success in the academy, particularly within disciplines where White men dominate, such as STEM.

African American Women in STEM

The discourse on accomplished African American women in the academy is paltry, although one reality is clear—women of color pursuing any form of post baccalaureate education face a wearying physical and emotional journey (Williams, Brewley, Reed, White, & Davis-Haley, 2005). However, the trajectory is even more problematic in STEM disciplines. Ginorio (1995) summarized succinctly the barriers to academic and professional success for women of color in STEM: (a) lack of academic resources, (b) limited opportunities for mentoring support, and (c) lack of a critical mass of African American women as professors in STEM disciplines. Reports from the National Science Foundation (NSF) amplify the issue of critical mass.

In 2011, NSF reported that the percentages of minority enrollments, including African American women in STEM disciplines do not parallel minority representation in the U.S. population. According to the National Center for Education Statistics (NCES, 2002) African Americans, represented 12% of the U.S. population and 11% of all students pursuing post-secondary education. In 2002, African Americans earned 7% of all STEM bachelor degrees, 4% at the master's degree level, and a mere 2% of doctorate degrees (NCES, 2002).

These trends represent the long-term impact of early gender differences in early education. According to the American Association of University Women (2004) and NSF (2007b), two-thirds of boys and girls alike express early interest in science. In other words, boys and girls are equally interested in science early in their education; however, socialization practices and the culture of schools create differences in how boys and girls

express their levels of interest in science. A similar pattern exists among women of different races.

According to Hanson (2004), African-American women actually express higher levels of interest in science than their White counterparts, yet within STEM fields, the proportion of women of color is paltry and continues to decline at each level of degree attainment (NSF 2007b). These trends transfer to the academic and professional world, with men outnumbering women (73% vs. 27% overall) employed in STEM careers (NSF 2007a). According to NSF (2007a), African American men and women saw increased percentages in some science and engineering fields over the last 25 years. In fact, the proportion of science and engineering occupations has more than doubled for Black men and women; yet, racial disparities remain.

Other studies support the contention that women and minorities trail behind their majority counterparts in the academy (Cassell & Slaughter, 2006; Perna, Lundy-Wagner, Drezner, Gasman, Yoon, Bose & Gary, 2009; Whalen & Shelley, 2010). For instance, Perna et al. (2010) reported that African Americans represented only 4.9% of full-time engineering faculty and just 3.4% of full-time faculty in the natural sciences at four-year institutions. Despite what the data reveal, some African American women have developed clever strategies to resist the constraints of underrepresentation in STEM, which often leads to feelings of isolation and lack of peer support. This study details the experiences of eight African American women who *have* achieved their professional and academic goals in STEM fields.

Rationale

The rationale for this study is based on the history of African Americans in education. The purpose of situating the study within a historical context is to speak to the complex cultural and historical significance of struggle and resistance among African Americans in the U.S. educational system. It is well documented that the pathway to formalized education for ethnic minorities in the United States is tainted by a clash of cultural intolerance and racism (Spring, 2001; Willinksy, 1998). How has the pathway to formal education been muddled for African American women?

The primary mechanisms used to dominate African Americans and other ethnic groups have included deculturalization, assimilation, cultural pluralism, and forthright denial of formal education (Spring, 2001, p. 1). In addition, several policies rendered schools the sites of symbolic violence and cultural power struggles (Bourdieu & Passeron, 1990; Levinson, & Holland, 1996). Following the Civil War, education served as a mechanism to subjugate African Americans through denial of access to education and limitation of educational opportunities. Consequently, unequal funding, racial division, and resistance to integration by Whites typified the educational experiences of African Americans. These characteristics extended into higher education. Johnson (2006), a contemporary scholar on activism and educational philosophies in the lives of prominent African American female educators, contended that historically, education has persisted as a dominant force in the struggles and protests of African Americans.

Purpose

The purpose of this study was to: (a) focus on the detailed experiences of African American women in STEM, providing vivid descriptions of their daily experiences as STEM

scholars; (b) identify possibilities for change in higher education policy; (c) highlight the accomplishments of African American women in STEM; and (d) use this body of research as a starting point to encourage African American and other young women to actively pursue careers that may in fact collide with their subjective self-perceptions and identities.

Research Questions

The guiding research questions for this study were: (a) what strategies have African American women in STEM fields used to accomplish their academic and professional goals? (b) how have they negotiated the intersection of their race and gender during their academic pursuits? (c) do accomplished African American women in STEM associate their accomplishments with a broader agenda for social justice in education? and (d) is there a collective identity by which successful African American women in STEM identify? If so, how do they describe this identity?

Theoretically, my research questions were gleaned from the tenets of Black feminist thought (1986; 1997; 2000). Given that all the participants received their formal education from predominantly White institutions or they conducted research and taught at predominantly White institutions, Black feminist thought provided a means for taking notice of the differentiated experiences of African American women who were both *a part of* and *separate from* the institutional power structures inherent in educational institutions. Examining these dichotomous social locations demonstrates how internal struggles become anchored in the social construction of identity. Moreover, their unique locations in the dominant power structure of higher education allows African American women to identify how their individual streams of consciousness transform their perception of “otherness” or the “outsider-within” perspective (Collins, 1986).

Defining Otherness

According to Collins (1986), the construction of Black feminist thought emerges from sites of contestation, or at border crossings—“social locations occupied by groups with unequal power” (p. 5). The women in this study traversed the margins of the academy simply by being African American women. However, they simultaneously inhabited legitimate spaces in educational institutions where knowledge is constructed, validated, and influenced by grounded, historical power structures.

Chapter Descriptions

The objective of chapter one, “Introduction to the Problem,” is to provide an overview of the problem statement and purpose of the study, establish the rationale of the study, and provide the guiding research questions. In addition, I oriented the reader toward the structure of the dissertation by providing brief descriptions of the ensuing chapters.

In chapter two, “Historical Influence on Current Trends in Higher Education,” I provided a summary of applicable literatures and connected them with the theoretical framework that is Black feminist thought. Furthermore, I explicated how Black feminist thought bridges localized, individual knowledge and theory, allowing African American women to develop distinctive interpretations of their experiences (Collins, 1986; hooks & McKinnon, 1996). In chapter three, I outlined the tenets of Black feminist thought and its conceptual link with critical race feminism.

In chapter four, I described the research methodology, data collection procedures, participant demographics, and researcher positionality. I also described and justified my use

of narrative inquiry (Connelly & Clandinin, 2000) as a form of data collection and analysis. I concluded chapter four with a discussion of the study's limitations.

In chapter five, I presented the personal narratives of each participant, allowing my reader to hear the actual voices of the participants. In chapter six, I provided an analysis of my respondents' narratives using Labov's (1972) narrative structure. I also used this chapter to represent the connections between narrative themes and relevant theories. As well, I outlined the connections made between the analytic themes and the findings from this study.

In chapter seven, I described the implications of my study for African American women in STEM. I also offered points of departure and suggestions for future research on African American women in STEM and rendered policy suggestions higher education institutions.

CHAPTER TWO

HISTORICAL INFLUENCE ON CURRENT TRENDS IN HIGHER EDUCATION

Introduction

Chapter two includes relevant literatures on the historical experiences of African American women as they pursued higher education. This chapter begins with a description of African American women who forged their own trails to become flourishing scholars. Then, I offer an account of the historical challenges these women faced as they constructed multiple identities to reach their academic goals. For instance, Kilgour-Dowdy (2008) and Perkins (1993) unraveled the web of struggles African American women encountered as they were identified as scholars, parents, and activists, while at the same time contending with isolation, sexism, and racism in formalized educational systems.

I also explore the social context in which African American women's stories are situated, a context reflecting a broader activist agenda, which served as a target for scrutiny as their efforts to liberate African American women were oftentimes censured for refuting the messages of the civil rights movement. Such attacks arose from the conservative perspectives that many Black educators (female and male) revealed in their roles as administrative leaders and teachers.

Next, I address the current state of affairs for African American women in STEM disciplines by providing an overview of data pertaining to the enrollment and retention rates of African American women in the academy. Subsequently, the literature connects the reality of "lack of critical masses" in graduate school with the minuscule number of African

American women in faculty positions within STEM. In the final section, I laid the foundation for exploring the experiences of African American women in STEM from a Black feminist perspective.

Historical Challenges for African American Women in Education

The experiences of African American women in higher education have been tenable. Despite tacit and explicit rejection of their scholarship in the academy, some African American women endure the scourge and forge ahead. Whether as administrators, faculty members, or undergraduate or graduate students, African American women have traversed difficult pathways into higher education programs. Just as earlier generations did, African American women faced oppression, hostility, disapproval, and lack of adequate support when they participated in higher forms of education (Perkins, 1993; Prosper, 2004; White, 2004; White, 1999). Evans (2007) cited a litany of obstacles that African American women have contended within the academy, for instance, (a) physical violence, (b) discriminatory classroom or campus policies, and (c) social embarrassment.

For many years, the sources of the impediments remained “unidentified.” In other words, researchers and educators were reluctant to identify the obstacles or validate the lived experiences of African American women in the academy. Researchers and educators also negated the tacit exclusion of African American women into the norms and cultural practices of institutional culture. However, Delpit (2006) named these maneuvers explicitly, arguing that persistence in higher education is predicated upon students being provided with specific knowledge regarding institutional rules and cultural norms, as well as “safe spaces” for their voices to be heard.

According to several scholars (Howard-Hamilton, 2003; Jones, 2001; Malcom & Malcom, 1995; Ong, Wright, Espinosa & Orfield, 2011; Perkins, 1993; Prosper, 2004; White, 2004; White, 1999), the struggle to locate “a space” within the academy is not a new problem for African American women. Collins (1986; 1997; 2000) asserted that African American women have negotiated their self-definitions and self-valuation as a prerequisite to acceptance into the academy since the days prior to the Title IX, Education Amendment of 1972, which paved the way for African American women to gain *access* to higher education (Malcolm & Malcolm, 1995). This legal precedent spelled an increase in numbers in higher education, which translated into an amassed presence of African American women in graduate programs, particularly in medical schools, where the representation of African American women rose from 16% in 1972 to approximately 50% in 2009 (NSF, 2011). While the increased presence of African American women in graduate programs, such as medical schools, reflected progress, not all of the obstacles to academic success and degree completion were eliminated.

For example, Title IX dismantled *legal* barriers in higher education. However, inhospitable cultural norms within the academy remained an indelible feature of scholarly pursuit. Consequently, battles for African American women shifted from *overt acts of discrimination*, to *subtle forms of resistance*, such as (a) denial of access to critical resources for academic success, (b) lack of funding, (c) fewer opportunities for effective mentoring relationships, (d) lack of validation of knowledge, and (e) insufficient access into the cultural practices of institutional and academic culture (Bonner & Evans, 2004; Milner, 2004, as cited in Cleveland, 2004). These clever forms of discrimination represent the vestiges of White supremacy and racism throughout U.S. history.

Johnson (2006), a scholar on Dr. Anna Julia Cooper and Nannie Helen Burroughs - women described as enduring multiple oppressions, yet overcoming insufferable circumstances—celebrated the lived experiences of Cooper and Burroughs, whose work as activists and educators reached their height in the midst of America’s war on civil liberty. Johnson (2006) commemorated the extraordinary determination that Cooper and Burroughs personified as educators and social activists during a time when African Americans were denied civil rights and the civil liberties of women were assailed.

Cooper and Burroughs represent just two historical figures who served as social activists, educators, political organizers, and progenitors of the ethic of caring (Noddings, 1984) among African American educators. These thematic connections have persisted as a dominant discourse in the lives, struggles, protests, and scholarship of many African American women. The research conducted by Johnson (2006) also explored the cultural and educational influences that shaped African American women’s race, gender, and class-consciousness. Dr. Cooper, like several other African American women throughout history—for example, Nannie Hellen Burroughs, Ida Wells-Barnett, Lorraine Hansberry, Pauli Murray, Coretta Scott King, Audre Lorde, June Jordan, and Dorothy Height (Guy-Sheftall, (1995) - viewed their academic work as “educators” as a means for improving life conditions for other African Americans. In other words, education for African American women served a specific function—“racial uplift” (Loder-Jackson, 2011; Perkins, 1993; White, 1999).

Historically, African American women used their cultural and educational influences to resist oppression from slavery and to connect their roles as educators to agendas for social justice. In order to accomplish their activist goals, African American women conceptualized

their individual experiences into a broader collective effort to transform dominant power structures (Loder-Jackson, 2011). Collins (1998; 2000; hooks, 1981; 1989) argued that focusing solely on their individual experiences and knowledge claims were inadequate for explicating the experiences of an entire group; but together, their particularized interpretations of reality at the intersection of race, gender, and class created a distinctive symbiotic voice. Subsequently, by aligning their individualized but unique realities, African American women developed a dialectical relationship supporting broader educational goals and equity for all oppressed groups.

Intersectionality

Collins (1986; 2000) asserted that the individualized experiences of African American women scarcely represented a conceptual explanation for an entire groups' experience because additive models of oppression situate dominant systems in a dichotomous, either or logic, thus obscuring the possibilities available when identifying oppression through interlocking systems. Stated more concretely, if the level of oppression is determined by how many oppressive locations one occupies (e.g., black + woman + poor), we miss the opportunity to understand the uniqueness of each person's experiences *despite* their shared, intersecting locations.

Crenshaw (1991) added that additive models disempowered some marginalized groups by splitting gender from race, which produces conflicting agendas for social justice, again, an either or logic with different foci. However, Crenshaw (1991) recognized that appreciation for the realities of one's particularized location at intersecting power matrices impels an elucidation of how multiple identities (i.e., race, gender, class) become identity performances constrained by the context of certain cultural practices. From this perspective,

Crenshaw (1991) asserted that individuals located at the same intersections of race, class, and gender can experience differential treatment within dominant power structures based upon how one performs their particular identity (Carbado & Gulati, 2003). Moreover, performing a particular identity underscores the ability of marginalized groups to construct a process of knowledge construction and validation that counters the dominant group's knowledge validation process.

African American Women and Knowledge Construction

By teasing out the relevance of power in knowledge construction, Collins (1986; 1997; 2000) differentiated between individual knowledge and second-level knowledge among dispossessed groups. Stated more concretely, she illuminates the processes by which African American women use their particularized experiences (i.e., individualized knowledge) to validate knowledge claims among African American women and to those who maintain power (i.e. second level knowledge) within systems of oppression. The ability to validate their own knowledge, in the barrage of discriminatory obstacles, stems from the vestiges of racism and sexism. Despite the complex nature of validating their position within systems of oppression, this process has become normalized in the experiences of African American women.

Collins (1986; 1997; 2000) and hooks (1981; 1982) further argued that affirmation of self-worth and knowledge is instrumental for dismantling stereotypical images of African American women. When it comes to knowledge and education, African American women collectively aspired to unite intellectual and personal values, forming a unique interpretation of social reality. However, African American women also faced the challenge of having their knowledge invalidated by traditional processes of knowledge validation, which fail to

acknowledge the unique experiences of African American women. African American women also sought to establish political, social, and ethical standards for academic causes.

For instance, White (1999) detailed the historical struggles faced by African American women pursuing higher education, confirming that issues of isolation, sexism, racism, and lack of support are still interfering with the success of African American women. However, Malcom and Malcom (1995) conducted one of the first studies to provide empirical support for the contention that dismantling obstacles is a reality for African American women pursuing higher education, particularly within fields where they are significantly underrepresented, such as STEM.

Despite the fact that research on African American women and their personal experiences within the context of higher education are scarce Patitu and Hinton (2003), studies that have addressed these issues for African American women underscore three significant concerns that affect them in higher education: (a) lack of critical mass, (b) lack of representation in higher education (which is related to critical mass), and (c) retention of minority students.

Obstacles Affecting African American Women in Higher Education

Lack of critical mass. According to Howard-Hamilton (2003) and Milner (2007), critical mass is the underlying theme of affirmative action. Milner (2007) further suggested that a critical mass exists when there is sufficient representation of underrepresented groups in such a way that the classroom and institutional environments are conducive to enhancing the minority student's ability to contribute to academic discourse. However, given recent court rulings, affirmative action has been expanded to encompass the benefits of a larger community of learners in higher education (Schmidt, 2006). The intention in widening the

scope is to ensure that all individuals—minority and majority—benefit from the diversity that African American women can offer to the university climate. What is more, a critical mass implies the notion that students and faculty from majority groups perceive and interact with minority students as individuals rather than representatives of their entire gender, social class, or racial or ethnic group.

Lack of representation in higher education. The second relevant issue for African American women in higher education is their representation in the academy as a whole (i.e., as faculty members, administrators, or students). While White men still constitute the majority of the workforce in STEM, women and racial minorities have made inroads over the last three decades (NSF, 2011). Even with improvements, the relative numbers of women of color in STEM is meager. Furthermore, women of color hold lower ranks in the academy than other racial and ethnic groups (Nelson, 2004; NSF, 2007a). Researchers contend that even with specialized attention given to this population, political, social, and racial forces continue to cluster African American women into lower academic ranks, stifling their progress (Tack & Patitu 1992).

Retention of minority students. Underrepresented, minority students generally maintain smaller percentages in the academic pipeline than their actual representation in the U.S. population (Nelson, 2004; Nelson & Brammer, 2010). Given the growing presence of diversity as a strategic priority for college leaders and the increasing number of students of color in colleges and universities, fostering multicultural learning environments could serve as a decisive factor in the overall reputation of colleges and universities. As such, executive administrators are seeking the best combination of policies and strategies to retain African American women in higher education.

Strategies for retention. In an effort to ameliorate the multiplicative effects of racism, sexism, and classism in the academy, scholars have explored retention strategies employed by various institutions. For instance, the latest set of qualitative studies on the retention of minority students explained current strategies. The institutions represented in these studies have been identified as holding a blueprint of the appropriate blend of social, academic, and cultural factors ensuring academic success for minority students. Some of the examples highlighted in the literature focus on institutional or systemic changes, addressing the psychosocial needs of minority college students, and mentoring.

Systemic retention strategies. Kezar and Eckel (2007) conducted a series of qualitative studies, which consisted of semi-structured interviews with various college presidents throughout the U.S. The purpose of Kezar and Eckel's (2007) research was to learn which courses of action proved most effective in retaining students of color. One of the most important factors gleaned from their analysis was the need for institutions to adopt a learning framework (i.e., learning from the students specifically what their needs are). Interview data from the studies revealed that most institutions of higher education lack an in-depth understanding of the fundamental challenges faced by underrepresented populations. Consequently, college presidents participating in the studies suggested that retention of minority students starts with ongoing evaluations of programs, services, and student progress to measure the potential for academic success among African American women and other students of color (Kezar & Eckel, 2007; Swail, Redd, & Perna, 2003). Moreover, the studies revealed that college presidents of institutions with strong minority retention and graduation rates refer to this framework for learning, program evaluation, and measurement of student success as "a culture of evidence," which encapsulates the presupposition of a research-based

framework for retention of minority students. This model of retention creates a structured environment for faculty, administrators, and staff members to monitor the progress of underrepresented students. Findings from studies where institutions employed a “culture of evidence or systemic retention models suggested that institutions adopt three philosophical tenets to facilitate minority student success:

- *Use institutional data as a retention strategy.* In addition to tracking enrollment and retention rates across programs, universities could assist more students by also tracking grade-point averages across majors, by race, and ethnicity (Kezar & Eckel, 2007). These data include proportion of students of color on the dean’s list as well as trends in transfer of majors by race and ethnicity. Moreover, universities could periodically review the data to identify academic problems and then develop programs or interventions to meet student needs. Tracking data this way will also help decision makers identify areas where students *are* making progress, as well as what works in terms of university programming and support.
- *Communicating directly with students as a form of retention.* Kezar and Eckel (2007) reported on one college president’s encounter with a group of African American college students who expressed deep concern over being denied the opportunity to participate in new student orientation and registration processes. The students maintained that these events were overwhelming for many African American students. The president cited this as an example of simply listening to the needs of minority students. Kezar and Eckel (2007) suggested that universities could make genuine efforts to include diverse student voices by developing student focus groups, advisory boards, administrative and faculty retreats, and campus town hall meetings

to identify specific retention issues. One of the presidents in the report expounded on his encounter with a group of African American students on his campus, initially, he was advised to deny the students a meeting. Contrary to advice, he agreed to meet with the students and had the following story to tell:

I was asked to meet with a group of African-American students, and I knew they were upset about something. Other administrators were telling me not to take the meeting, but I told them it was important and invited the other administrators to come as well. There was a really tough-looking guy who was wearing a cap and looking down the whole time. I kept trying to bring him out and make him feel comfortable. Finally, he said, “I don’t know if I can do this but, I really have something to say. Can’t we be part of registration and orientation so that we can help the other African American students feel more comfortable; because African-American students find this to be a really isolating process.” This was the first time I learned that these two processes were alienating to students. (Kezar & Eckel, 2007, p. 21)

- *Align institutional retention strategies with the campus climate.* This strategy was also closely tied to data analysis and assessment, understanding the historical trends of the university, recognizing who the stakeholders were, and identifying supporters and opponents to change (Birnbaum, 1992; Kezar, 2008). Understanding the nature of each of these areas would help institutions effectively implement minority retention plans. In addition, it would provide an overview of what specific strategies departments, schools or colleges within the university employ as retention efforts.

- *Psychosocial strategies for retention.* In addition to institutional changes, researchers have purported that addressing the psychosocial needs of minority students is crucial for retention. For instance, studies in this area have linked stress to the minority students' lack of academic and social connections at predominantly White institutions. Findings suggested that academic outcomes and retention have been linked to stress levels, particularly among African American students (Greer & Chwalisz, 2007). In addition, research in this area is based on transactional theories of stress and coping in psychology. These models are related to the emotional, psychological, social, and academic development of African American students, both male and female (Greer & Chwalisz, 2007).
- *Other psychosocial strategies for retention.* Additional studies on psychosocial strategies for retention suggested that five factors mediate the minority students' academic and social experiences: (a) social milieu, (b) interracial stressors, (c) racial discrimination, and (d) stress associated with academic achievement (Smedley, Myers, & Harrell, 1993, as cited in Swail et al., 2003). Despite the fact that stress has been studied extensively in other disciplines, it has not been studied widely in higher education among African American women.
- *Mentoring as a retention strategy.* Strayhorn and Terrell (2007) posited that mentoring is a decisive factor in the career trajectories of African American students. Moreover, the researchers contended that mentoring encourages African American students to pursue higher forms of education, such as graduate school. However, Blackwell (1983), Jacobi, (1991), and Strayhorn and Terrell (2007) also exposed a vexing reality - African American female graduate students were less likely to form

mentoring relationships than their male counterparts were, particularly in STEM disciplines.

Mentoring African American Women Students in the Academy

Few studies provide statistical evidence to support direct links between mentoring and proximal academic outcomes. However, scholars agree that mentoring has an important role in the retention of minority students, especially African American women (Collins, 2000; Girves, Zepeda, & Gwathmey, 2005; Grant, Simmons; 2008; Kilgour-Dowdy, 2008; Patton, 2009; Vann Lynch, 2009, as cited in Cleveland, 2009). These same scholars agreed that the presence of African American women as faculty members greatly influences the lives, perceptions, and retention rates of minority students, including African American women (Gregory, 2001). However, the dilemma in higher education is that a lack of mentoring is a major reason why universities fail to retain African American women scholars, which affects the retention of African American female students and faculty alike. More important, this cycle is detrimental to the social and emotional development of African American students.

Blackwell (1983) and other researchers argued that African American female students perceive the absence of African American scholars as reflective of the university's lack of commitment to diversity the academic, emotional, social, and psychological development of African Americans in general (Brown, 1982; Brown, 1988; Gardnier, Ernomoto, & Grogan, 2000, as cited in Gregory, 2001). Blackwell (1983) further maintained that the presence of African American women as faculty members was a notable indicator of enrollment and retention rates for African American students. The state of affairs for retention, mentoring,

and overall academic experience is even more dismal for African American women in the hard sciences and STEM fields.

Women in STEM

Cultural diversity is a defining characteristic of higher education in the 21st century. Yet men still outnumber women at the full professor level in most of the hard sciences. When women are represented in STEM disciplines, they tend to be non-U.S. born women (Nelson & Brammer, 2010). The data reported in the literature and this study revealed the racial gulf in higher education that prevails as an exigent priority for researchers, educators, and policy makers. Although the minuscule gains are attributed to improved access to higher education for minorities—for example, improved financial aid programs and civil rights legislation have propagated reconsideration of racial exclusionary policies in higher education—the representation of African American women in STEM faculty positions remains paltry. The state of affairs for African American women in STEM prompts me to ask, “How are some African American women excelling under such harsh conditions?”

Are African American women making it in STEM?

Studies on women of color in STEM have identified major obstacles to success, but again, no solutions have been identified to reverse this trend. Moreover, for the few African American women who are represented in the academy, studies suggest that isolation inhibits the students’ ability to succeed academically. For these and other reasons, Turner, Gonzalez and Wood (2008) posited that we need more research on African American women in the academy, particularly on their unique experiences and *their* interpretations of these experiences. Using Black feminist thought as the interpretive lens offers an alternative framework for addressing questions regarding the individualized experiences of African

American women in STEM disciplines. Moreover, Black feminist thought offers the possibility of revealing specific strategies used by successful African American women in STEM.

