The Psychosocial Factors Contributing to the Underrepresentation of African American Males in Advanced High School Mathematics Courses

by

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DEDICATION

Dedicated to the memory of my paternal grandmother, Robbie Elizabeth Rowlett, and my maternal grandmother, Mary Frances Stanley

I know I made you proud

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ABSTRACT

This case study examined the beliefs of African American males on the psychosocial and pedagogical factors contributing to the underrepresentation of African American males in advanced high school math courses. Six 11th grade African American male juniors from a large, comprehensive, Southeastern high school served as individual cases. Within- and cross-case analyses were used to determine similarities and differences among the cases. Review of literature findings indicated that psychosocial factors, such as the stigma of “acting White,” racism and stereotype threat, teachers’ low expectations for minorities, and a lack of African American male educators are ever-present barriers to math success for African American male. The Eurocentric school model that is pervasive in our nation’s schools establishes numerous, ingrained obstacles for success: the tracking of African American males into lower level math classes; ineffective, traditional pedagogical practices; and a cultural disconnect between European and African values. This study revealed several barriers to African American males’ taking advanced math courses: their parents’ being uninvolved in their course-taking decisions; lack of communal learning experiences; and a lack of encouragement from their teachers and guidance counselors. Contrary to participants’ responses from prior studies, these participants revealed that the effects of racism and stereotype threat on their math journeys were minimal. The participants were highly motivated by competition and math games.

Keywords: advanced math, African American males, culture, Eurocentric, mathematics, pedagogy, peer influence, psychosocial, STEM

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CHAPTER I

INTRODUCTION

Background of the Study

The economic, social, and educational status of African American males is critical according to statistical measures such as premature death rates, substance abuse rates, out-of-wedlock births, and high school dropout rates. This representation, says Williamson (2012), contrasts sharply with their underrepresentation in groups that provide experiences that lead to college and better paying jobs. For example, the percentage of African American male representation in advanced high school math courses pales in comparison to all other ethnic groups. As such, African Americans are vastly underrepresented in science, technology, engineering, and math (STEM) fields (Williamson, 2012).

This dearth of African American male representation in STEM fields is a symptom of their being the most at-risk and underserved ethnic group in our nation's schools. Unfortunately, African American males' plight is forged by schooling practices that begin long before they enter high school. In fact, before they finish elementary school, many African Americans suffer from classroom experiences and teacher practices that woefully underprepare them for high school. Thus, when African Americans begin to struggle with secondary coursework, they become emotionally and cognitively disconnected from academics. Even worse, many of them choose to quit school rather than continue to struggle in an environment that is overwhelming if not uninviting, which, in many inner-city schools, has resulted in dropout rates as high as fifty percent (Williamson, 2012).

The federal government's emphasis on testing and the tracking of data on at-risk student populations has revealed further African Americans' lack of scholarly achievement. For example, African American males consistently score significantly lower than their White counterparts on standardized math, science, writing, and reading assessments (Gordon, Gordon, & Nenbhard, 1994). In addition, even those who plan to attend colleges and universities are graduating high school with subpar academic ability. Years of statistical data consistently show that African American males do not perform as well as Whites on standardized math examinations such as the Scholastic Aptitude Test (SAT) and the National Assessment of Educational Progress (NAEP) (Snipes & Waters, 2005). Therefore, unless school officials implement aggressive programs that strive for the sole purpose of improving African American males' educational experiences, these outcomes will likely continue to be the norm.

If African American males and other minority groups continue to struggle in STEM related courses, the consequences will impact not only our local communities but also our national standing. According to 2004 U.S. Census Bureau reports, African American, Hispanic, and Asian populations will increase at a significant rate by 2050, some doubling their then-current population percentages, to encompass half the U.S. population, whereas Whites are predicted to decrease their population percentages (Palmer, Davis, Moore, & Hilton, 2010). This increase in minority populations in the United States, however, will not increase their influence in math- and science careers. As a result, according to Palmer, Davis, Moore, and Hilton (2010), America's influence in the world's global economy will diminish over time (Palmer, Davis, Moore, & Hilton, 2010).

The plight of African American males is attributed to several factors within the schools' spheres of influence. The most obvious contributor to African American males being underrepresented in STEM fields is their graduating high school without taking advanced math courses (Kelly, 2009; Baranchik and Cherkas, 2002). The origins of this problem are established years before they enter 9th grade. A great deal of research (Palmer, 2010; Davis, 2003; Epps, 1995; Jackson & Moore, 2006) has shown that negative expectations of teachers and guidance counselors at the elementary level greatly inhibit African American males' success in high school. Many educators are familiar with the Pygmalion Effect, which argues that students rise to the levels of teachers' expectations. Unfortunately, the opposite is also true, for students will also descend to teachers' lower levels of expectations.

It is not surprising that unequal academic training between African Americans and Whites has resulted in achievement gaps between the races. The National Council of Teachers of Mathematics (NCTM) describes achievement gaps as "disparities among groups of students usually identified (accurately or not) by racial, ethnic, linguistic, or socioeconomic status with respect to a variety of measures, including attrition and enrollment rates, alienation from school and society, attitudes toward mathematics, and test scores" (Mathematics, 2005, paragraph 1). According to American College Testing (ACT) research, these achievement gaps are narrowed when students have similar requisite academic achievement (ACT, 2007). Similarly, Tate (1997) found course taking to be an equalizer of achievement gains across various ethnic groups. These findings indicate that courses taken during students' high school years may serve as predictors regarding their potential for success in college.

Williamson (2012), however, found evidence that challenged Tate's (1997) claim. He found that African American males in lower-level math courses score, on average, half a standard deviation below their White classmates, and in higher-level math courses score, on average, 1.5 standard deviations below their White classmates, suggesting that taking advanced math courses may actually increase the deficiency gap between Black and White males. This argument, however, seems to overlook the fact that both Blacks and Whites who take