Summary of Chapter Two

The purpose of this chapter was to provide a summary of applicable literatures on the history of African American women in the academy and their historical struggles in the academy. The other purpose was to outline the current state of affairs for African American women in higher education, particularly within STEM disciplines. In addition, the construct of intersectionality (Collins, 2000; Crenshaw, 1991) was introduced as a recurrent theme in the historical struggles of African American women pursuing higher education. I also provided examples of current retention strategies for African American women in higher education.

According to Tinto (1993), retaining students of color requires commitment to minority and majority students, as well as a focus on social and academic integration. I ended the chapter with a brief discussion of current strategies to improve the experiences of underrepresented students and women of color in higher education. However, strategies highlighted for African American women are still being evaluated for their effectiveness. In chapter three, I introduce Black feminist thought as the guiding theory for this study. In addition, the links between Black feminist thought and Critical race feminism are briefly discussed.

CHAPTER THREE

BLACK FEMINIST THOUGHT - THEORETICAL FRAMEWORK

Introduction

This chapter introduces Black feminist thought (BFT) as the theoretical framework guiding this study. First, I provide the conceptual foundation for Black feminist thought by delineating the relationship with critical race feminism. An outline of the social construction of Black feminist thought as described by Collins (1986; 1997; 2000) is provided. Then I explain the organizing themes of Black feminist thought. Next, I address the meaning of “Black feminist.” Finally, I sketch the relationship between Black feminist thought and critical race feminism. The chapter ends with a description of Afrocentric feminist epistemology, which provides the standards for knowledge construction and validation within Black feminist thought.

Conceptual Links for Black Feminist Thought

Black feminist thought is conceptually linked to multiple theoretical frameworks. Although Black feminist thought is a theory constructed by and for African American women, other theories preceded Black feminist thought that shaped the theoretical tenets of the theory. Furthermore, through the lineage of other theories, such as critical race feminism and critical race theory, Black feminist thought represents a copulation of legal precedents, gender equality, racial equity, and social justice.

Critical race feminism. Critical race feminism explains the complexity with which women of color are forced to negotiate various dimensions of their self-valuation and self-

definition. Critical race feminism describes and focuses on the experiences of women of color and advances a progressive response to the ways that women of color have been silenced and marginalized at the intersection of multiple forms of power and in multiple contexts, including higher education. The epistemological foundations of critical race feminism draw upon the writings and scholarship of Foucault's (1980) work when it asks the question, "What has been the role of law in society?" Critical race feminism is conceptually a critical race theory.

Critical race theory. Critical race theory is an "analytical framework on race and racism in the law and society" (Parker & Lynn, 2002, p. 258). The framework is the product of an activist movement led by graduate students and law professors analyzing critical legal studies (CLS). The pinnacle of these debates occurred during the National Critical Legal Studies Conference at Harvard and UC-Berkeley law schools in the early to mid-1980s, during which a particular group of scholars (law students and professors) challenged the foundations of liberal ideology. They challenged the doctrines of critical legal studies by rejecting the logic of incremental progress toward racial justice and by questioning the validity of the objective rationalist account of U.S. law and adjudication (Delgado & Stefancic, 2001; Parker & Lynn, 2002). In other words, these scholars took the U.S. legal system to task for the way that U.S. courts, criminal, welfare, and laws on poverty were used to privilege the wealthy while the daily life experiences of the poor remained a blind spot in the critical legal studies discourse (Delgado & Stefancic, 2001; Parker & Lynn, 2002).

While the discourses of the civil rights movement was driven by moral authority, focusing primarily on *overt* forms of racism and legal segregation, critical race theory (CRT) scholars believe that the moral authority of critical legal studies has led to a reduction in

overt forms of racism. However, covert forms of racism and microaggressions - that is, dispiriting transactions or small, conscious or unconscious, acts that occur as a result of assumptions about race, “which mar the daily lives of people of color” (Delgado & Stefancic, 2001, p. 2) have increased (Parker & Lynn, 2002). Critical race scholars separate themselves from the civil rights movement by placing the issues of race, racism, and power in the broader contexts of economics, history, social context, and group and self-interests (Delgado & Stefancic, 2001; Parker & Lynn, 2002). Considering these differences, critical race theory has a different approach to social change than did the U.S. civil rights movement. For instance, critical race scholars try to understand the social contexts where racism occurs, and the power relations that construct racial hierarchies, perpetuating discriminatory racial beliefs. In order to address these types of questions, critical race scholars are interdisciplinary in their research methods; and they link their agendas to other social movements, such as critical legal studies, European philosophy, American radical traditions, Chicano movements, and Black feminism, (Delgado & Stefancic, 2001, p. 4).

Social Construction of Black Feminist Thought

According to Collins (1986; 1997; 2000), Black feminist thought authenticates the personal knowledge construction of African American women by centering their personal interpretations of social reality, particularly in relation to race, gender, and class. The primary purpose for using Black feminist theory to explicate the particularized experiences of African American women is to empower all African American women to name the oppressive forces in their lives. In this context, empowerment means that African American women are encouraged to voice their contestations with dominant power structures and identify the injustices that permeate their daily existence.

Furthermore, Black feminist thought embodies a dialectical exchange among African American women, which links social activism with education for all African Americans. However, linking activism with individualized experiences creates a theoretical quandary. If African American women continue to occupy contested spaces, then their identities remain subjugated within matrices of domination and power. Consequently, how would their individual experiences transcend their contested spaces and connect with a panoptic agenda for equity and justice? One possibility is the application of a paradigm or construct that embodies not only the intellect, activist agenda, and self-determination of African American women, but also their knowledge of the dominant groups' suppression of Black thought. Collins (1986) used the "outsider-within" concept to describe how African American women perceive their marginality, acknowledge their contested social spaces, and articulate the complex histories of race and gender in American society.

Outsider-Within

Collins (1986) expanded the theme of Black feminism by constructing a framework that intellectualized the individual experiences of African American women and created opportunities for African American women to engage in the knowledge production and validation processes. Thus, Black feminist thought evolved from Collins' (1986) attempts to characterize the distinctive position that she represented as an African American woman enduring alienation in a predominantly White world. To that end, she interpreted her experiences and described her feelings of alienation by using the term *outsider-within*. Recognizing her experiences as a product of self-conscious awareness, Collins (1986, 2000) posited that African American women share similar individualized, as well as collective, realities because of their common locations along the boundaries of race and gender.

Subsequently, the definition of the term *outsider-within* described the position and viewpoints of African American women in relation to the historical context of race, gender, and class inequalities. As the term evolved in the discourse on African American women's experiences, it assumed a meaning closely related to one's social identity (Collins, 1986). However, relegating *outsider-within* to individual identity reduced the possibility of using Black feminist thought as a collective voice seeking social justice. Given the focus on social justice, the core themes upheld in Black feminist thought are:

- a) Institutional structures and historical conditions shape life for African American women (Crenshaw, 1991; Delgado & Stefancic, 2001). The essence of this tenet is that struggle defines the lived experiences of African American women since historically, this group of women has been thrust between the grasp of White supremacy and male dominance. African American women encounter multiple forms of struggle in their personal, professional, and academic lives, as well as in their everyday experiences. Each form of struggle emanates from the oppressive locations that African Americans occupy between two worlds—one defined as oppressive and the other defined as privileged.
- b) Black feminist thought is produced for and by African American women. This feature of the theory underscores the significance of self-definition among African American women. Collins (2000) suggested that African American women defining their own experiences negates a major theme in dominant ideologies - that African American women are capable only of self-identifying through the lens of their oppressor. In other words, African American women identify with the powerful; consequently, they are incapable of explicating their personal viewpoints. Black

- feminist thought rejects this claim, suggesting that African American women are fully capable of defining their particularized experiences.
- c) Black feminist thought challenges traditional, positivistic knowledge validation processes (Collins, 2000; Crenshaw, 1991). Contesting the production and definition of intellectual discourse is a primary goal of Black feminist thought. In other words, since epistemologies and theories represent the perspectives of those who created them (i.e. those in powerful social positions), African American women must contest a process of knowledge validation that *invalidates* their experiences. This contestation moves against traditional knowledge validation process by empowering all African American women, not only Black intellectuals.
 - d) African American women hold a distinctive perspective on their personal encounters with interlocking mechanisms of power and domination (Crenshaw, 2000; hooks, 1981; 1989). Simply by their complex locations among systems of domination, African American women maintain a unique perspective (Collins, 2000; Crenshaw, 1991; Wing, 2003) The common thread of their location builds a collective voice. By creating a collective voice, African American women empower each other in movements of resistance and in the creation of an agenda for social justice. However, each African American woman interprets her location through her *individual* perspective.
 - e) The commonality of experiences among African American women is also individualized (Collins, 2000; Crenshaw, 1991; hooks, 1981; 1989). While they constitute a unified voice, African American women distinguish themselves by their personal interpretations of racial, social, economic, and gendered locations.

Acknowledging individual viewpoints produces a multitude of new knowledge to share among other African American women, as well as among others who would not normally receive such exposure. Collins (2000) contended that oftentimes, African American women are not necessarily aware of the full spectrum of themes that may emerge from their particular experiences and historical locations along racial, gendered, and classed identities.

Significance of Historical Struggles in Black Feminist Thought

Historical struggle and resistance are recurrent themes within Black feminist thought. Struggle characterizes the position of African American women by illustrating their location between two opposing worlds—one White, oppressive, and privileged; the other Black, exploited, and oppressed (Collins, 1986; 2000). The vulnerability in this social position creates a common thread among African American women. Consequently, vulnerability is exactly what constitutes an African American woman's need for self-definition and expression. The need for self-definition and expression represents an underlying theme of social action for the purposes of changing inequitable conditions for African American women.

The need for self-definition and expression are important in the education of African American women. Both suggest a plausible rationale for highlighting personal experiences, while deconstructing traditional norms within institutional cultures and the policies that create repressive structures in academe. Moreover, other scholars contend that explicating the unique experiences of African American women in the academy provides a mechanism for breaching social norms as acts of liberation (hooks, 2000).

Black Feminist Thought and Methodology

Methodologically, Black feminist thought lends itself to the use of narratives and storytelling as forms of data collection and analyses when exploring the personal experiences of African American women. Prior to the Civil Rights Act of 1964, narratives of struggle described by African American women gained a presence in literature and education. Maynes, Pierce, and Laslett (2008) provided a template for the use of personal narratives and life histories to explicate trends in higher education and for explaining the use of subjectivity and agency to tell stories of struggle, leading to transformation for African American women in higher education. Storytelling for African American women caught within a matrix of domination also imparts a strategy for emotional survival (Polkinghorne, 1988). Hooks (1981; 1989; 2000), Myers (2002), and Collins (2000) unequivocally maintained that voicing their particularized struggles gives African American women a sense of freedom and provides them with mechanisms for survival such as empowerment and resistance to domination.

Advocating from a Black feminist perspective further requires a stance for empowerment and autonomy. In other words, Black feminist thought must avoid a “separatist” label, by endorsing the belief that *all* African American women are empowered, and that intellectuals are not the only ones with the facility to connect consciousness, knowledge construction, and social action. Given the independence of personal interpretations but *interdependence* for liberation, hooks (1981; 1989; 2000) suggested that supporters of Black feminist thought employ the phrase “I advocate feminism,” as opposed to “I am a feminist.” Refashioning the dialect accomplishes two important goals for Black

feminist thought, it avoids divisions among African American and other women, and it encourages an empowering spirit of truth and humanity.

Epistemology of Black Feminist Thought

Black feminist thought embraces an epistemology that refutes positivistic standards for knowledge construction and validation. According to traditional knowledge validation standards, members of academic communities, representing similar standards, must evaluate knowledge claims. Historically, White, male leaders have dominated these academic communities, specifically within the big four paradigms: (a) positivism, (b) post-positivism, (c) critical theory, and (d) constructivism. Lincoln and Guba (2000) suggested that the major distinctions between the four paradigms are in how questions of ontology, epistemology, and methodology are developed, as well as in how each determines the nature of inquiry and epistemological differences.

Lincoln and Guba (2000) tacitly implied that research scholars must join the ranks of one of the big four paradigms because only the big four have been deemed reputable for the knowledge validation process. Dillard (2006) and Collins (1998; 2000) both protested the proliferation of membership in one of the four paradigms, arguing that alignment with one of the four major paradigms forces Black female scholars to relinquish their unique worldviews and ascribe to perspectives that have historically dominated and oppressed multiple segments of society.

Collins (1986; 1997; 2000) and Dillard (2006) sought to disavow the four major paradigms as the only trustworthy paradigms for knowledge validation. Collins (1997; 2000), Dillard (2006), and hooks (1991) claimed that African American women must identify holistic worldviews to interpret their realities and experiences, ones that align with their

intellectual and spiritual comfort zones. This contention rests upon the notion that one's worldview and epistemology guides what we define as "legitimate or valid research." In other words, African American women use their worldviews to determine whether they believe in the veracity of a particular set of knowledge claims or body of research. On the other hand, members of most academic communities ensure their credibility through the criteria established by a larger, dominant group of scholars (i.e., White males) who have traditionally formulated the criteria in the big four paradigms. Given the contrasting perspective on definitions and validation of knowledge between African American women and traditional standards, African American women are forced into a process of resistance, in order to have their perspective on knowledge approved by other mainstream scholars.

Resisting the knowledge validation process. When African American women have attempted to voice their experiences through a Black feminist lens, their voices were unheard and positionalities deemed irrelevant. In the end, African American women obtained validation for their intellectual credibility through family, community, and other African American women. Additional obstacles in the knowledge validation process for Black feminist scholars emerged from three interlocking systems of domination: (a) exploitation of Black female labor, (b) politics of denying African American women the same rights and privileges enjoyed by White women, and (c) stereotyping of African American women (e.g. jezebels, aunt jemimas, prostitutes, and welfare moms) (Burnham, 1987; Carby, 1987; Collins, 2000; Jones, 1985; King, 1973; Marable, 1983).

Furthermore, these acts of structural exclusion were part of a culture within the academy that supported the ideals and philosophies of White elite men (Higginbotham, 1989). Consequently, an individual claiming a Black feminist perspective may not have her

knowledge claims validated. Hence, an African American woman anchoring her scholarship within a Black feminist paradigm adopted an unorthodox epistemology to articulate her conceptualizations of knowledge, power, and dominant structural forces in American society.

Black feminist thought and Afrocentric feminist epistemology. Constructing knowledge from a Black feminist perspective means that one must live the life of an African American woman. According to Collins (2000), knowledge is validated and produced within a particular context of history, material conditions, and epistemologies. Thus, African American women exist in a context that shapes how they produce knowledge, a process that demarcates knowledge production and validation among other women, White and Black men. This argument is central within the context of higher education.

As African American women pursue scholarly and research careers in the academy their knowledge, research and intellectualism become the target of harsh scrutiny. Consequently, if an African American woman constructs her knowledge claims based upon the traditions of a “Black feminist epistemology,” she would need to reject the knowledge construction and validation processes upheld by mainstream epistemologies in the academy. Taking such a risk leaves African American women vulnerable to isolation and rejection of their scholarship.

Despite the potentiality for academic and professional calamity, a small group of African American women repudiated mainstream standards. These women were “non-academics,” such as artists, musicians, and poets among others. Moreover, prior to the Civil Rights Act of 1964, an inconsequential number of African American women earned advanced degrees. Of the scant number who did earn advanced degrees, they were often caught between two opposing belief systems and forced to choose White Eurocentric

epistemologies in order to receive validation as flourishing scholars in the White-dominated social world.

Alternatively, some African American scholars anchored their scholarship within an Afrocentric epistemology, which deconstructs marginalization and the processes by which oppressed groups construct knowledge in an effort to resist oppression (Collins, 2000). However, by adopting an Afrocentric epistemology, scholars of Black feminism recognized an unusual paradox within Black feminist thought. The paradox revealed the reality that African American women actually shared common experiences with both Black men and White women. This irony contrasted the foundational claim of Black feminist thought as representing the *unique* experiences of African American women, leaving an unanswered question, “How does an Afrocentric epistemology address this irony?” Given the limitations of this study, I will not attempt to answer the puzzling question, “How does an Afrocentric epistemology address this irony?” Alternatively, I submit W. E. B. Du Bois’ (1903) theory of double consciousness as a plausible route of elucidation.

Double consciousness and Afrocentric epistemology. The theory of double consciousness first appeared in the works of W. E. B. Du Bois in 1903. Double consciousness conceptualized the notion that Blacks simultaneously viewed themselves through their self-definitions as well as from a White world perspective. Du Bois’ theory leverages the ability of African Americans to use the “veil”—a symbol of skin color that forever separates Blacks from Whites; and “double consciousness”—two organizing principles in his theory, to view themselves through the lens of society, while also engaging in self-reflectivity.

What this meant in practical terms was that through their ability to maintain double consciousness, African Americans were capable of relating to the experiences of Black men, by their shared racial connection, and White women, by their shared genders. In other words, the paradox revealed within a Black feminist framework did not truly represent a contradiction in the theory.

Later, Frantz Fanon (1967) extended the theory of double consciousness to his own work on colonization, demonstrating that oppressed people shared a common view on “Whites as oppressor,” both in the United States and abroad. Du Bois’ (1903) and Frantz’s (1967) works on double consciousness and how oppressors affect the self-definitions of marginalized groups have become organizing themes in Afrocentric epistemology. By extension, King (1973) and Thornton-Dill (1983) suggested that African American women produce multiple streams of consciousness by their circuitous state of both *belonging* and *exclusion*. The *both/or* orientation allowed African American women to produce multiple consciousness, subsequently producing their oppositional consciousness, as well as variations in their self-definitions and identities.

Teasing out the relevance of multiple streams of consciousness was a requisite component to the efficacy of Black feminist thought as a liberating and empowering theory. Collins (1986; 2000) contended that recognition of an African American woman’s multiple streams of consciousness avoids the criticism that Black feminist thought represents an additive model of oppression. In other words, acknowledging multiple streams of consciousness invalidates the critique that Black feminist thought positions African American women as more oppressed than other marginalized groups. By avoiding quantifying additive models of oppression (i.e., Afrocentric + female qualities), Black

feminist thought takes into consideration the fact that not all African American women espouse an Afrocentric worldview. For instance, class and social interactions produce a variety of perceptions, thus creating diverse accounts of oppression, multiple forms of knowledge, and self-definitions.

Summary of Afrocentric epistemology and Black feminist thought. Black feminist scholars contended that the theory affirms the significance of historical contestations related to race, class, gender, and cultural values—distinguishing underpinnings of American history. In so doing, Black feminists encourage all marginalized groups to contest all forms of domination and oppression. In other words, by inculcating the tenets of Black feminist thought with the conventions of an Afrocentric epistemology, Black feminist thought protects itself from the label of sectarian theory.

Given this stance, Black feminists contend that any epistemology that fails to incorporate a stalwart position on empowerment for all persons lacks the veracity to confront or disaffirm the premise of dominant ideologies (Steady, 1981) . Another critical reason for fashioning Black feminist thought from an Afrocentric epistemology is the ability to move from individualized experiences to theory, and action (hooks & McKinnon, 1996). In order to preserve its applicability as a theory of change, and to move from theory to social action, Black feminist thought upholds the following principles: (a) link personal, individualized experiences to broader agendas for social justice (Collins, 2000); (b) use real experiences to develop knowledge claims and as criteria for credibility (Collins, 1986; 2000); (c) use tangible experiences to invoke care and empathy, and to promote networks of support (Noddings, 1984); and (4) examine the role of dialogic exchanges as part of epistemological assumptions (Collins, 2000). Finally, Black feminist thought must provide African American

women with the requisite tools to validate their own set of knowledge claims among other African American women, as well as the intellectual, academic, and practical tools to resist oppression.

Summary of Chapter Three

In this chapter, I introduced Black feminist thought as the theoretical framework grounding this study. I started chapter three with a brief description of the theories conceptually linked with Black feminist thought (i.e. critical race feminism and critical race theory). Next, I outlined the social construction of Black feminist thought, providing the core themes of the theory. Then I addressed the relevance of “historical struggles” for African American women. Afrocentric epistemology was also introduced as the worldview encapsulating Black feminist thought. To that end, organizing themes such as self-knowledge, knowledge validation, and multiple streams of consciousness were explained within the Afrocentric framework.

CHAPTER FOUR

RESEARCH DESIGN AND METHODOLOGY

Introduction

In chapter four, I offer a bit of insight into my positionality on race and the role of higher education in my life. I also describe the research methodology, including respondent demographics, data collection, and analysis procedures. In addition, I discuss the limitations of the study.

Researcher's Positionality

Given that my positionality influenced this study in multiple ways, from selection of the research topic and theoretical framing to data collection and analysis, I want to describe how personal experiences and my location on the axes of race, gender, and perhaps, class shaped my positionality.

I am an African American woman, born and raised in the northeastern part of the U.S.. I acknowledge and accept that I have regional distinctions that color my perspective on the role of higher education in democratic society. My formal education occurred in public schools (suburban and urban). However, my public school experiences were affected by the realities of attending a college preparatory high school. As such, my transition to college was less about academic preparation and more about “average” late adolescent and early-adulthood development. Furthermore, I attended historically White institutions for each of my two previous degrees, as well as the degree that I am attempting to earn.

Attending college and pursuing graduate education were my personal goals for as long as I can remember. My obstacles were, and remain closely related to an early awareness of my gender, race, and skin color, along with the role of these social anchors in shaping my educational experiences.

I situated my study from this particular standpoint because as an African American woman with a research agenda focused on race, my personal experiences shape how I conduct my research and how members of my academic discipline will receive my scholarship. My encounters with peers, professors, colleagues, and other Black scholars brought with it a peculiar experience that affects my career as a research scholar because they are the experiences that I will embrace, or reject as I negotiate my identity and carve out a particular space for myself in the sphere of Black and White scholars, male and female.

I welcome my experiences as an African American woman conducting research on other African American women as a privilege. However, my position is complex and required multiple levels of negotiations as I came to grips with my choice. One area of negotiation was epistemological beliefs, as well as the requirement to engage in a form of reflexivity that I never explored as part of my academic preparation. In other words, I knew what it meant to engage in reflexivity on a personal level. However, I always viewed my scholarship as distant from my “self,” so reflexivity in a research study was new to me. All of these challenges were filtered through my lifelong interest in learning more about my personal identity and the connection to my ancestors from the transatlantic slave trade. I also centered my perspective on the notion that race would determine the ultimate path of my academic career.

Along with complex negotiations with myself, often I felt the press of White faculty members and students, as well as African American peers, to affirm my position on many research-related topics. As a new member in a community of qualitative researchers, I was not only uncomfortable with the subtle and covert messages, but I also had no knowledge of the significant role that my positionality would play in my research. Furthermore, I resisted what I felt was “White People” telling me (i.e., an African American woman) how I should interpret my *own* experiences and perspectives. Plainly stated, I felt as if I was being told that I was incapable of evaluating my experiences and only someone other than me could adequately interpret my personal experiences and perspective. In her explorations of the social construction of African American women in American literature and history, Harris (1981) wrote:

Called Matriarch, Emasculator and Hot Momma. Sometimes Sister, Pretty Baby, Auntie, Mammy and Girl. Called Unwed Mother, Welfare recipient and Inner City Consumer. The Black American Woman has had to admit that while nobody knew the troubles she saw, everybody, his brother and his dog, felt qualified to explain her, even to herself. (p. 4)

Given these challenges, I chose to remain silent until I believed it was time to express the *who, what, where, when, and how* of my research journey and how it would influence my research respondents.

After a long dance with multiple theoretical frameworks, I finally began to develop the alignment between my epistemological understandings concerning knowledge and the construction of knowledge, and a theory that would allow me to interpret my study from the unique position of an African American woman. I embraced the beliefs that Ladson-Billings

stated: “Through Black feminism, Black female researchers can be self-reflexive and comprehend more fully the double or (multiple) consciousness [they] operat[e] in as researcher” (Maylor, 2009, p 54).

Drawing upon the view maintained by Collins (1998; 2000) that Black feminist thought is produced by African American women trying to understand our particular experiences, I approached my dissertation with an open mind. The women in my study made the transition from students to scholars, and have demonstrated that barriers and obstacles are surmountable. I recognized the opportunity for me to learn from them while also acknowledging my own subjectivity. Most of all, I hope to use their narratives as a point of departure to advocate for other African American girls and women who want to pursue career paths that clash with their self-perceptions and broader conceptions of what they are told they represent in this world.

Rationale

Johnson and Onwuegbuzie (2004, p. 20) posited that the strength of qualitative research rests in the fact that it provides an understanding and description of an individual’s personal experience. It is for this reason that I have selected qualitative methods for this study. In addition, Johnson and Onwuegbuzie (2004) cited the opportunity for people to describe, in rich detail, the contextual factors that are related to a phenomenon. Together, these qualities justify my methodological choice. Furthermore, I wanted to give educators a glimpse into the lives and strategies used by successful African American women in STEM disciplines to excel beyond cultural, structural and academic barriers.

Purpose

The purpose of this study was to: (a) focus on the detailed experiences of African American women in STEM, providing vivid descriptions of their daily experiences as STEM scholars; (b) identify possibilities for change in higher education policy; (c) highlight the accomplishments of African American women in STEM; and (d) use this body of research as a starting point to encourage African American and other young women to actively pursue career paths that collide with their self-perceptions.

Research Questions

The guiding research questions for this study were: (a) what strategies have African American women in STEM fields used to accomplish their academic and professional goals? (b) how have they negotiated the intersection of their race and gender during their academic pursuits? (c) do accomplished African American women in STEM associate their accomplishments with a broader agenda for social justice in education? and (e) is there a collective identity by which successful African American women in STEM identify? If so, how do they describe this identity?

Life Narratives

My primary data collection strategy was informed by the theoretical framework of Black feminist thought. Methodologically, the use of storytelling and narratives serves as the primary vehicle for explicating the personal experiences of African American women in education and society. According to several scholars within Black feminist thought, the use of narratives is pertinent in the lives of African American women as they endure historical struggles related to race, gender, and class (Collins, 2000; hooks, 1981; 1989; Maynes et al., 2008; Myers, 2002). The other significant reason for using life narratives when interpreting

the lived experiences of African American women caught within a matrix of domination is that it provides a voice, and opens up dialogue on strategies to improve the experiences of these women. Finally, Solórzano and Yosso (2002) concurred with the notion that methods such as narratives and storytelling are useful in countering a master narrative on race and racism.

Narratives also served the purpose of highlighting the properties and social function of the narratives (Coffey & Atkinson, 1996; Labov, 1972; Noblit, 1999). Accordingly, I selected this form of data collection because I wanted the narratives to invoke self-reflection (on my behalf). I approached this study from the perspective that all knowledge is socially constructed; therefore, I do not claim any objective reality. As Noblit et al. (2004) posited, critical theories such as Black feminist thought join with an interpretive approach to participants' life narratives to create multiple perspectives. Noblit et al. (2004, p.3) contended, "Methods are theories within themselves because they are linked by people in their historical and contextual ideations." Given that I am an African American woman, my participants' narratives, along with my self-reflection, have the potential to produce new knowledge.

Semi-structured interviews. I used a semi-structured interview protocol to encourage study participants to retell their narratives as students and scholars within STEM. Interview questions can be found in Appendix I. During the interviews, I tried to learn as much as possible about the participants' academic and professional experiences. As such, the dialogue focused on the women sharing their prior experiences in college, graduate school, and career highlights. For instance, one of the first questions I asked was, "What do you think are the highlights of your academic/career experiences in STEM? Can you please

discuss them with me?” In addition, my goal was to gather specific information about the participants’ current lived experiences as research scholars in STEM.

My intention was also to allow the participants to reconstruct the details of their current lived experiences as they relate to being an African American woman in the academy. Given that I would like this study to have some practical implications, I also asked the participants to describe the nuances and details of their interactions with peers, faculty members, administrators, and the local community. I also asked for specific policy suggestions to improve the experiences of African American women in STEM. Throughout the interview process, I looked for the various ways that the women constructed meaning from the personal, social, and institutional factors that led them to their current status in the academy.

Case study methodology. I present the stories of the women in my study in the form of case studies. Case study was particularly useful for this body of research given the focus on contextual analysis of particular experiences pursuing a doctorate degree in STEM (Yin, 2009). My goal for using case studies was not to generalize the findings of this study. Thus, case study is an appropriate method for presenting life narratives as it favors the commonality of experiences, while also identifying what is unique or particular (Stake, 1994, as cited in Denzin & Lincoln, 1994). While I recognize the strength of case studies, I also acknowledge that narrative analysis and case study are not the only viable methods of data collection, analysis and presentation. Furthermore, there are a few weaknesses in presenting the data in the form of case study. Some of the drawbacks to using case studies to present data are (a) aligning the method with the research question and (b) linking the findings to theory (Stake, 1994, as cited in Denzin & Lincoln, 1994).

Data Collection

After obtaining approval from the Institutional Review Board at the University of North Carolina at Chapel Hill, I conducted my study with eight African American women holding research and teaching positions in STEM disciplines. Data collection occurred over the course of one academic semester from the beginning of the fall 2011 semester into the following spring 2012 semester. This time frame provided me with the opportunity to conduct intensive semi-structured interviews with eight self-identified African American women who have successfully earned terminal degrees in STEM disciplines, and who are working in their respective STEM fields.

I used a purposive sample of eight volunteers who were self-identified as African American women conducting research or teaching in a STEM discipline and who also hold terminal degrees in STEM. The sample was small and purposive, with a design that allowed in-depth interviewing that in turn allowed the participants to describe their ways of perceiving issues and dilemmas, and, thus, providing rich and thick data (Geertz, 1973). Given the nature of narrative analysis, there is no requirement for a representative sample size.

I specifically identified study participants by initiating contact with Dr. Gregory, the former program director of a summer research-training program implemented at a comprehensive university in the southeastern region of the United States. The program was designed for underrepresented students pursuing careers in STEM. During my initial contact with Dr. Gregory, I shared general information about my dissertation study. Subsequently, he shared the details of my study with former program participants, who then initiated contact with me via e-mail and telephone, expressing their interest in my study.

After the women expressed interest in my study, I sent individual e-mails to each respondent with a description of the study (see Appendix II), consent forms, and a request to meet face-to-face for the formal interview. During the initial meeting with respondents, I once again discussed the study, answered questions, and provided them another copy of the consent form. Consent forms can be found in Appendix III.

In addition, I utilized snowball sampling (Marshall and Rossman, 2006, p. 70.) to identify other potential participants. At the conclusion of each interview, I asked the women to share my e-mail address, and the details of my study with other African American women teaching or conducting research in STEM. If other potential respondents were interested, they followed the same pattern as the initial respondent (i.e., they e-mailed me expressing interest, and I then provided them with details on the study and consent form).

Description of Participants

All eight of the participants were self-identified African American women conducting research and teaching in STEM disciplines. Four of the women were currently employed by an historically Black college or university, and the other four were employed by predominantly White institutions. The majority of the participants were assistant professors and two were associate professors. Participant demographics are summarized in Table 1. Below, I also provide a brief description of each of the eight women in the study.

Dr. Geneva. Dr. Geneva was born and raised in the southeastern region of the United States. Currently, she is employed as an assistant professor of chemistry at a historically Black college/university. She earned her doctorate and master's degrees at predominantly White institutions. However, Dr. Geneva earned her undergraduate degree from an

historically Black college/university. Dr. Geneva participated in the summer research-training program directed by Dr. Gregory.

Dr. Hightower. Dr. Hightower is an associate professor of chemistry at a PWI located in the southeastern region of the United States. She was born and raised in the southern region of the United States. Dr. Hightower earned both her undergraduate and graduate degrees in chemistry from a PWI.

Dr. Stacy.¹ Dr. Stacy is an assistant professor of mathematics at an HBCU in the southern region of the United States. She earned her undergraduate and graduate degrees from HBCUs. As a result of her participation in the summer research-training program directed by Dr. Gregory, she expressed interest in this study.

Dr. Powell. Dr. Powell was born and raised in the southeastern region of the United States. Currently she is employed by an HBCU as an assistant professor of chemistry. Dr. Powell earned her undergraduate and two graduate degrees from PWIs. She has never participated in any type of research-training program.

Dr. Foster. Dr. Foster participated in the summer research-training program directed by Dr. Gregory. She is currently an associate professor of statistics at a PWI located in the northeastern region of the United States although she was born in the southern region of the country. Dr. Foster earned her undergraduate degree in math at an HBCU. She earned her master's and doctorate degrees in math from PWIs.

Dr. Tracy. Dr. Tracy is an assistant professor of math at an HBCU located in the Midwest. She was born in the southern region of the United States. Dr. Tracy earned her

¹ Dr. Stacy did not grant permission to audiotape her interview. Consequently, her narrative is represented in my "retelling" of what she shared with me during our interview. In addition, she also would not allow me to interview her for the requested time frame. However, I was permitted to interview her for approximately 30-45 minutes.

undergraduate and master's degrees in math from an HBCU. She earned her doctorate degree in math at a PWI. Dr. Tracy was a participant in Dr. Gregory's summer research-training program.

Dr. Rosenberg. Dr. Rosenberg never participated in any type of summer research-training program. She is currently employed at an HBCU in the southern region of the United States as an assistant professor of biology. Dr. Rosenberg earned her undergraduate degree in biology.

Dr. Murray. Dr. Murray is an assistant professor of biology at a PWI in the Midwest. She was a participant in the summer research program directed by Dr. Gregory. She earned all three of her degrees from PWIs. Dr. Murray was born and raised in the southern region of the US.

Table 1

Participant Demographics for African American Women in STEM

Pseudonym	College	Grad. School	Current	Rank	Discipline	Research Prep
Geneva	HBCU	PWI	HBCU	Assistant	Chemistry	Yes
Hightower	PWI	PWI	PWI	Associate	Chemistry	Yes
Stacy	HBCU	HBCU	HBCU	Assistant	Math	Yes
Powell	PWI	PWI	HBCU	Assistant	Chemistry	No
Foster	HBCU	PWI	PWI	Assistant	Math	Yes
Tracy	HBCU	PWI	HBCU	Assistant	Math	Yes
Rosenberg	HBCU	PWI	PWI	Associate	Biology	No
Murray	PWI	PWI	PWI	Assistant	Math	Yes

Note. College refers to the type of institution attended for undergraduate school, graduate school refers to the type of institution attended for graduate school, research prep – indicates if the participant participated in the summer research preparatory program during undergraduate school.

Analysis

I used Labov's (1972) structure of narrative analysis as my primary analytic strategy. Narrative analysis in its basic form stresses the relevance of structure of the narrative and the interaction between interview and interviewee (Connelly & Clandinin 1990; Coffey & Atkinson, 1996). Moreover, according to Polkinghorne (1988) narratives provide the opportunity for individuals to give meaning to their lives and circumstances. Narratives have formal, identifiable properties in relation to their social function, and allow a focus on the particular (Coffey & Atkinson, 1996; Labov, 1972; Noblit, 1999; Reisman, 1993, p. 57).

I analyzed, structured, and interpreted the data from this study following the sociolinguistic approach to narrative analysis Labov (1972) for identifying recurrent patterns in the narratives. I also interpreted segments of the women's narratives to understand what happened in their academic experiences, how the events took shape, why specific events were more relevant than others, and who the significant individuals were in the chronicles of their academic lives. In other words, I interpreted the participants' narratives by segments, looking beyond content but paying close attention to how they reconstructed and retold their stories; how they used the interview as an opportunity to make a particular point; and to which audience they were speaking—whether to the research community, educators, future STEM majors, or me. This model of narrative analysis is referred to as an evaluation model (Coffey & Atkinson, 1996, p. 58), which means that I assessed their stories in relation to specific organizing questions. For instance, in narrative analysis, Labov (1972) suggested the following format:

Table 2

Labov (1972) Structure of Narrative Analysis

Narrative Structure	Question Addressed in Narrative
Abstract	What was the story about?
Orientation	Who? What? When? Where?
Complication	Then what happened?
Evaluation	So what? Why is this important?
Result	What finally happened?
Coda	Conclusion to narrative

In my selection of narrative analysis, I also recognize that narrative analysis was not the only suitable form for my study and that there are some drawbacks to using narrative analysis in qualitative research. The three most prevalent drawbacks to narrative analysis are: (a) the misconception that events are causally linked, (b) attempting to conceptualize recurrent patterns in one narrative and across multiple narratives, and (c) the potential for respondent narratives to change as they re-tell their story to the researcher (Connelly & Clandinin, 1990; Marshall & Rossman, 2006; Richmond, 2002). Despite the drawbacks, the strengths of narrative analysis (i.e. obtaining rich, multi-faceted data, providing voice to the respondents, and opportunity to engage in critical reflection for the researcher and respondent) outweighed the weaknesses and made it a useful analytic tool for this body of research.

Limitations and Key Assumptions

My study focused solely on the experiences of *successful* African American women in STEM disciplines, and these findings are not generalizable for other groups of African American women. For instance, the findings from this study are not representative of the experiences of *all* successful African American women in STEM. Furthermore, by focusing solely on accomplished African American women, the findings do not speak to the personal experiences of African American women who unfortunately were not able to reach their academic and professional goals in the STEM disciplines. However, I hope that the findings will guide other Black and non-Black scholars toward a better understanding of the particular experiences of accomplished African American women in STEM, providing some direction on how to assist other African American women in STEM with their scholarly pursuits. The focus here is on developing an understanding of these women's experiences and on how I took specific measures to ensure the trustworthiness of my interpretations.

Trustworthiness

Throughout the interviews, I continually analyzed what the participants' stories were about, what messages the women wanted to send, and I determined who the influential individuals were in the lives of these women and how their interactions with peers and mentors have shaped their experiences. In addition, after my initial analysis of all of the interviews, I constructed a general outline of the themes and topics that were discussed with all participants. Then I organized preliminary analytic themes by segments according to the sociolinguist structure developed by Labov (1972). Finally, I sent the participants blind copies of the document (i.e., no one receiving the e-mail could see who else received the e-mail or attachment). The preliminary analytic themes can be found in Appendix IV. I asked

all of the women to review the outline and to let me know if I had adequately captured their stories. Two participants responded and agreed that my interpretations were accurate.

Summary of Chapter Four

Chapter four served the purpose of introducing my research methodology, which I selected because of its alignment with my theoretical framework, Black feminist thought. Furthermore, I provided a rationale for my study, as well as described the purpose of the study. I outlined the research questions that guided my study as well as my data collection procedures and the selection of participants. I ended the chapter with a description of my analytic strategy, limitations of the study and steps taken to ensure the trustworthiness of my analysis and findings. In chapter five, I provide the life narratives of the eight women in this study. The narratives are structured according to Labov's (1972) sociolinguistic narrative analysis.

CHAPTER FIVE

PARTICIPANT NARRATIVES

Introduction

In this chapter, I represent the narratives of the women in my study. I organized the participant responses in terms of the structure of narrative analysis by Labov (1972) presented in Table 2. As stated elsewhere in this study, I concede that narrative analysis was not the only suitable form for data analysis and that there are some disadvantages to using narrative analysis in qualitative research. Even with the drawbacks, the benefits of obtaining deep multi-layered data, giving voice to my respondents, and connecting with my respondents through critical self-reflection compensated for the limitations of narrative analysis. As such, in chapter six, I provide an analysis of the narratives as they intersected with the theoretical framework for this study, Black feminist thought.

A crisis of representation is how Denzin & Lincoln, (1994) described qualitative research. This means that among other things, the researcher must question her ability to adequately represent the voices and experiences of another person (Glesne, 2006). It also means that the researcher must make a choice to relinquish her authoritative voice, her stance as the “all-knowing” scholar. Despite this substitution of voice, (Richardson, 2000, as cited in Glesne, 2006) the researcher does know “something” although that knowledge is connected to the researcher’s personal history within a particular context. In other words, what I know as an African American woman requesting entry into the academy is principally connected with my subjectivity, positionality and personal life experiences that led me to

where I am today - writing a dissertation on the experiences of African American women in the academy and endeavoring to view their lives through the lens *they* have created.

Conducting a research study on your own ethnic or racial group is daunting, to say the least. Previous personal experiences may dictate that you would have encounters that were effortless, given the potential similarities along racial, ethnic, gendered, and class correlates. However, my experience in conducting this study was different. You might say that I discerned my place in the world from an “outsider-within” perspective (Collins, 1986; 2000) and my respondents interpreted their experiences differently. In other words, Willinsky (1998) asserted, the marginalized or “outsiders” are always aware of the colonizer’s gaze and recognize its otherizing effect. Personal interpretations of my academic, professional, and personal opportunities parallel the stance that Willinsky (1998) espoused.

My disposition emanates from a Black feminist proclivity, although prior to this process (i.e., writing my dissertation), I would not claim Black feminism as my epistemological lens because I believe relics of slavery (i.e., intra- race/class/gender discrimination and color prejudice) created a chasm in the coalitions among women of color. Consequently, a discontinuity detaches us from one another. These differences have been examined in a very small number of empirical studies where the researcher and the participants shared the same race and gender.

Johnson- Bailey (1998) conducted a study in which the same phenomenon was reported (i.e. the researcher and respondents interpreted their academic and professional experiences through different worldviews). However, her participants all named *race* as a factor in their experiences, while gender remained unnamed. By contrast, my participants named *gender* as the most significant factor in their academic and professional experiences.

Moreover, very few of the respondents in my study named race as a contributing factor in their personal experiences. In fact, the majority of my participants intimated that “if race were an issue,” it served as a stepping-stone for them. Although the women were not specific about the impact of race on their academic experiences and careers, most alluded to the existence of racial disparities as a social reality in higher education, STEM, and for some of their colleagues.

Narrative One - It’s Not Always Racism or Sexism

Abstract. Dr. Geneva is an assistant professor of chemistry at an HBCU located in the Southern United States, where she was also born. Dr. Geneva’s narrative highlights how she interpreted any obstacle during her academic and professional pursuits as opportunities for growth. She also relied upon her spiritual beliefs as a source of strength and empowerment. The significant message I gleaned from Dr. Geneva’s narrative was the relevance of gender, as opposed to race, as the focal point of most of the obstacles she has overcome.

Orientation. What are the highlights of your academic/career experiences?

I am a fourth-generation teacher, so education is very important in my family. I have always liked math and science. It was not until my junior year in high school where I took advanced placement chemistry and met my teacher, Mrs. Pearl, who was African American and held a master’s degree [that I really started thinking of pursuing a career in chemistry]. Mrs. Pearl described to us her ability to kind of move in and out of different aspects of the chemistry field. She worked in the industry, and now she was able to teach. What intrigued me the most was that she talked about her ability to travel. It was

mind-blowing to me at that time that a science degree could allow you to travel, and a science degree that incorporated science and math, which were two subjects that I really enjoyed. It was at that point that I decided that I really wanted to major in chemistry.

Q. How did your high school teacher influence your choice of college major?

I had been offered to go to several different universities, because I graduated number 4 in my class. That was out of 208. My heart was set on going to an HBCU. I was one of two at my high school, who had the opportunity to interview for the Merit Scholarship at a comprehensive research university in the South. My father told me if I got the scholarship, I would have to go. But my heart was set on going to an HBCU, so I purposely messed up the interview. Both of my parents went to HBCUs. Something my dad said to me that stuck with me while I was making my decision. He said, “You have the option now to go to any school that you want to, and that is fine. But once you graduate from an HBCU, you will always be able to go back for homecoming and enjoy yourself and see the people that you graduated with and have a good time.” That may sound trivial, but I have heard too many horror stories from people who went to predominantly White institutions. They start out with one aspect or one major, or they end up quitting or changing their major, and I didn’t want that.

Complication/Evaluation. What did you do?

I ended up going to an HBCU on a full academic scholarship and majored in chemistry. There were times that I wanted to quit. However, I continued and

finished. I didn't do as well as I should have done; but when I finished, I was tired. However, during college, I became a STEM scholar, and one of the requirements was to go to another university and do extra research. During my involvement in the STEM Scholars program, I was introduced to biochemistry. The research my mentor was doing, I found interesting. At the end of the program, my mentor called me into his office and said, "You have done a very good job, and you would make a very good graduate student." But, I didn't understand at the time that the purpose of the program was to help get me from an HBCU to a PWI and help me get my PhD. I didn't understand that, and no one explained that to me.

Q. You said you really didn't understand the STEM scholars program and pursuing the doctorate. How do you think that lack of explanation impacted your performance in the program?

I have to say I am thankful that I did a good job because that is what I wanted to do. I think it was a good thing not to know the goal of the program because I wasn't working doing what I was supposed to do because I was thinking, "I can get to graduate school." I didn't even know what a PhD meant. I was working because *I wanted to learn*. I think for that reason, I am thankful that I didn't know. Nevertheless, I went back to my home institution, and I graduated. Then I interned at a top pharmaceutical company in their research and development lab. I was blessed to enter their program because they only accepted interns from PWIs. I was very blessed to be able to that. It was also there that I experienced my first real incident of racism. I got my first

introduction to the narrow-mindedness of people when it comes to historically black colleges and their graduates.

Q. Please talk a little bit more about the incident you mentioned related to racism.

I worked in the Department of Biochemistry and Endocrinology. The head of that division was a woman. My supervisor was a man; he was cool. Both were White, and I was the only Black. There were three interns in that division—one Caucasian female, one Asian, and one African American female. All of us were required to give an oral presentation at the end of our project in the program. I was the last one to present, and I gave my presentation. I admitted that I didn't understand everything, but I explained the things I did know. So one of the guys who was there—he didn't ask anyone else questions, but when it was my turn, he asked, "Well, Ms. Geneva, since you are a novice at this, can you tell me what directions you would go in next?" So I looked at him, I looked at my supervisor, and he looked at me like, "Don't answer that question." I looked back at the screen. I thought about what he was asking me. Then I turned and said, "Since I am a novice, that means I can't tell you which direction I need to go." The whole room just jumped up, like, "Yea, Ms. Geneva," and he was looking like an idiot, which he was. So when we walked out of the presentation, the head of the department said to me, "I can't believe he did that. I am sorry." The next day, the department head came to me and said, "You have my permission to go and just cuss him out if you need to." I said, "I think I handled it the way I was supposed to." Because you see, that was what they wanted me to do.

They wanted to say, “Oh, you brought this little Black girl from an HBCU, and someone asked her one little question, and she just went off on us.” I always try to remember—how I leave a place sets it up for the next person. I try to remember that. I wanted others to be able to come and experience what I did. Living in the South, we know that there is racism. But the expectation up north is that it is different. You hear about how slaves left the South to go north for a better life. What you realize is that it is true—that the content of the character is not determined by the region in which they grow up; it’s the attitude that they are taught. That was an eye-opening experience, but it was good. My heart was set on going back to the South so that was what I did once I finished the internship. I got a job working at a private company.

Q. What were your professional experiences like while working at the private company back in the South?

I did both quantitative and qualitative research. I made good money, but I was bored out of my skull, so I decided to go back to my hometown. I looked for a position at a comprehensive research university so I could learn molecular biology and apply to grad school. I got a job offer at one of the comprehensive universities in my hometown, and I worked there for more than two and a half years. During that time, I learned all the techniques that I needed to learn. My supervisor, a White female, she kept her promise. I told her when I started working there that my goal was to get into graduate school. She said if I worked hard, she would write a strong letter of recommendation. And she did. I got into a different research university (i.e., not the one where I

worked). Initially, I was accepted into the Department of Biological Chemistry, where I had three advisors. The first year, I did okay - 3.0 and above. The second year, first semester, I had a personal situation, that occurred, which I allowed to affect me (and I will not elaborate on that). I pretty much almost flunked out.

Q. Will you talk more about that?

So, in the one class I was taking, we only had a midterm and a final, which was fine. I took the midterm, and I got like a 41 on it. My colleague had taken the same class the year before and got a 43. He was told by the professor during his experience not to worry about it because he would do better on the final.

Q. What was the ethnicity of your lab?

He was a male Caucasian, and he had gone to the university for his UG degree. Well, when I got the 41 and asked for the same opportunity, I was told there was no way I could do better on the exam and that I needed to go ahead and drop the course. When I went to my advisor to explain this to him, his response was the same as the other professor: Just drop the class. That is when I decided that this man did not understand, and I didn't have time to explain. So I said, "Okay, I will drop the course," but that I wanted to audit the course and take the final. So the professor and my advisor said, "Sure, no problem." And with smirks on their faces, they added, "You can do that if you want to." So I audited the course and took the final, and I got an 86 on it. Before I took the final, I had a problem that I didn't understand, so I went to

ask the professor, of course. I said, “I don’t understand this. Can you explain this to me?” He said to me, “I don’t know why you’re here. You went to an HBCU. You don’t have any business being here.” I looked at him, and I said, “I didn’t ask you all that I asked you about this problem. I need you to explain this to me, so can you do that?” He looked at me and then started explaining. So when he came to bring me the test back—this is the same one who said I didn’t belong there—he said, “You got an 86.” I went to tell my research advisor, and he said, “Oh, you passed the final. That’s good. That means you can move on with your classes.” I said, “No, remember you told me to drop the course.” He said, “Oh man that is going to put you behind.” I said, “Yes!” I put that behind me and did what any good grad student would do. I went to the library and started researching. So I went to him and said, “I found this article, and I want to talk to you about it and see what you think about it. He was like, “Well, Ms. Geneva, if you don’t like what we are doing, you know you can leave.” I asked, “Is that your final word?” He said, “Yes, that’s my final word.” I said, “Okay.” I went and got my purse and my stuff, and I left. That night, I came and got all my stuff. Because I was, like, you are not going to talk to me any kind of way. I don’t care who you are. So I left, and the next advisor I had didn’t have the money to support me as a grad student. The next person I worked with had an Indian Post Doc, and when he saw that I was a hardworking student, we finished the project in, like, six weeks and published a paper. So he was trying to get me to do more projects. What bothered me was that he wrote the article, and I was the

second author, and I never got a chance to help write the article. I did all the work—every figure that was in there, I did it—but I didn't get a chance to learn what I needed to learn as a grad student. So basically, I felt that he was trying to use me as a technician. So after that, I said, "No more!" When I first started, I thought I was the best thing since gravy on mash potatoes; but then I stood up and said, "I am not going to do your work for you. If I can't learn what I am supposed to learn as a grad student so I can go on, I am not going to be an underpaid technician." After that, I became the worst thing since white bread and empty calories. I stayed in there for about two years. It was during that time that I realized that it wasn't going to get better. So I am a spiritual person, so [I was] like, "Lord, what shall I do." I called my mom, and we prayed every day. I was crying, saying, "What am I going to do? I can't stay here. So the way was opened up for me. I met my last advisor. When I went to him to explain my situation, he said, "I am not taking any more students since I am getting ready to leave myself." However, when he looked at my transcript and my experience, he was like, "You are not a bad student. You are a good student, and you have plenty of lab experience, so I don't have to train you. I said, "No, you don't." He said, "I am not going to block my blessing. God sent you my way so I can help you, and that is what I am going to do."

Result/Coda. Do you believe that your experiences were related to race and gender?

I take responsibility for some things because there were things that I was ignorant of. Honestly, there was no one that looked like me that I could go to and express to them that I didn't understand this. But you can't blame it on race or sexism all of the time. All people have their prejudices. When I was coming in here, I took the stairs, and I remember that quote about how the race is not won by the swift or strong but by those who endure. So I don't just want to survive, I want thrive. But I understand that in order to make it, you are going to go through some obstacles. But that is what you are doing—you *go through*. Anything you go through, you truly do come out a stronger person. It's not always racism or sexism. Sometimes it's just *plan ole ignorance*. We just need to take stock in ourselves, we being people of color.

Q. Describe to me where you get that strength that you describe, the strength not just to endure but to thrive.

I am a God-fearing woman. I pray, I read His word, and that gives me strength. I am a Christian.

Q. Do you think there this a collective identity that accomplished African American women in STEM share?

For me, I don't consider myself as conceited or arrogant, but confident, because I haven't ignored what I had to go through to get here. I truly believe that what don't kill you will make you strong. I have no reason whatsoever to identify myself as a victim and I think sometimes that is what we want people to do—have pity on us. If you pity me it's because you say, "She deserves a second chance," because we all mess up sometimes. All of us do. If I come

to you and say I want another chance, I think if you are honest with yourself, that is where the confidence comes in, and that is where you realize you know that the only way this is going to stop is if I stop. So again, it goes back to the individual. So I think you have to be honest with yourself, about what you went through to get where you are, and appreciate it. That is how I look at it.

Narrative Two - The Challenges ... of Being a Woman, a Minority...They are the Same...

Abstract. Dr. Hightower attributes her academic and career success to her parents and early mentoring. She describes all of her mentoring relationships with enthusiasm. She made it clear during the interview that her best mentoring experiences have been with White women and White men. The only mentoring relationship that she had with a Black female she described as “a disaster!” Dr. Hightower acknowledges the impact of race on the career of many African American women in STEM. However, she does not recall any incidents of racial discrimination along her pathway to success. Dr. Hightower believes that gender is more relevant as an obstacle than race in the academic careers of African American women in STEM.

Orientation. What do you think are the highlights of your academic/career experiences?

The highlights were pre-high school. My dad was a chemistry/math teacher in middle school, so I had always had chemistry and math in front of me. We were always practicing problems. The games we played were math games, so I first kind of thought about not necessarily chemistry at that age, but math and science. STEM in general was from my dad. Then when I got to high

school, I took a chemistry course as a sophomore, and it was fantastic. I loved it. I loved the math, was never afraid of the math because my dad was a math person. It never seemed threatening to me. So, K-12—those are the two experiences that I would say are the most important. In college, as an undergrad, I was a chemistry major and was determined that was what I was going to do. I wasn't thinking about being a chemist, just a chemistry major. With no goal except to get a degree in chemistry, I thought about med school, but that was because my sister was in med school at the time. But it really wasn't a choice I was making. It was kind of a default. So the most experience [I had] was actually right after my senior year when I did the [summer research program]. For the first time, someone introduced to me the thought of getting a PhD. Never thought about it before, never ever. Never had anybody tell me that I wasn't cut out for medical school, that I was really a teacher-scientist kind of person; and he just pretty much told me that. He said, "You want a PhD, you want to teach, you want to run your own thing, you want a PhD."

Q. Did you have a mentor in the summer research program, and if so, how did he/she influence your career path?

During that summer program, having that mentor at that point was really critical because he introduced something to me that really wasn't on my radar screen. Also, when I first came to grad school, I immediately found a fabulous mentor, who ended up being my graduate advisor. Again, what he did for me, I had no ability to do for myself, and he told me what I could do

based on how he knew me. I don't know how people do that. How do you visualize for yourself something that you don't even have in your view? You can't! So, during my first year of grad school, before I took my first class, I told my advisor that I loved teaching. I liked organic chemistry. I liked applied science. He told me, "I am going to teach you how to be a teacher and a researcher." What he was saying was that he was going to mentor me and allow me to work in his lab. His investment was so clear to me on day one, before we did anything. Of course, I said, "Yes, I want to be in your group." He has been my mentor ever since. People along the way kept feeding things to me that I didn't have on my own mind, and gave me some good feedback about things. Those are the kinds of milestones that made the biggest difference to me.

Complication/Evaluation. Did you run into any obstacles along the way?

Yes, I did run into obstacles that were my own. None that I could point to and say that people put in front of me. My own. It took me a second to get committed to the plan. It took me a second to actually believe it and embrace and really get into it and do the best I could. I fumbled around at the end of undergrad and the beginning of grad school. By the end of the first year, I was clear; but if those people had not been there, it is possible that I would have fallen off the track that I was on. I just struggled in course work and various places, and I thought that was the end of the road. They kept saying, "No, it's not. Keep going." Once I got into my second year of grad school, I was cruising. But that first year, it was unbelievable; and the end of

undergrad was also hard for me. I wasn't focused, and I was in some upper-level classes that were killing me. So, no, it has not always been easy, but the problems for me have always come from me. It took me that long to really understand what I was doing, research-wise and its importance. That was when I really took hold of my research because it was kicking my behind.

Q. What was your relationship like with your research mentor?

It was hard. Here is another one of those obstacles, which was me. I didn't really understand the dynamics of what a research lab worked like, didn't understand the social dynamics of research lab, and did not appreciate the concept at that time that I wasn't supposed to know everything. I often had questions that I did not ask. I put my own self into isolation. No one isolated me. I guess those are learning experiences that say, "Don't do that again". And in research experiences that followed, I didn't do that again. My research advisor should have known me better than she did, but I really didn't give it a chance. I was nervous about asking questions, didn't want people to think I was stupid. I didn't develop the kind of relationship that I had with other mentors you will hear me talk about. That was probably the least involvement I had with a mentor the entire time, and yet that was a really good learning experience for me on how not to approach it.

Q. Can you describe your interactions with both your peers and your mentors?

I have a very good relationship with my colleagues. We have about 40 to 45 faculty in our department, and I think we have six women in our department. I have a really good relationship with most of them. I have a serious set of

mentors within my department (I am the only African American in my department), one of whom was my research advisor because he went to school here. He is my number 1 mentor because he has been my mentor for almost 20 years in the department. I have faculty who were my mentors when I was in school, and I still consider them to be my mentors. It works out great. I have my research mentor [though] I am probably the person whom he would consider his mentor. I also have the past chair of the faculty. I consider him to be a mentor. If you look at my mentors, they are probably all White men in my department. I do have mentors who are African American women and of course, I have people who are not on this campus who are my mentors. So yes, I have lots of mentors who are not female or African American or minority.

Q. Have you ever encountered any challenges in your career right now as an African American women in chemistry, despite the fact that you have all this support?

The challenges are the challenges of being a woman, a minority, and I think they are the same for all of us. There are only so many of us, so there are a lot of committees that people want you to be on. There are a lot of things that people want you to lead, and then there are even fewer of us who are professors. Still fewer who want to get involved, so you get pinged a lot that—that is a real challenge. Learning from my mentors what to say yes to. I still have to ask, Should I do this? Is this something I should say yes to? Is this something I shouldn't do? The challenge for me is working this out.

How do I keep a balance and keep my research going, with teaching, research, and all the service that we do?

Q. How do you keep a balance?

I don't. I don't try to balance. I just hold one thing at a time, and then put it down and pick up the next. I think *balance* is a horrible word. That's craziness. Nobody can balance this job. You do things in priority the best you can and put down and pick up the next one. If you think you are balancing something that is insane. That implies that you are doing all of it at the same time, and who can do that?

Q. You mentioned that there are a few African American women in your particular discipline. How do you view the combination of your race and gender and/or class? How do you view these factors (i.e., race, gender, class) in relation to your professional pursuits?

Interesting. I have probably an odd view of this. That's because I have been given an incredible set of mentors and circumstances. So when my colleagues tell me that they are struggling with race, gender, or equity issues, I believe them. It is not my experience, but I believe them. Now when I say it is not my experience—and I am not saying that I don't believe those things exist—I mean they are all around me and are impacting people every day. They just have never caused me any problem. People may have some issues with me, but they have never caused me any problem. The way that it has played out for me has been for my benefit. Kind of a warped view of it, but what has

happened is, because the numbers are so small, people have bent over backwards to do things for me.

Q. Do you think that there is a collective identity that successful African American women like yourself share? If so, how does it evolve, and how is it shaped and influenced by institutional culture.

I never like to put everybody in the same box but interestingly enough, when I talked to my other female colleagues in chemistry, I find that we are all similar. It is rather bizarre, but there are some very similar traits. Most of us have this ability to manage with men well, and not seeing it as threatening. We just know what to do. Actually, it becomes a “non-kind” of factor in our heads because we worked like that almost all of our lives. When I sit down with my colleagues, I don’t have to think about I am the only Black person in here. Never. When I sit in a room with my colleagues, I am thinking, “Everybody in here is a man except three people . . .” If you live in the U.S., and you are a minority, you have to make adjustments. White people don’t have to make adjustments. They don’t have to make a single adjustment. If they don’t like it, they don’t like it. But the majority does not have to make the adjustment. We are steadily making the adjustment, and if you can do that, and I don’t mean you are making integrity adjustments—you’re just making cultural adjustments constantly. White people use language every day. They don’t even recognize that we are making adjustments all around it. One time, one of my colleagues said, “We are going to need an overseer.” I was like, “Jesus, come to the meeting. What do you mean an overseer?”

Really? It is 2011, and you think we need an overseer? But they say it without even thinking, like, man, somebody is going to get lynched for that. I am, like, really! Because it means nothing to them, but we make that adjustment and keep rolling, because it means nothing to them. That happens all day, every day in a majority society.

Q. Do you see your success, professionally and academically, as part of a broader activist agenda in higher education?

Yes, I definitely see it as an agenda, but the agenda isn't built on a good-hearted nature or doing the right thing. There is no such thing. The agenda for academic departments gathering more minority folks, if indeed that is their agenda: because they want to be more attractive to students, they are concerned about their rankings, and there has to be some element of diversity in there for a lot of places. They don't want to be seen without any diversity. It's not because they think it's the right thing—the right thing does not make people do diversity, not the majority. It makes the minority do diversity because it is the right thing.

Result/Coda. You said minorities focus on activist agendas because it's the right thing to do. Do you see yourself aligned with that philosophy?

Nope. I believe that it is the right thing to do. There are a lot of things that are the right thing to do, but I am not going to spend any time on that. Everything is not for me to do, so you have to decide what you want to do. So the reason I said yes to chairing this diversity committee is not because it is the right thing to do—whatever, okay. The reason I said yes to that is, for me,

diversity is bigger than that. Diversity to me is about excellence. There is no disconnect between diversity and excellence. As a matter of fact, I believe with every part of my being that you cannot be excellent if you are not diverse. If diversity were disconnected from excellence, I would be out.

Narrative Three - Basically, People of Color Don't Do Science

Abstract. From the start of my contact with Dr. Stacy, she made it clear to me that she did not want her interview audiotaped. She almost said it as if the interview was contingent upon this premise. Consequently, her narrative is not a presentation of her “exact” words, given that I was unable to obtain a transcript. However, I present her story to the best of my ability using field notes. Dr. Stacy is an assistant professor of math at an HBCU located in the Southern United States where she was born and raised. Dr. Stacy earned one of her degrees at an HBCU (UG), while she earned her master’s and doctorate degrees at PWI.

Orientation. What do you think are the highlights of your academic and career experiences?

Dr. Stacy attributes her accomplishments to early academic preparation, such as summer math camps and participation in a summer research-training program, and mentors who held a particular mentoring style. She described her mentors as having concern for the overall well-being of their students—not just their academic success. Dr. Stacy also stated that she recognized her ability to compete with her peers, while in graduate school, and that recognition was an important milestone in her academic career because it allowed her to believe that she was just as capable as her White counterparts.

She stated that she was also strong in her academics; however, graduate school challenged her belief in her own skills. Thus, when she realized that she could compete with other students, she developed more confidence. Dr. Stacy also notes she simply realized that she performed better when the academic success measures were not defined by prior knowledge but by an ability to use the resources in the academic context.

Q. Given the impact of mentoring, can you tell me who some of your mentors were?

For instance, were they professors, teachers, or other peers?

Dr. Stacy identified her mother, sister (who also is accomplished in STEM), teachers and professors, and other peers and colleagues as mentors. She discussed with me how her mentors provided her with moral support and reminded her of her religious faith, all in an effort to help her develop a balance between her academic/career goals and personal life. She also described how reliance on her mentors and family for support helped her develop the tenacity to succeed in her academic and career goals.

Complication/Evaluation

Despite the rich foundation, preparation, and mentoring that Dr. Stacy was provided during her undergraduate experiences, she shared with me the fact that once she attended a PWI, which was during her graduate pursuits, the academic tide began to take a different shape. During her pursuit of her master's degree, she was the only black female accepted into the cohort and the only American as well. The program lasted for three years, and she described her major challenge as trying to fit into the study groups with other

students. She described her experience as a “cultural nuance” of being in the program. It was during this time that Dr. Stacy began to excel beyond her classmates. She told me that she began to realize that she was “just as intelligent as her classmates.” She describes this phase of her academic career as one that revealed her highest level of academic acuity.

Result/Coda.

Dr. Stacy’s narrative mirrors many of the stories shared with me by other African American women in STEM. She succeeds in both her academic and professional positions. Now, as an assistant professor, she still recognizes the paucity of African American women in her field. Therefore, she places mentoring of students at the top of her priority list. However, she injects the role of religious faith in her accomplishments, as well as the ability to find a balance between her personal and work life. However, this comes with a different set of challenges because she believes that the role of the woman is to protect the family. With these commitments, she learned how to remain focused on her own long-term goals (i.e., obtaining her doctorate degree), holding little concern or engaging in competition with other students. As she had stated, “What is for me, is for me.” Given the importance that she placed on religious faith, I interpreted this statement from a biblical perspective. (e.g., two verses in the Bible make a reference to a similar concept: “For I know the plans I have for you,” declares the LORD, “plans to prosper you and not to harm you, plans to give you hope and a future” [Jeremiah 29:11] and “A man’s heart deviseth his way: but the LORD directeth his steps” [Proverbs

16:9]). To that end, perhaps she meant that what God has promised to her is only for *her*, and other people may have different blessings promised to them. Thus, she would not worry about obtaining what her peers had. She only concerned herself with *what was meant for her to have*. She made a commitment, and while personal tragedy and family life presented additional challenges, she was determined to meet her goal, even when she *thought* she would not.

Narrative Four - It's Rare to See Women in Chemistry; Definitely Minority Women

Abstract. Dr. Powell was born and raised in the Southern United States. Currently, she teaches at an HBCU located in the South. Her preparation for a STEM career derived from early academic preparation and her success in high school (i.e., she earned high grades in high school). Unlike many of the women in this study, Dr. Powell never participated in any type of formal research-training program. She also attended all PWIs for her bachelor's, master's, and doctorate degrees. Consequently, she encapsulated her current experience at an HBCU with one brief statement: "Not the real world."

Orientation. Can you discuss the highlights of your academic/professional career?

Highlights. So, I am an assistant professor in chemistry. I've been teaching at an HBCU for seven years so, I guess I play a role here because most my higher education has been at predominantly White, comprehensive research universities. I did do a master's, I did put that on your sheet, at an HBCU, and then I came to a comprehensive research university for graduate school and switched advisors, so I terminated the career with what I thought was going to be my PhD advisor and got a master's with him and then switched to another

guy. I have two master's degrees. So most of the bulk of my training has been from a Research I, but then I have that HBCU experience, and then I went to an all-female liberal arts for my bachelors, so the meld of what I bring this institution as a role model, I think, is unique. So I think my highlights are that I am still doing research, still publishing, still trying to do what a scientist would do on any grounds, and yet I am really impacting, I think, a segment of society that needs to see that.

Q. How did you become interested in your career?

I definitely think I got turned on to chemistry early on, probably high school; but I really thought I was going to do an MD program. I think more minorities do at that early age if they get interested in the sciences. You know, that's usually the glamorized field, but going up, advancing in my career—biology really didn't mesh as well with my thinking as chemistry did. It's more—especially physical chemistry, which is my discipline of choice—it's more math-oriented. It's more a model of the world. So, I had some key people early on who were physical chemists that impacted me, I guess. They didn't actually look like me. That is the funny thing. They were not African American because there aren't a lot of us in physical chemistry. They were women. In one case, I had an internship experience, and one of my key contact persons there was a physical chemist who was a woman, and she was just phenomenal and was really inspirational to my attending graduate school. From there, before that, I guess I didn't really know what I wanted to do but kind of the general theme of chemistry was there. The obstacles are that you

don't see much of yourself in the field anyway, so when you are studying, it was very hard to find study partners. So I didn't think about it, though. I'm not sure it was that much of an issue. I don't tend to view the world as black and white, even though it may be that way, but I just do what I have to do.

So, with that mind-set, I survived.

Complication/Evaluation. I want to ask you a question about that, that is, the fact that you don't see much of yourself in the field, when you were studying, it was very hard . . . Can you talk more about that?

Yes, a number of thoughts—but to keep it positive. (*Laughter*)

Interviewer comment. It can be both.

This is taped?

Interviewer comment. Yes, but all names, places, locations, are de-identified.

I mean, it's just a certain way. Even now, an HBCU pays the bread and butter, but there are just certain things that we don't handle well when it's just us. I don't know why. It's the organizational factor. It's the strategy. It's the long-term planning. Everything from understanding that your customer needs to be satisfied, (and the customers on campus are students), to the faculty and to how you take care of them. Just the simplest things. It's a number of factors, but for all of those factors, it makes life at an HBCU more challenging in some aspects than you would have at a Research I. The resources aren't there. The infrastructure to support what you are trying to do isn't there. And yet, you are trying to obtain pretty much the same goals—an education for the

student—and you don't want it to be an inferior education by any means; but sometimes, to make it on par, it's just a challenge.

Q. But obviously something keeps you there?

It's the impact that I have. And it's also kind of like a reverse too. I never considered myself to be a star scientist. My goal was not the Nobel Peace Prize or anything. My goal was actually to stay in the area because at the time I finished my graduate degree, I had a small family I had started, and so my parents are here; and it just made life comfortable. I wanted to stay in the area, and teaching is not a bad profession to do if you can maintain that kind of lifestyle with your family nearby to help out. It's not bad at an HBCU, at least you think. But what you have to do, sometimes I think it can be worse than a Research I, just because the resources and support are not available. You are everything at an HBCU. You are the secretary. You are the grants man. You're in the lab. You can't just give instructions. There is a different level of maturity, I think, in the students from, say, a PWI. If you tell them to go do something, you may have to show them one or two times but pretty much you don't have to do that again. There is some transfer of knowledge. There are some students sticking around, so there are some mature people in the lab who can help with the younger students. However, you are constantly turning over undergraduate students. The students are trying to do something (i.e. conduct research) and they are not really research-savvy so you are talking about a whole new beast that you are introducing them to. The whole thing is a mix for what could be a disaster but turn into what is best.

Evaluation. Who are your mentors/role models?

My role models are not women, but I knew people at other institutions, and they just treated me like I was at a comprehensive research university. I took what was applicable, and I tried to incorporate it into—not everything—[things] that they go through, I really do. But that is kind of where I have an advantage. So, I think my role models have been my peers at Research I universities. I have taken bits and pieces of what I can use from people, I guess. And it hasn't been all women.

Q. That actually leads into the next question. You are teaching at an HBCU. But there are other minorities who are faculty members there. Can you talk about your interactions with other faculty members, including White colleagues?

You can decide if you want to put this in or not. Just to put it in context, I think there is almost like a reverse racism on an HBCU campus. It's very rich in knowing the history of, especially the older folks that have been here for a while, so they are quick to tell you about how it was [during the time of] Jim Crow laws, and they are very supportive of you—wanting you to do well because you represent them, the African-Americans. The men even, which probably is not what you would find at a Research I. But then the Caucasian interactions are just as pleasant, but from a different—it kind of seems through their eyes you almost feel a sense of “You went through a lot.” It's almost odd that they still continue to stick around and do what they do for the university. Because in a lot of ways, everything you would expect an African American to experience here, they experience. But some of my best

interactions are with the Caucasians. I wonder if that is the nature of my advanced degree training. I'm better able to talk and not have that in my mind because I look at some of my counterparts who have done most of their training in an HBCU environment, so they might have gone all the way through school in PWIs and then they went to an HBCU for a PhD. They just don't handle it well. They've almost got this suspicion of "What is your real intention?" Nothing is ever of face value when they are talking to their Caucasian counterparts, whereas I don't have that. I'm kind of like, "Well that may be, but we got to get the job done." I don't know if I answered your question.

Result/Coda.

I try to give my students a flavor of what the outside world is because so many of them think the HBCU environment is real, and it's just not. You know, this is something that I want them to understand and appreciate—you are being cultured, and it's a really comfortable and a nice environment. You have small class sizes. You're able to interact with your faculty members and pretty much camaraderie is everywhere, but this is not real. There is another world out there, and I want them to see it through my eyes.

Narrative Five - I Collaborate with a Lot of PhD's, Caucasian Males, They Are Supportive

Abstract. Dr. Foster is an assistant professor of math at a PWI located in the Northern United States. However, she was born and raised in the South. Dr. Foster explained that she never faced any specific obstacles in relation to the rigor of her academic

preparation. However, she does indicate that she encountered obstacles in relation to her relocation from the South to the North. She also explained that she has a collegial relationship with her White colleagues.

Orientation. What were the highlights of your academic career?

The highlights of the experiences? In the preparation or in general? OK.

Uhm, I think in terms of the highlights of my preparation it was being involved in a, I guess a scholarship program called [*Blank*] at my UG institution, which was to support students and encourage them to go to graduate school. We were encouraged to do research during the semester, as well as attend summer programs. And that is how I got hooked up with Dr. Gregory's program in my second summer.

Q. How did you choose your major?

I guess I chose my college major because I always liked math and, I don't know, that is really the only thing that I did like and enjoy, so I started out as a math education major, thinking that I could teach math in high school or something like that. But then getting involved with the program at my undergraduate institution, it encouraged people to go to graduate school. Also, going to the other program, I was matched up with a mentor in the biostatistics department—that was how I found out about biostatistics, and loved it from the beginning.

Q. Can you talk about any of your challenges, whether they be academic, social, or cultural as you moved through your preparation to have the career you have today?

Well, I can't think of any specific obstacles in the rigor of the program or teaching in biostatistics. I think for me, coming from the South and the Northeast for graduate school was a big obstacle. Meaning that I had to get used to a Northern environment, which was an obstacle.

Q. And how were you able to make those adjustments? Did you have influential people in your life? Were there resources available for you?

Well, I guess I was fortunate to have my roommate from college who was also a math major who also attended Dr. Gregory's summer program for the two years. Uhm, to go with me through the doctoral program, as well. We'd been together for a long time and to have that support from each other was very good. And I also had a very supportive mentor in the doctoral program that kind of helped with the transition.

Q. Do you mind talking a little bit more about that mentoring relationship? Can you describe it and why it was so positive and that person's style of interacting with you?

Uhm, definitely, on the academic level, making sure that I fell into my classes and prepared for my qualifying exam and that type of thing but also made sure that personally I was OK. I think my initial visit to the institution was hard—making a decision of which school to choose. The lady who would be my mentor allowed me to stay there in her house with her, although she was actually going out of town the very next day. She had never met me before, and she wasn't there. It was just her style of being open that was very comforting.

Q. And what race or ethnicity was she?

Caucasian.

Complication/Evaluation. What is it like to be an African American woman in STEM at your particular institution?

I think it's rewarding that there are African American women in my department. There are three of us, so there is support there. In terms of challenges, I think I just have challenges in general. I don't know if it's related to being African American. Going through the process of promotion—that is a major challenge, but I believe that everybody has the same challenge.

Q. What are your interactions and relationships like with White faculty members and White colleagues?

I think I have collegial relationships with many of the members of my department. We have a mixed department: minority and Caucasian. Primarily White, but I also collaborate with a lot of physicians and PhD's across campus who are Caucasian males, and I think they are very supportive of my work, and they seek out my input, so I really haven't had any conflicts that I recall. So it is an overall positive.

Q. Do you believe that there are concerns regarding issues of gender in STEM, and if so, how do we approach those types of challenges?

I do think there are challenges. When I go to conferences and look around there, I feel that African Americans are underrepresented. I think programs like the one I participated in get the word out that there are opportunities in

these areas. And I think it really needs to start in grade school where so many students feel like they can't excel in the STEM fields. Teachers need to be supportive and encouraging.

Q. What is it that researchers and policymakers need to understand about the needs and the experiences of African American women as they pursue STEM careers? What is it that we need to understand at a broader level in order to be certain that success is the only option?

I think having a mentor relationship is one thing that can be done and doesn't necessarily have to be the same race/ethnicity and gender, but someone who is sensitive to having a supportive environment. (Pause) I think that it is beneficial to have a career outline, which shows what is required to get from point A to point B.

Q. Do you believe that there is a collective identity accomplished African-American women in STEM share?

Uhm . . . I don't know. I guess. Uhm. Maybe something that you're born with. I think all of us have had similar experiences, but I think we have the same end point in our experiences?

Q. Thank you. So, having had similar experiences and coming to the same end point, how do you think that happens? This is sort of a difficult one, but I'd just like to try to pick your brain a little if you have any insight on the topic?

Uhm. (Pause) That's a tough one. I . . . (Pause)

Q. No. That's OK. I just wanted to give you time to think. One last stab. Was there any influence from the institutional culture that might have shaped any aspect of that shared identity?

(Long pause) I don't know. I guess I feel like we are all striving for the same thing. Although the institution is still driving our career direction.

Result/Coda. What do you think would be an effective academic policy change or other policy changes that can ensure that more African-American women succeed in STEM?

Well, I think the obvious one is more spending for school. (Pause) I can't really think of anything else right now.

Q. Broadly speaking, what suggestions do you have for Black females interested in STEM careers?

I think they should get involved in opportunities out there going back to as early as elementary school—participating in summer programs where they live, have the opportunities to shadow, or be in a particular field and if they start early enough until they find something that they like and love. So, I think starting early is key.

Narrative Six - I Thought Yes, We are on the Inside, but are We Really on the Inside?

Abstract. Dr. Tracy is an associate professor of math at an HBCU located in the Midwestern United States. She was born and raised in the Southern United States. Dr. Tracy earned a bachelor's and master's degree at HBCUs. She earned her doctorate at a PWI. Dr. Tracy attributes her accomplishments to the supportive environment of her undergraduate school. Dr. Tracy indicated that during college, everyone around her believed in her abilities.

“No one ever doubted me,” she said. However, doubt from peers and professors was the nature of the environment in graduate school.

Orientation. What are the highlights of your success?

I knew early that I wanted to do something with math and science as early as 7th or 8th grade. So I would say a strong foundation is what made me continue to do math and do well in it. Math, more than anything, because it made sense to me in undergraduate because of a strong support system in the sense that I have never been considered a minority, not as an African American or as a woman because the program was mostly women and the program was at a HBCU. Just having a strong network and support system is what led me to strive in the area because I was never doubted. People around saying I could do it and people around me who were doing it as well. I knew I was well prepared for graduate school. But once I got to grad school, I did have these doubts sometimes, not because I felt I couldn't do the work but [because] the doubts were coming from outside sources.

Q. Please talk about the same question more in reference to graduate school.

I started graduate school not knowing what a minority was. Then I was the only African American in the program. The program had not graduated an African American student in the last 30 years or so, and there was no support from within the department. In the beginning, they just didn't know what to do with me. I was questioned more so than any other student in the class. I just knew it because I was a math major, so no support from within the department, in the beginning in the sense that they just didn't know what to do

with me. I found support from within the university. I was a part of a group who helped to revive the African American graduate student association. We found that most of us were the only ones in our department, and we could support each other by coming together outside the department, so having that strong system of community, having networks outside the department, I believe if I did not have that outside the department, I don't know if I could have survived that first year.

Complication/Evaluation. What is it like to be an African American woman in STEM at your particular institution?

I am the only African American in my department. We have a full-time faculty of 87, out of which 12% are Black, within the sciences. My department is one of the largest departments. There is one other African American in all the other STEM disciplines together. It is a very collegial place to work, but it saddens me because the makeup of our student body is majority African American, and Hispanics are the next largest population of students, but our faculty does not reflect that reality.

Q. What would you describe as the rewards and the challenges of being there?

Most of the students are coming so underprepared for college, especially in the math and science areas. A lot of that has to do with the region of which we serve, even though they come from top schools in their district. I am finding that if they are not advanced placement students, the students are left to fend for themselves, and not as prepared as they should be for college. The rewards are that I get to help students get to the next level. Helping them to

navigate the system. I do serve as an advisor to the honors society. I do not limit myself to the honor students. I see all the students and have an open-door policy. It keeps me going back.

Q. You did not have doubts, but doubts came from outside. Would you be a bit more specific about where they came from? How were they expressed?

From faculty, professors, in classes that I would take. I remember very specifically in one of my first courses I took as a graduate student. It was a very small class, and pretty specialized. I was one of the few students who were majoring in applied math, and one of the few who did not have a master's degree. The program is really a PhD, where you get the master's along the way. In this one class, it was a three-student class, and I was the only math major in the course. It was an applied course. There was a student from computer science and a student from finance also taking the class. It was a tough class. The other two students were men. One was Asian, and the other was Caucasian American, and I was doing well in the class. However, the professor could not understand how I could be doing so well and the other students were struggling. He just asked me, "How do you know this stuff?" My response to him was, "I am a math major. This is what I do." I saw it as a slap in the face, like you can't know this stuff especially since the others are men. Again, I was a minority, as in I was African American. But we were pretty well even, gender wise, about 50-50 men and women, but the faculty was all male with the exception of one female, who was nearing retirement.

In 25-plus years, they had not hired a female in the department and I did learn that many of the professors had issues with women being in mathematics.

Q. When you say they had issues with women in mathematics, what do you mean?

We weren't supposed to be smart enough to do that, so there is the question, "How do you know this?"

Evaluation. I described you as an accomplished African American woman in STEM. Do you feel your personal accomplishments as part of a broader activist in education?

Yes, I actually do. When you are saying accomplished, I think the community may be looking for publications. But the accomplishments that we are doing is that we are working to increase the numbers of African American and women who are choosing to study STEM as their major of choice, trying to do something, and they are not really research savvy, so you are talking about a whole new beast that you are introducing them to.

Result/Coda. How do you think educators and researchers can assist in getting more African American women in STEM?

It has to start early in elementary school. I discovered math in that it was interesting and easy for me to do. I was continually inspired. We need teachers to encourage us, to actually 'do' math and science. I will be honest with you, the teacher that I had for four years was a White male in a small town of mostly African American children. He saw us. The color and gender did not matter and the worst teacher I ever had was an African American female math teacher. She was my 6th grade teacher. I really didn't look

forward to going to 7th grade because 6th was so bad. She taught other classes, but the math was what stuck out. It wasn't because she didn't know the discipline or anything like that. It was because she did not care about the students. And at that age, students need to know that you see them and that you care about them. They are willing to do anything for you in the sense that "I want you to do well," and they will do well. They will do their best. So, programs that support the students, and of course parental involvement. If parents don't get involved, it can be hard to keep the students interested.

Q. You stated that the 6th grade teacher didn't really care about the students. How would you describe the White male teacher?

Oh yes, he just simply said, "These are my expectations, and I know you guys can reach them because I care about you. I am going to work with you and make sure that you achieve. The 6th grade teacher said, "I don't care. I am just here because." This is someone who is from the community. The teachers who taught in these areas weren't from this area. They were transplants. This is someone whose children were raised in the community too. It was just that if it wasn't her, she didn't care.

Q. Is there anything else that you would like to share with me regarding anything that I discussed or anything that I did not discuss?

I do have a question for you. Your title, "Being on the Inside Looking In," so why that title? I thought it was really interesting. I thought yes, we are on the inside, but are we really on the inside. I thought the title was a good title because we are inside, but we still kind of look in on some things.

Narrative Seven – Students Saw You as Competition; That Was From Their Professors

Abstract. Dr. Rosenberg teaches in the biology department at an HBCU located in the Southern United States. Her mother is an educator, thus, Dr. Rosenberg was exposed to the importance of education at an early age. Dr. Rosenberg has never participated in any formal research-training program; however, she was always interested in science. Dr. Rosenberg cited the irony of teaching at an HBCU, yet she still represented the minority (i.e., African American women in science) among faculty. Dr. Rosenberg stated that both race and gender have influenced her career. However, she cited the significance of gender in her field, describing it as male-oriented.

Orientation. Can you please talk about your academic experiences, including highlights and challenges?

I got involved botany because I liked living things. I liked biology. I was interested in research to further my career, and I liked botany because I was able to be practical with my research. That appealed to me. In terms of my academic experience, I did an undergraduate, graduate and Ph.D. at three different schools. I gained something from each school, and each school had its own academic culture in terms of how they treated students and the students treated each other. My mother's a teacher's aide, so I have always been around education. I was familiar with science and kind of went with areas where I did well in during high school and the subjects that appealed to me. I thought, I like It. I can do well in this. Let me go for this.

Q. Do you mind talking about the differences in academic culture among the schools you attended?

As an undergraduate, I attended an HBCU where most of the students would work together as they tried to finish the courses they needed to finish their degree. For the master's degree, I attended a PWI, and the culture was relaxed and collegial. Most of the professors were collegial. This may have been because it was South University [*pseudonym*], and it was located in a diverse region of the United States, and the professors promoted collaboration. At the comprehensive PWI, where I earned my doctorate degree, things were different. It was not a collegial school, and the population was not as diverse as it was in South University. Students were more edgy. I found that most of the time, students saw you as competition rather than someone to collaborate with, that was spillover from their mentoring professors. It was much more intense at this institution.

Complication/Evaluation. Can you please go into detail about the student-professor interactions at each of the institutions?

Professors had a lot to do with that in terms of their personalities. As soon as I got there (i.e., the university where I pursued my master's degree), we were told, "We are not an island here. Let's talk to this person. This is how science life is. Since my advisor (a female) worked with us step-by-step, telling us, This is the process, and this is what is going to happen. There may be a period here where you might not like me very well, but just understand that I am trying to push you because there is a deadline so you can finish." She was

very open, and students in return were very open. At my doctoral institution, it wasn't that way. The professors wanted you to spend all of your time in the lab or working on the project. But, I learned early on, you can still be focused and do a good project and still have a life outside of your particular major. I thought that was important in terms of developing into a well-rounded individual. Also, when I got to my doctoral university, the students would say, "You might not want to tell your major professors this." I was actually approached with that comment by a former student of his (i.e. my advisor). I found students were not willing to help because a lot of the professors were not willing to help students. They wanted to make certain the students could struggle alone and figure it out. Students usually take on the behavioral traits of their professor, and that was how we usually interacted with each other. That was the major part in terms of the culture. I guess you could say it was more cutthroat at my doctoral institution than the institution where I earned my master's degree. And it wasn't because I was doing a Ph.D. It was the same way for the master's students at this school as well.

Q. What is it like to be an African American woman in STEM at your particular institution?

At my current institution, I often feel like a minority even though I am at a minority institution. By that, I mean I am at an HBCU and there still aren't a lot of Black females in the sciences. You come into a place where even though I am not a minority, I am still a minority. In the science world, it is typically a male culture, so you come into things with that mind-set—this is a

male culture! In terms of being a scientist, I like being a scientist; but as a female scientist, it is different. In high school, you have many female teachers, but you don't have many female professors, especially not in the sciences.

Q. Can you please describe the male culture in science?

Able to teach whatever class, whenever on a minute's notice—that is what I mean by male culture. Females typically have schedules and more going on in their lives. They can do it, but it is typically planned. By that, I mean I could teach a night class, but you can't tell me on Monday that you want me to teach a night class on Tuesday. So scheduling is not a factor for males. Males may not plan as much as females plan. Their world centers on work. With females, we typically make our work schedule "centered on family life." I don't mean just being married—centered around whatever the family life is. If they are single, they still have a family. So centered on family or being able to travel. Males typically put everything around work.

Q. Can you discuss some of the other challenges you have had in your career?

Family tends to be a challenge—to have one and to manage it. You spend a long time to study and become a PhD. So it's hard to start a family during that time. Then you spend time working toward tenure, and it's not advantageous to have a family during that time. When it is most advantageous for a family, your body may not be able to start a family. These issues are life challenges. In terms of working, if you are assertive, then you are perceived as aggressive. If you are not assertive, you are going to get

walked on. So it is a fine line in terms of trying to gauge how your counterparts feel about you. I think that the females play this political game because they have to. Males may not necessarily have to play the game, but females must play the game!

Result/Coda. How did you learn to play the game?

I had female mentors who told me things that I just was not thinking about because I just wasn't there. I had this at each step. There was a female mentor. She wasn't necessarily Black, but she was female, and she anticipated my questions. I believe males have a different idea of what mentoring means. I think male mentors interpret mentoring to mean, "You can come to me and ask me whatever you need, and I will help you." Female mentors anticipate what questions you are to have and bring forth answers. For me, that was the case.

Q. Do you believe that race/gender has any influence on your career status?

Yes, I am in a male-dominated profession. Most males will look out for each other because they feel intimidated when women come into their area. They think, "Oh my goodness, I am going to have to step up my game some." So they try to protect each other, and they may be quick to try and diminish your accomplishments in the eyes of others.

Narrative Eight - I Am a Non-Threatening Black Person to a Lot of White people

Abstract. Dr. Murray is a first-generation college student. She was born and raised in the southern region of the US. She attributes her success to the support of her family (i.e.

mom and sister), supportive female mentors (White) all throughout her life, and her friendly personality, which she believes does not threaten White people.

Orientation. Can you please discuss your academic preparation/experiences, including highlights?

The field I am in now, I had no idea I would be in it when I was in high school. I guess I was doing college prep and honors classes in high school. My parents didn't go to college, or my siblings. I didn't have any cousin that went through a four-year college, but I always knew I would go to college. Yes. I am completely first generation. I guess my preparation was through teachers who really believed in my ability. I had quite a few people along the way who took me under their wing and showed me a world that I would not have been exposed to if it was dependent upon my surroundings. In terms of college, when I entered undergraduate school, I entered as a biology major because I wanted to be a medical doctor. But I realized that it wasn't a good fit for me because of my personality and my studying skills. So, I was exposed to microbiology, and that is how I was introduced to epidemiology. Actually, Dr. Gregory's summer research-training program was a fantastic lead. The summer program was where I was introduced to epidemiology. Thinking about challenges, I don't think I had a huge amount of challenges in high school, and even in undergraduate school, people just took a liking to me. I am very people-focused and had great mentors. I am really outgoing, so I have always had great mentors.

Q. So, why do you think people tend to take a liking to you?

I am really, really outgoing and very friendly. In terms of talking and getting to know people, the things that I talk about with Whites are not racially charged issues, unless I know them really well and we can have a good conversation. Just the fact that I am just terribly friendly and people get to know me as a person. I really do think that sometimes they stop thinking of me as the Black female in the department. I connect with a lot of people on a personal level.

Q. How did you choose your major?

When I got to graduate school, that is when I decided that I wanted a research career and to go into academia. I had a mentor, a White female, who started mentoring me and gave me some good advice on how I could achieve that goal.

Q. Can you discuss your successes and challenges?

Successes, I remember like a broad picture in term of things. I didn't feel like anything was terribly hard. There were not any people of color in my program, very few minority students, and no faculty members of color. That also helped me make my decision, because we relied on each other for support, and we really counted on each other. I also had the support of family throughout the entire time. Even though my mom was a single mom, she and my siblings didn't quite understand, but they were always my cheerleaders. Also, I knew that my family sacrificed a lot for me—that was also a force pushing me.

Complication/Evaluation. Did you face any challenges, or barriers?

One of the barriers that I had was that I wasn't a particularly strong test taker. When I was applying for graduate school - for my Ph.D., that became an issue. So, I started initiating interviews so I could figure out the best fit. I kind of got used to people saying, "You may not do too well based on your scores." I have always been able to push through and do pretty well with my academic career. I feel like another barrier—it wasn't quite a barrier, but it turned into one because it was not the best for me. It ended up being more hurtful towards my success. The obstacle was I felt that sometimes some of my professors gave me too much assistance. Instead of me finding my way and figuring it out on my own, they would come to my rescue. So, while I was in "the moment," I would say, "Okay, yes, I need some help." Now, as I am mentoring minority students, I want to help make them pass, but don't want to give them so much help that it's like I am doing the work for them, because it really doesn't benefit the student at all in the long run. A couple of times they had good intentions, but they made it not as challenging.

Q. Can you talk about what your interactions and relationships were like with White faculty members and peers?

They have always been very positive. The only time I had a negative reaction with a peer was in graduate school. It was a White male, a fellow student. He would not confuse me, but he would confuse the other three African American women in our program. There were four African American women in the program. I would say to him, "They don't look alike." I would say that is the most tension that I had with any of my White classmates. There were some

other interactions that I had in undergraduate school, but they were with White folks that I really didn't even know. In terms of the situation that happened with the White male in graduate school, it was like the worst thing that happened. I never really had any random acts of racism. When I was in undergraduate school, we had this huge, huge problem in my dorm. A lot of it had to do with being in the South, and the Confederate flag was still flying, and this was like the mid-'90s. Racism was much more blatant in the South than when I was in the Northeast or Midwest. It is still very prevalent. In the South, I don't have to ask myself what they mean by that. I know exactly what they mean.

Complication/Evaluation. I just want to make certain that I understand you. Are you telling me there was one negative situation in graduate school while you were working on your Ph.D., there was a White male working on his master's and he would confuse the Black female students?

Yes, he didn't get me confused, but he would get the other three confused and call them by the wrong name. That was the worst situation that happened. They were friends of mine, and I would see how upset they would be because it was kind of like a sense of they never have to take the time (White males) to get to know you as a person, just labeling that person for the first name that you [they] could think of.

Q. Talk about your mentoring relationships, mentoring style, and background.

They were all White females. The one Black female mentor that I had, it was like a disaster. It was horrible, to say the least.

Q. Why do you think it was a disaster with your Black female mentor?

I think that it was a part of her personality. She was the type of person that if she was having a bad day, everyone around her was going to have a bad day. I think she had higher expectations of me and I wasn't meeting her expectations. I was having such a horrible time, I was very unhappy, and I'm generally a very, very happy person. But I started to get depressed and just hated to go to work because I had to interact with this person (i.e. the Black female professor).

Result/Coda. Talk about your successful mentoring relationships, what was their mentoring style and background?

As early as being in elementary school, there was always these White females who took a liking to me. I grew up not only in a single-parent household, but we were really poor. But I was in the advanced classes like honors, and so I was always one of one or two blacks in the class; and there were always extra activities that we were encouraged to participate in but I could never afford. I would not even ask my mom. I think I had asked her for something before, and she couldn't provide it for me, and I think the look in her eyes or something about how she responded, I pierced her level of disappointment in herself for not being able to provide this for her child, so I just never asked. As I went to undergrad, I had an advisor who was very supportive of me going on to graduate school. When I got to graduate school for my master's degree,

I had two research assistantships two half times, one with a White female. We are like really good friends now. When I went to work on my Ph.D., my advisor was really supportive. She would get fellowships, and tell me about all these opportunities that I could have and tell me to take advantage of these opportunities and that I shouldn't feel bad about taking advantage of them.

Q. What it is like to be an African American woman in STEM at your particular institution?

In my department, this is the beginning of my fourth year as a tenure track professor at a research-intensive university. So, the way that I came into the department was interesting because there wasn't a position available. They weren't hiring. What happened was that a professor who had been in the department was on my dissertation committee. The professor on my dissertation committee and the former mentor of the current professor, he told him about me. So he contacted me, and we started having conversation. He had been here long enough to know that university was always trying to diversify the staff and their students. He knew that even though there wasn't a position available, if they were to identify a talented minority faculty member, they could find money from various university funds to fund a position, and that is what happened. They created my position for me. They didn't announce the position. I came in to give a job talk, and I had to talk to students, interview with faculty members, but not with a search committee. They funded my position through funds from the Dean's Office and also, the Office of Diversity. They have turned out to be very supportive in my

department. I think what happened was that from the very beginning, I am sure they were thinking that I needed to prove myself, but I proved myself very early. In the first year I was here, I got two very substantial grants, and I have continued. I am out in the community. There have been a couple of comments, and they have always come back to apologize for what they have said, if they said something inappropriate in a meeting. My thing is this: I am not the most unbiased person myself. I have a little prejudice in my bones, and so I am not free to point fingers to anyone who has some thoughts in their minds, whether it's racial or sex related or gender related. A lot of those comments, when they come, I just let them roll off my back. Unless it is something really blatant and I am really offended. I am, like, whatever, those are your hang-ups. I don't have time to be dealing with your hang-ups because that will hinder my progress and what I want to accomplish.

Summary of Chapter Five

The purpose of chapter five was to provide in-depth responses to the interview questions. By providing the participants' responses in the form of Labov's (1972) narrative structure, my reader heard the exclusive words and voices of accomplished African American women as they reflected on their academic and professional experiences. Among the narratives, several themes emerged, providing a starting point for analysis. Primarily, the themes of mentoring, gender issues, and early academic preparation surfaced from the narratives. I use these themes to guide my interpretation of the respondents' experiences and outline the findings from this study in chapter six.

CHAPTER SIX

ANALYSIS AND FINDINGS

Introduction

In chapter six, I present the findings from this study. I outline the analytic themes that emerged from my analysis of the narratives. The major analytic themes are attached with associated two theoretical frameworks: (1) Black feminist thought, which served as the guiding theory for the study, and (2) the cultural theory of identity (Holland, Lachicotte, Skinner, & Cain, 1998), which was used to elucidate the unexpected analytic themes that surfaced from the respondents' individualized experiences. In addition, I provide quotations from respondent transcripts, offering my reader direct exposure to the voices of African American women in STEM. I summarize this section by segueing into the implications of this study for higher education policy and African American women in STEM.

Findings

Connelly and Clandinin (2000) suggested that interpretations of personal histories or narratives are not ritualized processes but complex understandings of experience. In addition, narratives serve a particular purpose. I used Labov's (1972) form of narrative analysis as my primary analytic tool, while also immersing a continual process of data analysis, identification of analytic themes, and interpretations of functionality for each narrative. In other words, I revisited my conceptual approach, developed initial themes, revised codes, and tried to identify the multiple purposes of each narrative. Analysis of the narratives yielded several findings: (1) women in this study did not interpret their individual

experiences from a Black feminist perspective (i.e., the women in this study did not interpret their experiences from a position of marginality); (2) the women in this study described the obstacles and challenges of pursuing a career in STEM from a feminist perspective, describing gender as more significant than race; (3) the women in this study experienced more positive interactions with Black male, White female, and White male mentors than with Black female mentors; (4) the women in this study described a shared conviction, involving the use of empowering or resilient undertakings as mechanisms for overcoming obstacles in their academic pathways; and (5) their collective academic identities were constructed in relation to interactions with other members in their academic communities and early exposure to the language and cultural norms of their academic disciplines. However, the construction of academic identity for these particular women included individualism (Mead, 1934). In this context it is important to note that individualism does not negate the relevance of collectivism. Individualism, as it relates to the construction of identity, refers to Mead's (1934) definition of identity, which is founded upon an "I-me" dynamic, forming the basis of a self, which is developed in relation to social activities and relationships. This form of identity development relies heavily on dialectical exchanges and symbolic forms of communication to influence identity construction.

I used Black feminist thought as the organizing theory for this study because it substantiates the role and significance of race, gender, and racial identity in the interpretations of particularized experiences. Moreover, I approached the data collection process with a conceptual map that connected my respondents' experiences with the ideologies of Black feminism thought. Thus, I expected race, gender, domination, and various interpretations of power to emerge as the primary analytic themes. Given that my

positionality is shaped by personal experiences with race, gender, and class, I anticipated narratives that explicated structural forms of oppression and a multitude of race-related obstacles in the pathways to success for the women in this study. However, the analytic themes from this study revealed two unexpected conclusions. First, through reflexive exchanges with my study participants, I recognized that my theoretical approach was shaped by *my* academic and professional narrative. Second, while my participants and I shared the same race and gender, we held very different perceptions and interpretations of our “marginality” along the axes of race and gender. Stated more concretely, the women in this study articulated their academic and professional experiences through the lens of feminist principles. In addition, their narratives were far less about the oppressive forces operating at the intersection of race gender, and more about using their positions along multiple axes of race and gender to *redefine* their self-definitions. The following themes emerged from the participants’ narratives: (1) mentoring and race, (2) gender, (3) activism in higher education, (4) early academic preparation, and (5) identity.

Connecting Findings to Analytic Themes

The findings from this study are not completely explicated by a Black feminist framework. However, I accepted the alternative findings as part of my role as learner and my participants in the role of teachers. What is more, Noblit et al. (2004) argued that the primary purpose of adjoining critical discourse with interpretation is to explore the possibilities of difference in positionality, voice, and perspective. Noblit et al. (2004) further contended that given the emphasis on reflexivity, the researcher accepts the speculative nature of her inscriptions of theory and epistemology—trading them in for an appreciation of multiple contexts of meaning, identities, and interpretations that study participants produce. To that

end, the findings in this study support some of the tenets within Black feminist thought, while simultaneously curtailing the *intersection* of race and gender as obstacles to success in STEM for this particular group of African American women. The failure to link the respondent narratives to the *intersection* of race and gender is a problematic finding, but important for retelling the histories of this particular group of successful African American women in STEM. Table 3 summarizes the connection between the major findings in this study and the analytic themes.

Table 3

Findings Linked to Analytic Themes

Analytic Themes	Findings
Mentoring & Race	Early exposure to the cultural norms of their academic disciplines, facilitated by mentors and teachers shaped identity
Gender	Gender represented more of an obstacle than race
Activism in Higher Education	Most of the respondents perceived their professional success as part of a broader agenda to expose and prepare minorities and women for careers in STEM
Early Academic Preparation	Early exposure to the cultural norms of their academic disciplines, such as science camps and research preparatory programs shaped identity
Identity	The women in this study expressed a common thread of resiliency as a mechanism for overcoming obstacles in their academic pathways

Analytic Themes

Mentoring. “Lack of mentoring is one of the most significant barriers to career and academic advancement; you don’t ‘climb’ to the top—you’re coached, counseled, pushed,

and supported into senior ranks” (Smith, 2000, p. 375, as cited in Collins, 2000). Pamela Smith’s words resonate with many scholars researching academic achievement among women of color, including African American women. I say this because several studies have substantiated mentoring as a pragmatic approach for understanding academic achievement, and addressing the underrepresentation of African Americans in higher education and the professoriate, despite the inconsistencies in definition and vague theoretical roots of mentoring (Dodson, Montgomery, & Brown, 2009; Ehrich, Hansford, & Tennent, 2004; Evans & Cokley, 2008; Gaston, 2004, as cited in Cleveland, 2004; Grant & Simmons, 2008; Harris, Freeman, & Aerni, 2009; Ishiyama, 2009; Kilgour-Dowdy, 2008; Smith, 2009; Tillman, 2001). Smith (2009) and Tillman (2001) offered several reasons why mentoring is a constitutive factor in higher education for minorities and women: (1) mentoring has the potential to populate the higher education pipeline, (2) institutional practices are improved by using mentoring to engage underrepresented students with the social culture of academic life, and (3) mentoring provides a structured opportunity for the transfer of knowledge and intellectual skills both sources of academic capital.

Smith (2009) further contended that the purpose of mentoring underrepresented students in the academy is to equip them with institutional cultural capital and with tools for negotiating border lives. In her analysis, institutional cultural capital refers to cultural norms prescribed by dominant groups that materialize in academic life (Bourdieu, 1977; 1992). Smith (2003) posited that students from underrepresented populations may hold cultural values that collide with institutional norms. Often, these students feel less acquainted with the unspoken rules of the institution. To that end, Smith (2009) also implied that underrepresented students need exposure to the rules of the hidden curriculum. However,

she does not release the institution from its responsibility to provide material resources that foster a climate of mentoring. She implied that without real resources and genuine commitment, mentoring is a futile political strategy, incapable of producing any difference in the experiences or academic outcomes for minority students in the academy.

In her book entitled *PhD Stories: Conversations with My Sisters*, Kilgour-Dowdy (2008) captured the nature of mentoring relationship, particularly among African American women in the academy. Exploring the role of professors as mentors, Kilgour-Dowdy (2008) offered a glimpse into the daily lives and interactions of Black female scholars with their students. During interviews with these scholars, Kilgour-Dowdy (2008) shared with her reader how Black female scholars view the goals and aspirations of their students; and the targeted strategies Black female scholars use to empower and affirm their students. Other scholars exploring the connection between mentoring and the academic experiences of African American women in STEM agree that mentoring African American women in the academy is critical, particularly because of their locations within interlocking systems of oppression (Settles, Cortina, Stewart, & Malley, 2007; Turner, 2003; Wasburn & Miller, 2004).

Moreover, Smith (2009) contextualized mentoring within the historical context and remnants of slavery, which propagated stereotypical images of African American women and constructed institutional boundaries at the intersection of race and gender. By situating a “lack of mentoring” within these contextual spaces, Smith (2009) instantiated institutional culpability in the denial of access to resources that ensure success for African American women. Consequently, reproduction of oppressive norms and failure to act continue to block African American women from achieving the same level of achievement as their White male

and female counterparts. Smith (2009) took the absence of mentoring for African American women a step further, arguing that failure to mentor or blocking access to opportunities violates Title VII of the Civil Rights Act of 1964.

Mentoring experiences for African American women in STEM. The women that I interviewed also identified mentoring as the most influential factor in their academic success. For instance, when I asked about their personal accomplishments, the respondents in this study linked mentoring to their academic success, personal well-being, and academic preparation for qualifying exams. Below are representative quotations from the respondents:

Uhm, definitely on the academic level, making sure that I fell into my classes and prepared for my qualifying exam and that type of thing, but also made sure that I was OK personally...the lady who would be my mentor actually let me stay there with her although she was actually going out of town the very next day. She had never met me before...so it was just her style of being open and it was very comforting. - Dr. Green

The biggest things I got out of the summer research-training program was a cohort of students who were attempting to do at that point the same thing I was—trying to understand what this PhD was about and trying to get prepared for this GRE and trying to take on a vision for themselves...the other side of that is just having the mentor...playing a big role in teaching us about to prep for these classes and exams, and what kind of career you can have with a PhD. - Dr. Hightower

Dr. Stacy implied that her mentor was significant in helping her “make it through” the first year of graduate school: “The focus is so much farther down. That is really critical because first year can crush you, as mine could have if I had not had a mentor.”

Mentoring is cited in the literature as a benefit not only to Black female students, but also as a priority to Black female academics. Kilgour-Dowdy (2008) interviewed Black female scholars in the academy, and her participants' stories resonate with the notion that mentoring is part of their professional responsibility and call to teach. Similarly, the respondents in my study also acknowledged that mentoring was significant not only in *their* academic lives but also in the experiences of *their* students. Dr. Geneva expressed her passion for mentoring students in the following passage:

One of my first students, she was in the first year of the PhD program. She waited a year before she went to graduate school; she gave me a thank-you note. Something that she said to me was, "Even when you were not in your teaching mode, I was learning something from you." You are not just my teacher, you are my mentor, my advisor, my mother, my sister, and my friend. So, for me, that is what I think about. Anytime a black woman walks into my office, she might see her mother, she might see her sister, she doesn't see a scientist. What she learns if she stays up under me is that it's okay to be beautiful and smart, and to be all that God intended you to be. That is what I want them to learn.

During the interview with Dr. Foster, I asked her about the main highlights of her career, and she cited mentoring as one of them: "Having student mentees and getting the first grants to study my particular area that supported the students. Another highlight would have been obtaining a grant to help students outside the classroom as well."

Mentoring and race. Despite the positive experiences related to mentoring, an alternative perspective on mentoring is that it has been used as another element within matrices of power and domination to *exclude* African American women from obtaining the

cultural capital required to navigate contested spaces (Fries-Britt & Turner, 2002; Smith, 2009). The rationale for this perspective arises out of the notion that traditional mentoring models replicate current institutional norms and practices by training mentees to assimilate as part of the criteria for success. Some scholars offer a remedy for protecting African American women in the academy from the potential negative effects of traditional mentoring models—pair African American women with mentors who share the same race and gender (Sligh DeWalt, 1999, as cited in Cleveland, 2004; Tillman, 2001). At the heart of this contention is the inference that African American women, by their unique locations at the intersection of race and gender, have a different set of academic and cultural needs, which are understood only by other African American women. The notion of intersectionality provides a plausible explanation for pairing mentors and students based upon gender and race.

A small number of studies on mentoring African American women in the academy implied the notion of intersectionality (Grant & Simmons, 2008; Patton & Harper, 2003; Patton, 2009; Tillman, 2001). Specifically, these studies highlight structural intersectionality—specific ways that race and gender make the experiences of women of color qualitatively different from White women (Crenshaw, 1991). For instance, Patton and Harper (2003) found that African American women in their study felt that they could only connect with another African American female. And the women in Patton and Harper's study contended that a White mentor, male or female, could not understand the uniqueness of existing in society at the intersection of race and gender. Despite the importance of connecting with mentors on several factors, pairing African American women with other African American is impractical given the paucity of representation of African American

women in STEM disciplines. In my study, Dr. Foster's experience challenges the tenets of intersectionality since she *does not* emphasize the importance of a mentor's race, but she does underscore the significance of gender:

Yes, my female mentors, because I believe males have a different idea of what mentor means. I think male mentors mean you can come to me and ask me whatever you need and I will help you. Female mentors anticipate what questions you are to have and bring forth answers; for me that was the case. I had female mentors that told me things that I just was not thinking about because I just wasn't there. I had this at each step—there was a female mentor. She was not necessarily black but she was female. She anticipated questions.

Thoughts on mentoring and race. Dr. Foster's experience negates the premise that her location at the intersection of race and gender served as a barrier to her academic success. However, extant research on the needs of African American women in STEM validates the contention that matching mentors and students based upon race and gender is beneficial (Downing, Crosby, & Blake-Beard, 2005; Tenenbaum, Crosby, & Gliner, 2001). As I reviewed Dr. Foster's transcript, I asked myself, "What made Dr. Foster's mentoring experience different?"

Dr. Foster explained that gender was more important in her mentoring relationship because of the differences between mentoring styles among men and women, regardless of race. Her position suggested that in her particular experiences, women were more likely to anticipate Dr. Foster's academic needs. In other words, her mentors provided guidance before she even asked. On the other hand, her experiences with male mentors suggested that men operated on an "informational basis" in their approach to mentoring. In other words,

male mentors never anticipated Dr. Foster's questions and viewed their role as simply representing a source of information once the student asked for guidance. The purpose of highlighting Dr. Foster's experience is not to draw any broad conclusions about how mentoring relationships should be developed for African American women in STEM. By contrast, I want to share her experiences and provide another possibility for conceptualizing the use of mentoring as a tool for promoting academic achievement.

Interestingly, a recent study by Beard, Bayne, Crosby, and Muller (2011) found that students in STEM who were matched with mentors by race and gender received more direction and assistance than other minority or women students who *were not* matched on race and gender. However, the study also concluded that academic achievement markers were not different between students paired with mentors of same race and gender and students not paired.

Being mentored by other African American women. Another unexpected finding from this study was that some of the participants related their *best* mentoring experiences to interactions with White females or White men. For those who had experienced mentoring that was matched on race and gender, the relationship was not productive, and the participant considered the mentoring relationship a failure. Below are some of the responses to questions that I asked about interactions with Black female mentors:

“The one black female mentor that I had was a disaster.” - Dr. Murray

My mentors, they are probably all White men. The one black female mentor that I had, it was like a disaster. It was horrible to say the least. I don't have a single female mentor, not one. We tried that once, and it was a train wreck. Like, don't

help me please. The person doesn't have to look like you—they just have to be willing to invest in you and know what they are doing. - Dr. Hightower

No, not a lot. I have colleagues, mentors. African American women, no. A lot of my mentors in grad school, and now, have been women; but they are not African American women. I have male mentors too that are different races, but the ones that I have turned to most consistently have been women. - Dr. Rosenberg

“I think having a mentor relationship is one thing that can help and doesn't necessarily have to be the same race/ethnicity and gender but someone who is sensitive to having a supportive environment.” - Dr. Green

The worst teacher I ever had was an AA female math teacher. She was my 6th grade teacher. I really didn't look forward to going to 7th grade because 6th was so bad. She taught other classes, but the math was what stuck out. It wasn't because she didn't know the discipline or anything like that, it was because she did not care about the students; and at that age, students need to know that you see them and that you care about them. They are willing to do anything for you in the sense that 'I want you to do well.' And they will do well. They will do their best. - Dr. Tracy

As I listened to the women in my study describe their mentoring relationships with other African American women, I was dismayed to hear how negatively they described their experiences. I used Black feminist thought to ground this study theoretically, since Black feminist thought is described as a theory that is created by and for African American women to explain the complexity of their negotiations along various dimensions of self-valuation and self-definition. However, I believed the accounts of my respondents were atypical. Furthermore, this finding raises questions about the role of mentoring in the lives of

successful African American women in STEM, and how Black feminist thought explicates the contrary views on matching mentors and students on race and gender.

On the other hand, given the variation in experiences and interpretations that Black feminist thought allows, this finding represents an opportunity for future study. Nonetheless, when I asked the respondents why their mentoring relationships with other Black women were unproductive, their responses included lack of empathy and caring on behalf of the Black female mentor, academic and professional jealousy, as well as the negative repercussion of small numerical representation of Black women in the academy. In other words, since there are so few African American women in STEM, the few who are faculty members become overburdened with trying to assist all of minority students, (in STEM and other majors) while simultaneously trying to meet the requirements of service, publication, and other milestones on the path to tenure. Simply stated, these women become burned-out and incapable of offering the best mentoring experiences to their students.

Researcher's reflection on mentoring. Throughout the interviews and data analysis, a nagging question remained in the recesses of my mind—"Why has pairing mentors and students by race and gender failed for these highly successful women?" My respondents provided cogent explanations for why their mentoring experiences with other African American women were fruitless. As I listened to their explanations, I reflected upon my personal mentoring experiences. Hence, I had to acknowledge that my mentoring experiences were actually similar to my respondents' experiences. Stated more concretely, most of my academic and professional mentors have been men. I have never had a female mentor.

Prior to establishing my research agenda or pursuing my doctoral studies, oftentimes I asked myself why I never had a female mentor—African American or any other race or ethnicity. As I mentioned in previous sections of this dissertation, my purpose in highlighting similar experiences and explicating alternative explanations for the findings is not to generalize to other groups of African American women. However, I am suggesting that these unanticipated findings concerning mentoring and race highlight potential areas for future research on African American women in STEM as well as in the academy. In addition, given the message that “African American women mentoring one another can be potentially disastrous,” I recognize that there is potential to re-examine how Black feminist thought explains these findings.

Summarizing mentoring in this study. Elucidating the distinctive experiences among this particular group of African American women is the primary purpose of using narrative analysis. Furthermore, I wanted to describe their experiences while engaging the possibility for alternative explanations for why their stories unfolded in a particular fashion. However, I faced a dilemma during the course of this study. Everhart (2004, as cited in Noblit et al., 2004) charges the educational researcher with the responsibility to address the structural forces of race, class, and gender as they moderated access to power, material, and cultural resources.

However, I attempted to accept my responsibility by allowing Black feminist thought to guide my research. Nonetheless, my participants’ stories failed to support the notion that the combination of race and gender limited their access or potential for academic and professional success. To this end, my hope is that my readers will welcome a dialogue on the multiple perspectives on positionality, subjectivity, and reflexivity that shape our

individualized experiences and use these multiple perspectives to evaluate how we interpret our own experiences in relation to race, gender, and class.

Gender

Collins (1986; 2000) expressed a deep level of commitment to assisting African American women in finding their own voices. As she penned the introduction to her second volume of *Black Feminist Thought: Knowledge, Consciousness, and the Politics of Empowerment*, she shared her struggle with identifying as the sole voice on the experiences of all African American women. Her feelings reminded me of the difficulty that many African American women feel about their particular experiences. However, Collins provided a sense of comfort for African American women who recognize the need to voice their concerns, yet they want to avoid the appearance of reifying the experiences of an entire group. Collins' words were as follows:

How can I as one person speak for such a large and complex group as African-American women....The answer is I cannot and should not because each of us must learn to speak for herself...part of a large process, as one voice in a dialogue among people who have been silenced (Collins, 2000, p. xiv).

White (1999) linked the experiences of African American women to the historical construction of Black and White women. Her contention is that slavery shaped the self-image of African American women and that the history of experiences provided them a foundation to maintain a high regard for self. However, the remnants of their slave histories has not provided these women the means to reject the requirement of proving their womanhood. This burden stems from the historical construction of African American women as something less than a woman. Thus, race and gender are inextricably linked in the

lived experiences of African American women (Crenshaw, 1991 Collins, 2000; White, 1999), unless they choose to “present themselves as pieces of wholeness” (Harris, 1981, p. 50).

Gender in STEM. The women in this study “added their voices” to the dialogue, by decentering their race, and emphasizing gender as the focal point of their epistemologies. I have no knowledge that their moves were intentional. But more important, these women were strategic, accomplished, and none of them denied the importance of race in the academy, history, or in their particular disciplines. In other words, the women in this study “theoretically rejected” the major premise of Black feminist thought, which suggests that their unique locations represent contested spaces—impeding access to resources and their academic and professional success. Here are a few examples of how the women described their experiences as “women” in STEM:

Again, I was a minority, in that I was African American. But we were pretty well even gender wise about 50-50 men and women, but the faculty was all male with the exception of one female who was nearing retirement. In 25-plus years, they had not hired a female in the department, and I did learn that many of the professors had issues with women being in mathematics. - Dr. Tracy

That is one thing I found that was interesting. Usually, when something happened that was not positive, it was related to gender as opposed to race. My personal opinion is that people are just more comfortable talking about gender, so when they say things that refer to gender. They know they can't talk about race, so they talk about gender. The things that happen that were negative was usually in relations to gender. - Dr. Rosenberg.

“The challenges are the challenges of being a woman.” - Dr. Hightower

After Dr. Hightower made it clear that gender was the major obstacle for African American and other women in STEM, I asked, “Do you think it is possible that African American women who are interested in STEM view gender as an obstacle, consequently, they shift away from careers in STEM?” Here is how Dr. Hightower responded to my question:

Absolutely, not just African American, but females. My students, who have come through when I was on tenure track, that were female, they were like, “I can’t do it.” They did not want to make the choices that I had made. I would say to them, “You don’t have to do it like I did it.” You go to a university where they understand that the tenure clock may have been put on hold while you have a child, or you decide to have children later. You have a husband that decides he is going to stay home while you are on a tenure track, and then you honor his career after you have gotten tenure. There are a lot of versions of that. That has to be told to students, because if they just look at women on a tenure track, it’s going to look like a man, unless the woman has decided to take those alternative routes. I didn’t have children because I wasn’t married. I didn’t choose to get married until I was 35—that is just the way it worked. That is perfectly fine with me. Women have to understand that having it all does not exist. You can this, or you can have that, so that in the end, you can have both. But all at the same time is insanity. You are only one person. Some adjustments have to be made on the university level, or you have to make the adjustments so you can actually end up with a family and a career. With my colleagues who I watch do it, they made those adjustments.

Dr. Foster reinforced Dr. Hightower's assertion that family concerns become central to a woman's decision to pursue academic and career pursuits in STEM:

Family tends to be a challenge to have one and to manage it. You spend a long time to study and become a PhD, so it's hard to start a family during that time. Then you spend time working towards your tenure, and it's not advantageous to have a family during that time. And when it is most advantageous for a family, your body may not be able to start a family, so those are life challenges. In terms of working, if you are assertive, you are perceived as aggressive. If you are not assertive, you are going to get walked on. So it is a fine line in terms of trying to gauge how the counterparts feel about something and express concern or something that you want, so I think that the females play this political game because they have to. Males may not necessarily have to play the game, but females must play the game.

Despite the fact that participants in this study expressed more concern about gender-related issues as opposed to their collective positions as *African American women*, there was one topic that a few participants identified as specifically related to African American women—relationships with Black men. Drs. Rosenberg and Hightower took on this critical point:

I know you make the point earlier that you wanted to focus on academic and professional stuff, but the fact that we are women means that the family part plays a big role just by definition. I think that is part of the reason women shy away from a PhD. They are thinking about kids, getting married, having a family and they are thinking, 'I can't do all that and get a PhD,' or 'I don't want to wait 5 to 7 years before I get married and have kids. I am already 22. I am so old when I finish my

PhD. I will be ancient.’ But I think that has an impact on the decision that we make. I think that there is an issue with African American women and finding mates with black men and the whole idea with this success gap and could cause tension in the relationship, and that might cause women to shy away from doing that. I think it is related. I think it has some impact. - Dr. Rosenberg

The system is built for men. If you take a biological clock with years it takes to do this, it is not built for women. My mentor was married, in graduate school; so when he came to start his faculty position here, he had a two-year-old. Who can do that? His wife had the first child when he was in grad school, and the second child when he was on his tenure track. He was here when I got here every morning 6:00–6:30, go home, eat dinner that his wife had made (she was working at the time), and then come back and be here working like I am working, until 11:00 p.m. Who can do that if you are the mother? That has to be a special arrangement if you are the mother? If you look at my colleagues, none of us had children until two years ago. That is bizarre. Those are choices that we made given the system that we were in. My colleague who is pregnant now is 40-ish and had her first child when she was 38 or 39. Other than her, none of the other tenured women faculty in our department has children. When I say we are alike, that is not a small fact. That is a pattern. - Dr. Hightower.

Are You an Activist for Higher Education?

Historically, education has been connected to paradigms of liberation (Anderson, 1989; Baszil, 2004, as cited in Cleveland, 2004, p. 161; Fairclough, 2001; Foster, 1993, as cited in McLaughlin & Tierney, 1993; Freire, 1970; Fultz, 1995; Loder-Jackson, 2011). For African Americans, that connection has been described as a “dialectical legacy of oppression

and activism” (Collins, 1986; 2000, p. 12; Loder-Jackson, 2011, p. 153). The role of Black female intellectuals revisits the idea that African American women’s perspectives and interpretation of experiences validate their ability to produce valid knowledge. However, some scholars claim that Black intellectuals align themselves with conservative ideologies in political and social movements (Fairclough, 2001). Given the tradition of activism, I wanted to learn whether the participants in my study viewed their roles or accomplishments in the academy as part of a broader agenda for activism in education.

Most of the women viewed their accomplishments as indirect contributions to equity and social justice in higher education for African Americans. In some cases, the women believed that their accomplishments served as examples for budding African American scholars, while other respondents believed that their participation in the institutional structures defined by the academy rendered their work a part of a broader agenda. I interpreted this notion to mean that the initiatives by larger institutions to include more underrepresented populations required participation from underrepresented groups who are already members of the academy. Below, I provide the responses that the women in this study provided on the topic of activism in higher education:

I do, because especially at this institution, where there just aren’t that many students of color, and even fewer faculty members, . . . When they look at me, they just don’t look at Dr. Murray, they look at me in terms of, like, representing the larger race—whether it is African American women all over the world or, in this particular state, the black race. I don’t just represent myself when they look at me. So when I do well and I succeed, I feel like it brings a positive light to my race. It makes the students and other faculty members realize that people of color can do just as well or

contribute just as much as Whites. I really feel that now, with the study I have working with African American females, daughters and their mothers. I had 21 undergrad research assistants last year, and I have 15 now. I agreed to take on so many undergrad students because this type of community-based work is not traditional in my department. So this is really their first opportunity to be involved in such a project, and additionally, because there is just so little interaction between majority students with people who don't look like them, and especially if they are not a student at the university. So I felt it was really important to give these students an opportunity. Before they start working, they go through a really intense cultural sensitivity training, because they just don't even think about it. A lot of them are from very rural towns, very small, where if there are any Black people there, it's like the biracial girl who they went to high school with. Yes I do feel that my success is part of an activist agenda. - Dr. Murray

Yes I definitely see it as an agenda, but the agenda isn't built on a good-hearted nature or doing the right thing. There is no such thing. The agenda for academic departments gathering more minority folks, if indeed that is their agenda, are because they want to be more attractive to students, they are concerned about their rankings, and it has to be some element of diversity in there for a lot of places. They don't want to be seen without any diversity. It's not because they think it's the right thing. The right thing does not make people do diversity, not the majority. It makes the minority do diversity because it is the right thing. Academics, you ask my colleagues if they care about diversity. Are you kidding me? No. What they care about is being a great

department. If that diversity agenda aligns with them being a great department, they are all for it. - Dr. Hightower

Dr. Rosenberg held a unique perspective on her role in a broader agenda of activism. She underscored the distinction between engaging in activities to promote equity in education on a micro versus a macro level. For instance, Dr. Rosenberg attributes her accomplishments to the broader agenda of social justice, only if others outside of her immediate academic circle are aware of what she is doing and how her efforts help minority students gain exposure to higher education. Dr. Rosenberg explained,

Only to the extent that people are aware of it. So how many people know that I am here doing this? The kids that we want to help, they don't. The kids that need help or we want to help, they don't know. That is why when I am able to or have an opportunity, there are kids who come to visit the campus from middle schools, I participate in those visits. I show my labs so they can see I am here doing this. The kids that are going to come to this university (i.e., a comprehensive research), they don't need to see me. They are okay. Well it helps to see me, but I think what you are talking about in terms of an activist agenda, they are not the ones who really need help. I think those kids they don't even know I am here.

Yes, I actually do. When you are saying accomplished, I think the community may be looking for where the publications are; but the accomplishments that we are doing is that we are working to increase the number of African American and women who are choosing to study STEM as their major of choice. - Dr. Tracy

Dr. Geneva extends her view of activism in higher education beyond the benefits to African American students. She views her role as one that helps students make connections between

the macro world and civic responsibility in the field of chemistry. Here is how Dr. Geneva explains her activism:

I see my role is helping my students make that connection, helping them to understand that chemistry is one of those sciences we use to understand the world we live in. So activism as an AA woman is not just ‘Okay, well I want to make more Black folks with PhD’s,’ although that is one of them. My other goal is that I want to help us understand that we have a responsibility to understand how everything is integrated, and we have to take care of what we have and those that came before us who didn’t quite get it. So now, we are seeing all these problems with our environment and all the health issues. I want you to take chemistry and understand how it affects you and your world. I want you to take some responsibility for that and make this a better place as a chemist. So my activism has moved from I want to help create as many AA PhD’s in STEM as I possibly can to *what is the big picture*. How do I get these kids to understand that you have a responsibility not just to make a lot of money from what you create in a lab but also in a broader scope as to how is what you have created in a lab going to affect not just you but your children and their children.

For the most part, respondents in this study generally view their accomplishments as one piece of a larger agenda on activism. However, two of the participants, Dr. Stacy and Dr. Foster, offered dissenting perspectives on the connection between their professional accomplishments and activism for higher education:

I don’t, but so many people come to mind. If you had broadened your study, I would have put you in contact with a very vocal male African American who knows that

that's his calling, and he tells you, and he is always about it to the extent that it is almost irritating. He will tell you quickly that his mission is to see more of us in higher education STEM. And so, he is all about networking; and you get a lot of information at an HBCU (more so than I am used to seeking at a Research 1) about opportunities for internships or jobs or whatever you might want to do. He is so phenomenal about that. I don't see myself that way. So I could definitely contrast when you said those words. I see myself as being an influential person, maybe, to a small body of people; and even my profession, physical chemistry, the discipline I've chosen—it doesn't impact a large number people. It's a gatekeeper. I'm not that big voice like this person that I have in mind when you said keywords that brought his name to mind. - Dr. Stacy

I don't think I do. By that, I look at it like I am trying to accomplish something for myself in a field that I like. I can do other things but I don't look at it like it is a greater good for all women. I haven't looked at like that. I haven't looked it like that but I look at my students, I view them that way, but I don't view myself that way. If we do this we can help students; particularly students in this region to go on and accomplish greater things, so I view myself as someone trying to accomplish greater things for my students. I want my students to have those accolades and my students to break barriers. But I don't think about it in terms of me. I have my own personal goals. - Dr. Foster

Summarizing the Role of Activism

Activism is a central theme in Black feminist thought. Most of the women in this study expressed similar views and identified particular areas of their work that exemplified their activist roles. However, two of the participants did not connect their academic and scholarly works with a larger activist project. Given the appreciation for difference in interpretation of experiences, Black feminist thought allows for multiplicity in interpretations and accentuates the fact that African American women, while sharing the same spaces, may interpret their locations from individual perspectives.

Early Academic Preparation and Constructing Scientific Identities

Given the fact that most of the women describe an early connection with their respective STEM fields, it is conceivable that their academic identities were formed before they entered college or graduate school. These early experiences are critical not only for educational purposes but also for early exposure to what it means to become a scientist. One aspect of constructing a scientific identity is a student's ability to develop scientific literacy (Brown, Reveles, & Kelly, 2005). Central to the task of acquiring scientific knowledge is to understand the practices, habits of mind, and ways of using scientific knowledge in everyday living (Brown, Reveles, & Kelly, 2005). The underlying notion of scientific literacy is examining the ways that students and educators use language, cultural norms, and identity construction to produce a scientific identity.

Production of a scientific identity renders the student a legitimate member of the scientific community. Identity in this context is described from a sociocultural perspective, given the emphasis on negotiation, dialogic exchange, individual histories, and cultural practices (Gee, 2001; Holland et al., 1998; Wortham, 2004). The participants in this study

shared stories about the significance of early academic preparation in their goals to become STEM scholars. Some of the participants received early academic preparation from teachers, family members, mentors, and research preparatory programs. Despite the fact that construction of a scientific identity was not a central focus of this study, it became apparent in the narratives of this particular group of successful African American women that early academic exposure to the practical applications and cultural norms within STEM influenced how they perceived themselves and their academic abilities. Below, I provide their renditions of how early academic exposure shaped their experiences and planted the seed for construction of scientific identities:

I guess my preparation was through teachers who really believe in my ability. I had quite a few people along the way who took me under their wing and showed me a world that I would not have been exposed to if it was depending on my surroundings.
- Dr. Murray

So if I think K-12: The highlights were pre-high school. My dad was a chemistry/math teacher in middle school, so I had always had chemistry and math in front of me. We were always practicing problems, the games we played were math games; so I first kind of thought about not necessarily chemistry at that age but math and science. STEM in general was from my dad. Then when I got to high school, I took a chemistry course as a sophomore, and it was fantastic. I loved it. I loved the math, was never afraid of the math because my dad was a math person. It never seemed threatening to me. - Dr. Hightower

I did well in school, in high and middle school and talking about what I wanted to do, my father would always tell me that if I really wanted to do well in a career, ‘you

should go into science. There are not a lot of black people in sciences, so you should go into science.’ My father is a math professor. He is in education. He would tell me, if I want to have a great career, ‘you should be a professor. You can do what you want to do. You get paid to sit around to think.’ So I had that in my ear. In high school, I did well in all my subjects, but I enjoyed my physics class the best. In the 11th grade, I was an AP physics course, and the teacher would do experiments in class, and I just enjoyed understanding how things really worked in the world around me. So at the time, physics was my favorite course. This was the time to start thinking about schools and start applying to colleges, so I decided that I would do physics. I had already decided that I wanted to be a professor, so basically, from that time on, I just decided I would do physics and would be a professor. So I made that decision in the 11th grade in terms of what I wanted to do. - Dr. Rosenberg

I knew early that I wanted to do something with math and science, as early as 7th or 8th grade. I had a math teacher who actually in 7th/8th grade went to high school. So I would say a strong foundation is what made me continue to do math and do well in it. Math more than anything because it made sense to me in undergraduate because of a strong support system in the sense that I have never been considered a minority, not as an AA woman or as a woman because the program was mostly women and the program was at an HBCU. Just having a strong network and support system is what led me to strive in the area because I was never doubted. People around saying I could do it and people around me who were doing it as well. - Dr. Tracy

“I am a fourth-generation teacher, so education is very important in my family. I have always liked math and science.” - Dr. Geneva

I got involved in biology because I liked living things. I liked biology. I was interested in research to further my career, and I liked biology because I was able to be practical with my research. That appealed to me. - Dr. Foster

Moreover, construction of identity from a sociocultural perspective considers how human agency produces the ability to author a particular “self.” Authoring an individual identity encompasses the ability of one to ascertain the relationship between power and possibilities, and self-direct to meet a particular goal and relax the grip of powerful forces on one’s life (Holland et al., 1998). Holland and her colleagues articulated identity in this way:

Self-consciousness and self-reflection develop in an active child as the product of social history. The person acquires the ability to take the standpoint of others as she learns to objectify herself by the qualities of her performance in and commitment to various social positions (for example, African-American woman, activist, or scientist) . . . Such objectifications, especially those to which one is emotionally attached, become cores of one’s proactive identities.” (p. 4)

Identity in Black feminist thought. Despite the fact that identity theory was not used as a theoretical foundation for this study, I must follow the path of the data, using a socio-cultural theory of identity to explicate some of the analytic themes. Identity is a central construct within Black feminist thought. In fact, a major premise within Black feminist thought is that multiple identities exist within Black consciousness (Du Bois, 1903; Collins, 1986; 2000; Fanon, 1967; hooks, 1981; 1989). These multiple identities intersect, overlap, and reinforce one another (White, 1999, p. 6). This phenomenon can be identified in the current study as participants shared how their perceptions of “self” were social, constructed through exchanges with mentors, advisors, teachers, other students, and family members.

The use of identity as a unifying construct in Black feminist thought parallels how identity is defined and produced within socio-cultural theories of identity. Examples from the narratives of the women in this study are presented below to demonstrate how the respondents viewed the formation of a scientific identity throughout their preparation in STEM.

Part of me wants to say yes, and I think the part of wanting to say yes is because of the environment I am in. It is very apparent here who the successful black people are. It is almost like a clique here. I have been here for five years, at times before I started having kids, I used to feel like I was in college again. It was very cliquish, like if you worked for this certain job, you had this certain level of success. The fraternities and sororities are very big here, so you know who all the successful people are. So in that sense, there is a shared identity even here at the university. I think that when I was living in another state (i.e., Southern United States) and the population of black people is so much greater, you had a large pool of successful Black people there. There was no one identity because there was so many. They came in so many different forms. I think it depends on where you are. It does not necessarily hold true for a unified identity. - Dr. Murray

I never like to put everybody in the same box; but interestingly enough, when I talked to my other female colleagues in chemistry, we are all similar. It is rather bizarre, but there are some very similar threads. Most of us have this ability to manage with men well, and not seeing it as threatening. We just know what to do. Actually becomes a non-kind of factor in our heads because we work like that almost all our lives. It's a part of what you do. People who focus on finding differences are going to struggle.

Because they are going to be all over the place. I don't think it is no small deal where I have a graduate education as a minority; that is a benefit to me. It has been because there is no adjustment; that is not a part of the adjustment. While I have colleagues who have had a strong HBCU, they have the same thing. Somewhere that got them confidence in who they were so that they could maneuver as a minority without a second thought. So where in there people get comfortable with who they are. So how did they get it? There are some very similar traits—being able to adjust on a dime at stuff that is happening is amazing. That is something that I think is a minority trait. So black people have . . . I don't want to put us all in one bucket...but my experience has been that black people are able to be with black people, and we are able to be with white people. So we make adjustments all day long. It's like blinking your eyes. You don't even think about it. You will make an adjustment all day long to different conversations, just steadily making adjustments and changes. Been able to do whatever you come up to, because that is how we live. If you live in the U.S. and you are a minority, you have to make adjustments. White people don't have to make adjustments. They don't have to make a single adjustment. If they don't like it, they don't like it . . . the majority does not have to make the adjustment, we are steadily making the adjustment; and if you can do that—and I don't mean you are making integrity adjustments. You're just making cultural adjustments constantly. -

Dr. Hightower

Defining identity. Holland et al. (1998) constructed a theory of identity that symbolizes the complex processes dictated by “enduring struggles”—historical, processional, and open-ended struggles. They refer to this process as “history in person”—the pattern of

connections between subjects' self-making and participation in local practices. In other words, as individuals engage in local contentious practices, all of their self-authored identities, cultural forms, and struggles, together, produce historical conditions and history in person. The definition according to Holland et al. (1998) is

People tell others who they are, but even more importantly, they tell themselves and try to act as though they are who they say they are. These self-understandings, especially those with strong emotional resonance for the teller, are what we refer to as identity. (p. 3)

Using this particular definition of identity, the application of a sociocultural theory of identity, may explain how the women were made aware of the academic cultures within their respective disciplines and how their interpretations of the academic culture led them to use empowering and resilient strategies as cultural artifacts, facilitating their academic success. Brown et al. (2005) provided empirical support for the notion that early exposure to language, cultural norms, and practices within the sciences contributes to the construction of a scientific identity for African American students.

Furthermore, Brickhouse, Lowery, and Schultz (2000) posited that African American girls who are introduced early to the contours of developing a scientific identity learn to use agency to author new identities within spaces of possibility. Local spaces of opportunity are where other identities can emerge as girls recognize the academic and career options that are available to them within STEM. Responses to the question "Do you think that there is a collective identity that accomplished black STEM scholars like yourself share?" provide plausible explanation for how the women in this study constructed scientific identities, and

viewed them as part of a collective identity; or alternatively, they did not perceive their actions or beliefs as part of a collective STEM identity.

In terms of school, and I mentioned this before, I do think that the fact that I went to an HBCU, and the one that I went to, we were just told things. Look, it is going to be hard. You have to behave a certain way, you have to do these certain things, you cannot be late to a meeting, and they just tell you this up front, and people know that; but I don't think you necessarily get that everywhere, and you are not necessarily told that you are going have it harder than everybody else. You shouldn't have it harder than everybody else. That is not fair. For me, personally, I think it was a service to have that instilled in me at an early age. I think that the institution where you go to grad or undergrad definitely has an impact. I don't see it impacting my identity, because at that point, you have pretty much got your identity I think. At that point, it becomes pretty much how you navigate your identity with the culture at that institution, and whether it is a good fit. Do you feel happy, comfortable? Do you like working there with the people that you are with? - Dr. Rosenberg

I think no matter where you are, you kind of have the same drive, a get-it-done attitude. I think certain things, regardless of color, women have uniquely that men may not in organizational skills, and those things that don't hurt in a STEM field, especially when you are trying to do many things—balancing that with a personal life and all that. Those might be some of the things I'd say. - Dr. Stacy

Throughout my interviews with these women, I learned that they believed there is a shared, collective identity for successful African American women in STEM, but I wanted to learn more about how this identity evolved. Given that Dr. Stacy maintained the collective

STEM identity superseded race and gender, I asked, “Where do you think those things come from? How do they evolve? Do they evolve from culture, exposure? Do they evolve in the institutional culture? Where do you think it comes from in women?”

I definitely think it’s a mixture. It’s what you’re exposed to. You are in many ways a product of your environment, so I’ve taken pieces of myself, I think, from the women’s college to the HBCU to the Research I, and that’s a part of my composition.

It makes me unique, I think. So, I think it is all of that together. - Dr. Stacy

Dr. Tracy attributed the collective identity to early exposure to the cultural norms and practices in STEM. Here is what she had to say:

I would have to say yes. For us, it was defined early on and encouraged early on.

The women that I know who are in STEM, they seem to just know; and it is beyond the color, and they are very supportive of each other. Not ignoring the color, when you look around and see that I am the only person here, unless it is specific to African Americans, then we are just there to celebrate each other. But yes, I do think that there is some strong identity that we all share.

Part of my quest for understanding how the women described their collective identities, was tied to my interest in learning how institutional culture shaped the collective identity by which these women link themselves. To that end, I also asked Dr. Tracy to expound upon her answer concerning a collective identity. Specifically, I asked, “Do you think that any part of that identity is shaped or influenced by the institutional cultural where a student is educated?”

Yes, in a culture that does not see the individuals, if they are not being supported as an individual, and identifying that as an AA these are obstacles, and being aware of

the world, and being nurtured in the identity of being AA. If they are not being nurtured, they will not thrive. - Dr. Tracy

For me, I don't consider myself as conceited or arrogant, but confident, because I haven't ignored what I had to go through to get here. I truly believe that what doesn't kill you will make you strong. I have no reason whatsoever to identify myself as a victim; and I think sometimes that is what we want people to do—have pity on us. Pity has its place, but don't pity me to the point that you stifle me. If you pity me, it's because you say she deserves a second chance, because we all mess up sometime. All of us do. If I come to you and say I want another chance, I think if you are honest with yourself, that is where the confidence comes in, and that is where you realize. You know what, the only way this is going to stop is if I stop. So, again, it goes back to the individual; so, I think you have to be honest with yourself about what you went through to get where you are and appreciate it. That is how I look at it. - Dr. Geneva

For the ones that I know, the ones in my circle . . . all of us are willing to help others. We work hard, we are terrible negotiators, generally friendly and efficient. Yes, shared experiences. All of us had one difficult experience in grad school. It was just a male/ female sort of thing. You didn't see it coming exactly. For each one of us, there is a situation where we felt pressured. It was this male/female pressure, and you just worked through it. - Dr. Foster

Identity was a common thread among the women in this study. Most of the women described a collective identity among successful African American women as one that evolves early, and is shaped by institutional culture through its failure to nurture their cultural and ethnic identities. In other words, a few of the women in this study believed that their

collective STEM identities were nurtured, while the cultural and ethnic identities were not. Thus, they had to assume the identity that was being nurtured—the scientific identity. The women also described the common thread of struggle or obstacles that were “overcome” by each, which contributed to a shared belief about their ability to support one another and survive in the face of academic and professional obstacles.

Summary of identity. Identity construction among talented African American women in STEM is a complex and multifaceted topic. While identity emerged as a critical, unexpected analytic theme for accomplished African American women in STEM disciplines, I presented these findings as possibilities for future research, and my goal was not to provide “correct” answers to any of the questions.

Several of the narratives suggested that the women in this study perceived their scholarly accomplishments through the lens of identity, or identification with other scholars, resources, and early preparation for STEM. Some of the significant findings related to identity revealed how these women viewed their obstacles and challenges as “par for the course” in STEM. In other words, their identity construction is a prerequisite for “doing science.”

Furthermore, each participant resisted the notion that their complex locations along the margins of race and gender had a negative impact on their academic and professional experiences. One of the participants resisted the notion that her complex location of “marginality” defined her as a victim. These women viewed their capacities to endure struggles in order to become “good scientists” as a requirement for achievement.

In addition, the narratives in this study may provide a basis for the argument that production of a STEM, or scientific identity requires African American women to

“acknowledge” race as problematic for African American women pursuing advanced degrees in STEM. However, it also requires them to set aside their racial identities and embrace their academic identities. The findings from this study concerning the construction of academic identities also raise questions about Black feminist thought. For instance, how does the theory address identity for accomplished African American women in STEM who assuage their racial identities and contend that gender is the precarious factor in their pathways to success?

Conclusion to Chapter Six

The purpose of this chapter was to provide an analysis of the interviews I conducted with my respondents and present the significant findings from this study. These significant findings are as follows:

1. None of the women in this study interpreted their individual experiences in STEM from a Black feminist perspective (i.e., the women in this study did not interpret their experiences from a position of marginality).
2. The women in this study described the obstacles and challenges of pursuing a career in STEM from a feminist perspective, describing gender as more significant than race.
3. The women in this study experienced more positive interactions with Black male and White female and male mentors than with Black female mentors.
4. The women in this study shared a common thread of acts of empowerment, or resiliency as a mechanism for overcoming obstacles in their academic pathways.
5. The women’s collective, academic identities were constructed in relation to their interactions with other members in their academic communities and early exposure to

the language and cultural norms of their academic disciplines. However, the construction of academic identity for these particular women included individualism (Mead, 1934).

In addition to presenting the analysis and significant findings, I also assessed the findings against the principles of Black feminist thought, identity theory, and relevant literatures.

In the final chapter for this study, I summarize the previous chapters. I discuss the implications of this study for future research on African American women in STEM. In addition, I address the guiding research questions and discuss possibilities for future directions on the topics addressed in this study. Policy suggestions are represented in the voices of the study participants.

CHAPTER SEVEN

IMPLICATIONS FOR FUTURE RESEARCH AND POLICY SUGGESTIONS

Summary of the Study

My purpose in conducting this study was to learn how African American women who are conducting research and maintaining academic responsibilities in STEM fields accomplished their academic and professional goals. My intention was to provide a glimpse into the daily experiences of successful African American women in STEM. Several themes emerged from my analysis, along with a few unexpected findings.

Organization of Dissertation

I organized this study in the following manner: In the first chapter, I introduced the research problem, purpose of the study, and rationale. In the second chapter, I provided a review of the literatures on the history of African American women in the academy. Next, I focused on the particular experiences of African American women in STEM.

In chapter three, I provided my reader with the core theories and conceptual framework that grounded this study: Black feminist thought. In addition, I outlined the linkages between Black feminist thought and critical race feminism. In chapter four, I described the research methodology, along with data collection procedures. This chapter also included participant demographics and researcher positionality, description and justification for using narrative inquiry as a form of data collection and analysis. I also described the limitations of this study. I dedicated chapter five to the personal narratives of each participant. Despite the fact that I did not provide the entire interview transcript, I presented a cogent summary of the interview to provide my reader with relevant themes and events in the lives of the participants.

In chapter six, I presented analytic themes and interpretations of the participants' narratives. I also used this chapter to illustrate the connections between several of the analytic themes such as race and mentoring, and early academic preparation and identity as strategies for success among this group of respondents, to the relevant findings from the study.

Addressing the Research Questions

In this section, I will address how the data from participants' narratives address or fail to address my guiding research questions for this study, which were as follows:

- 1) *How have African American women who are conducting research or who hold academic responsibilities in their STEM fields accomplished their academic and professional goals?* Most of the women in this study specifically identified early academic exposure and effective mentoring, as precursors to their success in STEM. After I teased out their stories, construction of academic or scientific identity emerged as another significant factor in their accomplishments.
- 2) *How have they negotiated the intersection of their multiple identities (i.e., race, gender, and class) during their academic pursuits?* Various forms of empowerment, such as resiliency, defined by Maluccio (2002) as a broad frame of reference, tools, and strategies used to guide an individual's ability to manage environmental stressors; and agency, defined as the ability of an individual to act strategically on her behalf to leverage perceived power in a particular context or within the confines of social institution were alluded to as mechanism for overcoming obstacles (Bourdieu, 1977; 1992). Playing "the game" was an important factor as these women negotiated their academic careers. In addition, having effective, supportive mentors (of any race or

gender), both within their disciplines and outside of their disciplines was another important aspect of their success.

3) *What cultural and historical foundations link equity in education for African American females in STEM, as perceived through their eyes and experiences?*

In general, the women in this study did not specifically address the historical representations of African American women in their experiences. However, one respondent provided the following comment, which suggests that she may view her experiences as part of an enduring struggle for African Americans as a whole:

You look back at history, and you recognize that if you buy into what is said, then you stop, and you allow the institution to win. My grandfather was a plasterer, and a lot of the older buildings built back in the '20s, '30s, and '40s, he worked on them, but he could barely read or write. My great-great-grandfather was a slave, and his master was a professor at a comprehensive institution in the south. The master's son befriended him and taught him how to read. You know the old saying, "Each one teach one." That was the responsibility of a learned slave. Now, I am a teacher. Education is what helps us not to be influenced by the institution to keep us from being who we are supposed to be. But with that education, you cannot be afraid to go back and look at from whence you come. I think a lot of times, some of us don't like to talk about slavery, or how our people have been treated. Not just back in slavery, but 45 years ago. Dr. Geneva

- 4) *Do African American women in STEM perceive their accomplishments as successes for an activist agenda in higher education?* Most of the women in this study perceived their accomplishments—teaching (particularly at an HBCU), grant writing, or program development—as part of an activist agenda, although two of the women disagreed with the notion that their accomplishments are part of an activist agenda in higher education.
- 5) *Is there is a specific, collective identity by which successful African American women collectively identify themselves in STEM?* Most of the women in this study agreed that there is a collective identity shared by accomplished African American women in STEM. In each instance, the women denied a collective identity on race. However, they agreed that the impact of their discipline, university life, or becoming a scholar in STEM connected their identities on some level.

Analytic Themes and Findings

Five major analytic themes emerged from this study. Below, I identify the themes and offer a brief synopsis of each theme:

- 1) **Mentoring and race.** The combination of race and mentoring surfaced as a significant factor in the success stories of the women in this study. Most of the women suggested that the development of effective mentoring relationships with faculty members who demonstrated a genuine level of caring for the student minimized the impact of academic and other obstacles in their academic and professional careers. What I found most relevant about this analytic theme was that the women in this study believed it was more important that the mentor share the same gender as the student and that race was less significant in the development of a good mentoring

relationship. Moreover, some of the women posited that within STEM, it is important that African American women have women mentors because they believed male mentors were less sensitive to the needs of a female student trying to learn the cultural practices, language and norms of the STEM disciplines.

- 2) Gender was a crucial factor in the academic and professional lives of the eight women in this study. Stated more concretely, each participant underscored the fact that STEM disciplines tend to be dominated by men, particularly White men. As such, the women in this study identified sexism as a major obstacle along the pathway to success in STEM for African American women. However, it was fascinating to hear the women describe most of their encounters with male colleagues as “collegial.” Although one of the participants clearly believed that men tend to understand the “rules of the game” in the disciplines of STEM, making it more challenging for women to navigate the academic topography. There were also notions that by the sheer nature of being a man, men in STEM disciplines were not confronted with the complexities of balancing work and family life. In their words, the women in this study attested to the fact that women were required to contend with family issues, if they wanted to become successful in STEM careers. The other fascinating finding from this study regarding gender was the observation made by one participant that African American women who choose careers in STEM, or the academy as a whole, may find it difficult to meet African American men as potential life partners and would have to decide if they would marry and build a family, or pursue their careers. This finding represents a fascinating prospect for future studies on African American women and men pursuing research degrees in the academy.

- 3) Activism. Most of the women in this study connected their scholarship with a broader agenda for activism and equity in higher education for African Americans in STEM, as well as women. Interestingly, two participants did not believe their accomplishments or scholarship represented a contribution to a panoptic agenda for activism in education. On the contrary, they believe their accomplishments were personal and only connected with activist efforts if communities beyond the walls of the academy were made aware of the participants' scholarship and research.
- 4) Early academic preparation was without a doubt critical in the academic lives of the women in this study. All except one participant received early exposure to what it meant to be a scientist and conduct research. Through mentoring, teaching, peer, or family connections, most of the women recognized their interest in STEM as early as elementary school. In turn, their interests were cultivated by participation in academic enrichment programs and early exposure to research.
- 5) Construction of a scientific or STEM identity emerged as an unanticipated but welcoming theme. The eight African American women described how their academic identities as future STEM scholars started as early as grade school. They also recognized the influence of institutional culture on the negotiations they made between their racial or ethnic identities as well as their academic identities. This theme represents another potential area for further research.

Findings

Analysis of the narrative themes led to several findings: (1) women in this study did not interpret their individual experiences from a Black feminist perspective (i.e., the women in this study did not interpret their experiences from a position of marginality); (2) the

women in this study describe the obstacles and challenges of pursuing a career in STEM from a feminist perspective, describing gender as more significant than race; (3) the women in this study experienced more positive interactions with Black male, White female, and White male mentors than with Black female mentors; (4) the women in this study share a common thread of resiliency as a mechanism for overcoming obstacles in their academic pathways; and (5) their collective academic identities were constructed in relation to interactions with other members in their academic communities and early exposure to the language and cultural norms of their academic disciplines. However, the construction of academic identity for these particular women included individualism (Mead, 1934).

What My Participants Taught Me

Through reflexive exchanges with my study participants, I recognized that (1) my theoretical approach was shaped by my academic and professional narrative, and (2) while my participants and I shared the same race and gender, we held very different perceptions regarding our race and gender. Stated more concretely, the participants' interpretations of their experiences and the functions of the stories were far less about obstacles and more about using their positions as *African American women* to redefine themselves and engage in acts of resiliency as a tool for producing an academic identity. These viewpoints facilitated their academic and professional accomplishments.

Implications for Higher Education Policy

By the year 2020, underrepresented minorities will maintain the highest representation of U.S. population groups (Van Der Werf & Sabatier, 2009). This expansion in human capital has a direct impact on how well the United States can utilize its human capital to infuse their multidimensional experiences into the range of solutions for global

concerns. In other words, this expansion of human capital is an opportunity for the United States to reexamine its approach to significant scientific and technological solutions by promoting input from underrepresented minorities. Throughout my analysis and interpretations, a few implications for future research emerged.

Future research on mentoring and race in STEM. One question that remains unanswered from this body of research pertains to the connections made between mentoring and race among African American women in STEM. In a previous section of this study, I posed a rhetorical question, “Why has pairing mentors and students by race and gender failed for these highly successful women?” My respondents provided cogent explanations for why their mentoring experiences with other African American women were fruitless. I reflected upon my personal mentoring experiences, acknowledging that my mentoring experiences were similar to my respondents. These puzzling and unanticipated findings concerning mentoring and race highlight potential areas for future research on African American women in STEM as well as in the academy. Although the purpose of this study is not to present generalizable findings, I believe this particular finding opens the door for additional research on this topic. Subsequently, with more studies on this topic we can invite dialogue to expand the discourse on Black feminist thought. For instance, by asking if there is potential to re-examine how Black feminist thought might be used to decipher these findings, we can learn more about the significance of the shared locations and experiences as well as the function and relevance of divergent interpretations.

Future research on gender in STEM. One of the most significant findings from this study was the fact that for the women in this study, gender represented more of an obstacle than race. The women in this study articulated their academic and professional

experiences through the lens of feminist values. This finding also provides another opportunity to explore the significance of gender in the academic accomplishments of African American women in STEM. Several questions remain unanswered by this finding:

- (1) Given that all of the respondents were African American women who attested to the fact that they as women and African Americans were underrepresented in their academic and professional lives, how is it that race was never a factor or obstacle in their pathways to success?
- (2) Since all of the women described their disciplines as “male dominated,” is race minimized as a critical factor for African American women in STEM?
- (3) Given that this finding negates the premise of Black feminist thought, are these successful women representing a shift in how we define race relations in the academy?

In other words, are these women’s stories examples of a new political ideology or movement in the US called “post-racialism?” If so, what does that mean for Black feminist thought and other theories that explicate the role of race in American social, cultural, economic and historical contexts?

Future research on identity and African American women in STEM. Black feminist thought was used as the organizing theory for this study. I used black feminist thought because it substantiates the role and significance of race, gender, and racial identity in the interpretations of particularized experiences. Despite the fact that identity theory was not used as a theoretical foundation for this study, I relied upon a socio-cultural theory of identity to explicate some of the analytic themes because identity is a central construct within Black feminist thought. In fact, a major premise within Black feminist thought is that

multiple identities exist within Black consciousness (Collins, 1986; 2000; Du Bois, 1903; Fanon, 1967; hooks, 2000). Exploring the depths of identity formation was beyond the scope of this body of research; however, I believe identity theory represents a promising extension of this study to examine research on African American women in STEM. Several opportunities exist for future research including, construction of collective STEM identities, the notion of figured worlds for African American women pursuing academic and professional careers in STEM, and addressing the question of how does a collective identity for African American women in STEM evolve.

Construction of collective STEM identities. The theme of identity in this study was not inconsistent with the theoretical framework—Black feminist thought. For instance, within Black feminist thought, identity is a major theme in the historical characterization of African American women, as African American women have resisted characterizations of their femininity by masculine norms, and as they resisted negative representations such as “mammies,” prostitutes, “welfare moms,” and other derogatory, controlling labels (Collins, 1986; 2000; White, 1999). Furthermore, identity has emerged as an analytic theme in the literature on mentoring (Hall & Burns, 2009).

More enticing is the fact that these women shared parallel perspectives across multiple contexts. For instance, (1) each of the participants adopted a feminist perspective, as opposed to a racial or Black feminist perspective, when recalling the challenges and obstacles in their academic and professional career paths; (2) each of the participants acknowledged that race remains an important concern with STEM; however, most of the women did not report personal incidents of racial discrimination along their pathways to success; and (3) each of the participants engaged in various forms of empowerment,

including acts of resiliency and agency as they authored their sense of self and as they learned how to navigate the academic cultures within their particular STEM disciplines. Specific examples of resilient or empowering acts were identified in the following quotations:

“You have worked hard and put in the time, you have time and knowledge—let it shine. Don’t let anyone intimidate you.”

“My initial reaction is that, no! I didn’t have any obstacles, because nothing stopped me from what I wanted to do!”

“You can’t let anybody stop you! You are going to have negative experiences. Someone is going to say something that is mean to you. It is all basically personal motivation stuff.”

Given that none of the women attended college or graduate school together, none of them were employed within the same institution at the time of the interviews, and all of them represented a variety of differences with regard to the types of institutions that they attended for undergraduate and graduate school and where they were employed at the time of the interviews, I wondered *how* their experiences could collide along multiple dimensions. Addressing this question is beyond the scope of this study. Perhaps the answer to this question can be explored in future studies on identity among African American women in STEM.

Policy Implications for Higher Education

I asked my respondents to share their suggestions on policy changes in higher education that may improve the experiences of African American women in STEM. In summary, their suggestions ranged from providing more funding for African Americans in STEM, to ensuring that underrepresented students received early academic exposure to STEM fields. Below, I provide specific responses to the following question, “How do you think that educators and policy makers can best assist in getting more black females into STEM?”

Mentoring. One respondent has this to say on mentoring:

More women mentors. As I said before, I just don’t think men truly understand what a mentor means as to what you are supposed to do. I think that you have to anticipate some of the questions because men and women were brought up differently. By that, I mean I have three daughters, and my husband and I were looking at one of our girls running, and she is eight. She was doing her little-girl run, and my husband said, ‘She’s not going get very far running like that.’ But that is just how little girls run. In terms of the counterpart—the males, they got their arms out there, and they are in stride. They are running, they are covering a great distance; so you have to anticipate some of those questions. They may be in the same household, but there are different rules in terms of growing up. Female mentors kind of help with some of that. I see why a lot of people don’t go into the sciences. They see a lot of working long days, not having a life; and they say, ‘I can’t go into that field.’ That is where administration comes in.

This respondent's suggestion aligns with the finding that the women in this study stated that their collective identities were formed through interactions with members in academic communities, including teachers, faculty members, and mentors. This policy suggestion can become actualized within more institutions of higher education if perhaps mentoring became incorporated into the institutional fabric and strategic priorities for universities, particularly as related to the tenure process. This would mean that faculty members' roles would expand, but it also means that universities would need to leverage their human and financial capital. For instance, training programs focused on mentoring, retreats and stipends might serve as external motivators for faculty members to become effective, genuine and caring mentors to students. In addition, perhaps the pedagogy of preparing teachers might expand to include "preparing to mentor your students for success." I also see the suggestion as one that might mean universities must systematically evaluate the skills and strengths of faculty members and administrators to learn more about which members of the academic community have the innate ability to capitalize on their strengths as mentors.

Funding. Another key suggestion from participants in this study was the need for more funding. Given current economic constraints and reduced funding from the federal government, this suggestion will be met with skepticism. However, colleges and universities are savvy in their quest and acquisition of research funds, capital funds for structural improvements and athletics. While this suggestion is thorny, perhaps colleges and universities might consider altering the traditional fashion by which funds and expenditures are prioritized. Stated more concretely, shifting the focus from tapping external funding sources and alumni for sports, perhaps using those same resources to invest in student

funding—in return, students serve as volunteers for various organizations and funding agencies.

African American boys. One of the fewer mentioned, but critical suggestions from respondents was the need for more guidance, mentoring and funding that promotes the success of African American boys in STEM. As one of the respondents stated,

I know you are focusing on females; but usually, it's both male and female. You know our numbers are down, as far as males are concerned in the area; and it's because of people like you that the numbers are down. What I mean by that is so many programs have been in place for years for women, and men have not been spotlighted.

This statement was profound because there has been a great deal of attention given to women in STEM for several years (Malcom & Malcom, 1995; Ong, Wright, Espinosa, & Orfield, 2011). However, boys have inadvertently moved farther down our list of priorities. There are ways that we can revive efforts to facilitate the success of African American boys in STEM. Similar to the women, early academic exposure to STEM careers, participation in academic preparatory programs, and working closely with teachers, professors, public and private organizations, as well as communities to provide practical implications for a career in STEM.

Recently, I met a woman who started a community-based, educational organization that offers African American males and females the opportunity to learn about science online and in person at various on-site events. Although I am unaware of the details and level of expertise, I believe the overall concept provides another opportunity for African Americans in nearby university communities can work as a collective to draw more students into STEM.

Other policy suggestions derived from this study include focusing on students with potential, not just the superstars and embracing diversity as strategic initiative at the university level. Of all of the policy suggestions discussed, these two might represent the most challenging because they require a shift in how institutions have operated for centuries and they mean a complete overhaul of academic culture and how institutions are viewed internally, externally and among other institutions. In other words, while these are important policy changes, they imply a change in ideology and perception of prestige. I believe these changes would redefine whom the “educated” are and who has the privilege to define knowledge – two criterion that will not be easily relinquished from the purveyors of dominant culture.

Appendix I

Interview Guide

Demographics

1. Name:
2. Contact Phone: _____ E-mail: _____
3. Current Position/Rank:
4. Institution/Type:
5. Specific Field of study/Research area in STEM

Background

1. What do you think the highlights are of your academic/career experiences in STEM? Can you please discuss them with me?
2. Can you please talk about your academic experiences in K-12, college and graduate school? Challenges or Obstacles? Successes? Influential people?
3. How did you become interested in pursuing a career in STEM?

Academic Preparation

Where did you complete your graduate studies in STEM? Were you involved in any type of preparatory programs or mentoring as it relates to STEM?

IF YES:

1. What was it like to be a student (i.e. UG & GR) in STEM? The preparatory program?
2. Did participation in the preparatory program prepare you to become a scholar in STEM?
3. Who was the program designed to serve? (e.g. minorities, women, etc...)
4. Who sponsored/implemented the program? (i.e. was it based at an institution? Which one?)
5. At what level of your education were you involved?
6. Are you still involved in any capacity with the program or current participants?
7. What were your interactions/relationships like with other African American women in STEM and other women of color as you pursued your academic career?

IF NO:

1. What were the reasons why you were not involved in a preparatory program? Were you aware of STEM preparatory programs at the time that you became interested or started pursuing your academic interests in STEM?

2. Were there other ways that you became involved in STEM (formal or informal; program/experiences, educators, parents, peers, etc.)

Career

What is it like to be an African American woman in STEM at your particular institution? Rewarding? Challenging? If yes, how so?

1. Do you have other African American women as mentors, colleagues, etc.
2. What are your interactions like with them?
3. Can you describe your interactions with your peers?
4. What are your interactions/relationships like with White faculty members?
White Peers?
5. What are the major challenges in your career?
6. Are there concerns about your race or gender as a STEM major? By whom?
7. How do you manage those issues/challenges?
8. How do you view the combination of race, gender and class in your academic pursuits?
9. Do you still contend with any of the same issues that you faced while you were pursuing your terminal degree?
10. Do you have colleagues who are African American women?
11. What are your interactions like with them? Other women of color?
12. Does your race or gender have any influence on your current career status?
13. How do you contend with those issues?
14. What/Who was most helpful in your accomplishment of your terminal degree?
In your current career?
15. Do you view your personal accomplishments as part of a broader activist agenda in education? If so, can you describe how the two are connected?

Suggestions

How do you think we (educators and researchers) can best assist with getting more Black females interested in STEM careers

1. What suggestions do you have for Black females interested in STEM careers?
2. What advice do you have for Black females currently pursuing a terminal degree in STEM?
3. Do you have suggestions for how to develop or implement programs designed to serve Black females in STEM?
4. What do you think would be the most effective academic policy changes (or other changes) that can be made to make certain that African American women succeed in STEM?

5. What should educators and researcher understand about African American women pursuing STEM careers?

Identity

1. Do you believe there is a collective identity that accomplished Black STEM scholars share? Can talk about where it comes from or how the identity evolves? How it is shaped and influenced by institutional culture?

Wrap up

Is there anything else that you would like to share with me? If you can think of other women (like you i.e. successful African American women in STEM fields) who may be interested in participating in my study, would you be willing to please ask them to contact me?

Appendix II

Letter to Prospective Participants

To: Potential Study Participants

Subject: Participation in My Dissertation Research Study

Greetings Dr. _____:

I am writing to extend a personal invitation to participate in my study.

My name is Stephanie Galloway. I am a doctoral student in the School of Education at the University of North Carolina at Chapel Hill conducting a qualitative study for my dissertation. Thank you for contacting me and expressing interest in my study.

As you are aware, I am conducting narrative interviews of 8 African American women teaching or conducting research in Science, Technology, Engineering, and Math (STEM) disciplines. The purpose of my study is to:

- Gain an understanding of the academic success patterns of African American women teaching, or conducting research in Science, Technology, Engineering & Math (STEM)
- Identify “frameworks for academic/professional success” – as identified by African American women in STEM careers
- Seek policy suggestions for improving the experiences of African American women in Science, Technology, Engineering & Math (STEM).

I would like to arrange a convenient time to meet and discuss the details of the study with you; however, here are a few important points to help you decide if you would like to arrange a meeting with me:

- I am conducting semi-structured interviews that will last for approximately 60-90 minutes
- Your interview will take place at a date, time and location of your choosing.
- I am including a copy of the consent form, which provides more information about participating in the study and asks for your written permission to take notes and record our conversations.
- If you decide to participate in the study, you will be interviewed one time during the fall 2011 or spring 2012 semesters.
- The study will be supervised by my research advisor at UNC-CH, George Noblit, Ph.D. He may be contacted at (919) -962-2513 or e-mail gwn@email.unc.edu.

I hope you will agree to participate. Your success story is important in the discourse on African American women in STEM disciplines. If you would like to contact me to arrange a time to discuss the study and to grant your written consent to participate in the study, please contact me at (919)-604-3812 or e-mail at ggstepha@unc.edu.

I look forward to hearing back from you!

Thanks,

Stephanie Galloway
Doctoral Student
University of North Carolina at Chapel Hill

Appendix III

Consent Form

University of North Carolina-Chapel Hill
Consent to Participate in a Research Study
Adult Participants
Social Behavioral Form

IRB Study Tracking # 101249

Consent Form Version Date: July 8, 2011

Title of Study: On the “inside” but still looking in: Reflections of accomplished African-American women in Science, Technology, Engineering & Math (STEM) Disciplines

Principal Investigator: Stephanie Galloway

UNC-Chapel Hill Department: School of Education

UNC-Chapel Hill Phone number: 919-843-4357

Faculty Advisor: George Noblit

Study Contact telephone number: 919-604-3812

Study Contact email: ggstepha@unc.edu

What are some general things you should know about research studies?

You are being asked to take part in a research study. To join the study is voluntary.

You may refuse to join, or you may withdraw your consent to be in the study, for any reason, without penalty.

Research studies are designed to obtain new knowledge. This new information may help people in the future. You may not receive any direct benefit from being in the research study. There also may be risks to being in research studies.

Details about this study are discussed below. It is important that you understand this information so that you can make an informed choice about being in this research study.

You will be given a copy of this consent form. You should ask the researchers named above, or staff members who may assist them, any questions you have about this study at any time.

What is the purpose of this study?

The purpose of this study is to: 1) Gain an understanding of the academic success patterns of African-American women teaching, or conducting research in Science, Technology, Engineering & Math (STEM) disciplines; 2) Identify frameworks for academic and professional success – as identified by African-American women teaching, or conducting research in STEM careers; 3) Seek policy suggestions for improving the experiences of African-American women in Science, Technology, Engineering & Math (STEM).

You are being asked to be in the study because you have been identified by a member of your community of STEM scholars as a successful, African-American women teaching or conducting research in Science, Technology, Engineering & Math (STEM). That is, either Dr. Gregory [pseudonym], former director of the Summer Pre-graduate Research Experience (SPGRE program) or another African-American women who participated in the study thought that you fit the criteria as a potential study participant and may be interested in the study.

How many people will take part in this study?

If you decide to participate in this study, you will be one 8 people in this research study.

How long will your part in this study last?

I am proposing to conduct this study over the course of one academic year, from the beginning of the fall 2011 semester into the following spring 2012 semester. I want to conduct a single intensive, narrative interview with each of eight, self-identified African-American women who have successfully earned terminal degrees in STEM disciplines, and who are teaching or conducting research in Science, Technology, Engineering & Math (STEM).

You will be interviewed once in a location of your choosing; the interview will last 60-90 minutes. The date of the interview will be a mutually agreed upon date, starting in August 2011 up to January 2012. Your involvement in the study will last be limited to this one interview.

What will happen if you take part in the study?

If you decide to participate in this study, several steps will take place:

1. After you agree to participate in the study, we will arrange a convenient time/location to conduct the interview that is anticipated to last 60-90 minutes, but you can respond as little or as much as you like to my questions.
2. At the interview, I will remind you that your participation is voluntary and once again ask your permission to audiotape the interview, and to take written notes. I will obtain your signature on a paper copy of the consent form at that time.
3. The interview will address questions about your educational experiences and preparation in your academic/STEM discipline. For example, I may ask, *“How did you become interested in pursuing a career in STEM?”*

What are the possible benefits from being in this study?

Research is designed to benefit society by gaining new knowledge. You may not benefit personally from being in this research study.

What are the possible risks or discomforts involved from being in this study?

There are no known risks related to your involvement in the study. There may be uncommon or previously unknown risks. You should report any problems to me.

How will your privacy be protected?

The risk for your involvement in this study is minimal; however, there may be some risk of someone learning your identity. However, I will take several measures to protect your identity by asking that you avoid the use of “real names” during the interview. I will remove your real name from all notes, documents, and audio recordings. In addition, I will create ID codes and pseudonyms for all of your identifying information, such as names, home institutions, birthplace, etc.

Participants *will not* be identified in any report or publication about this study. Breach of confidentiality is a potential risk that will be minimized by securing consent forms displaying participant information in a locked file cabinet, to which only the primary investigator will have the keys to access, securing all information in a secure computer system to which only the primary investigator will have access, storing all audio tapes of interviews in a locked file cabinet and destroying all interview audio tapes after the transcription, and using no real names in any publication of the findings. Please check the line that best matches your choice:

_____ OK to record me during the study, so the researcher can accurately capture what is said

_____ Not OK to record me during the study; just take notes instead

What if you want to stop before your part in the study is complete?

You can withdraw from this study at any time. If you decide to withdraw from the study, you may also request that all of your interview data will be destroyed.

Will you receive anything for being in this study?

You will not receive anything for taking part in this study.

Will it cost you anything to be in this study?

There will be no costs for being in the study

What if you have questions about this study?

You have the right to ask, and have answered, any questions you may have about this research. If you have questions, complaints, or concerns, you should contact the researchers listed on the first page of this form.

What if you have questions about your rights as a research participant?

All research on human volunteers is reviewed by a committee that works to protect your rights and welfare. If you have questions or concerns about your rights as a research subject, or if you would like to obtain information or offer input, you may contact the Institutional Review Board at 919-966-3113 or by email to IRB_subjects@unc.edu.

Title of Study: *On the “inside” but still looking in: Reflections of accomplished African-American women in Science, Technology, Engineering & Math (STEM) Disciplines*

Principal Investigator: Stephanie Galloway

Participant’s Agreement:

I have read the information provided above. I have asked all the questions I have at this time. I voluntarily agree to participate in this research study.

Signature of Research Participant

Date

Printed Name of Research Participant

Signature of Research Team Member Obtaining Consent

Date

Printed Name of Research Team Member Obtaining Consent

Appendix IV

E-mail and Outline of Initial Analytic Themes

E-mail

Greetings _____:

Once again, I thank you for participating in my dissertation study. I hope you had a good holiday break.

The purpose of my communication is to invite you to review the emergent themes from all of the interviews from my dissertation study. This process will provide me with a “check” on the validity (i.e. trustworthiness) of my initial analysis. Hence, I have attached a one-page outline of the themes from all interviews. If you choose to review and comment, please feel free to respond by Wednesday, January 11, 2012.

If not, please do not feel compelled to reply. I recognize the spring semester begins very soon and I fully understand that you have a very busy schedule as you prepare for the new semester.

Again, thank you for all of your support. I would not have made progress on my dissertation if it were not for your willingness to participate in my study. Take care!

Stephanie N. Galloway
Research Assistant
School of Education
University of North Carolina at Chapel Hill
ggstepha@email.unc.edu

Who wants to be well-adjusted to injustice?
~Cornel West~

Outline of Analytic Themes

I. What Was This Story About?

- A. Academic preparation; Early interest in major
- B. Influential people (HS teachers, college professors and family)
- C. Research preparation

II. Orientation of the Story - Who; What; Where; and When?

- A. Influential people: Family, educators, mentors, peers, co-workers, employers
- B. Few *external** obstacles/Challenges in undergraduate school
- C. Few *external* obstacles/Challenges in graduate school

III. Significant Events

A. Obstacles/Challenges in Undergraduate School

1. Race and/or gender issues
2. Cultural differences
3. Academic challenges; Academic performance in major; Previous preparation
4. Socialization with peer groups
5. Impact of “type” of institution (HBCU; traditional White University, public, private)

B. Challenges/Obstacles in Graduate School

1. Race and/or gender
2. Cultural differences
3. Academic challenges; Academic performance in major; Previous preparation
4. Socialization with peer groups
5. Impact of “type” of institution (HBCU; traditional White University, public, private)
6. Personal and/or family life; Finding a balance
7. Inter & Intra-racial negotiations, academic and/or racial identity

IV. Why Are The Issues Significant in Participants’ Experiences?

- A. Impact of mentors and research advisors; Significance of mentor’s race and/or gender
- B. Influence of mentoring styles
- C. Mentoring and its impact on career/experience

V. What Finally Happened in This Story?

- A. Learned to play and understand the rules; Learned to navigate institutional culture
- B. Developed or maintained resilience
- C. Co-construction of academic identities

VI. Conclusion

- A. Suggestions/Implications Research & Education Policy
 1. Social justice/Activism in education – is there a role?
 2. Early academic preparation
 3. Remember African-American boys in STEM
 4. Types of studies i.e. more qualitative
 5. Intra-racial dynamics in the experiences of African-American Women in the academy
 6. Support within smaller circles of AA women in STEM & Academy; cross-discipline

Note. I use “external” to mean external influences vs. “internal” meaning influenced by the individual, personal choice or decision. This document was e-mailed to participants on January 03, 2012.

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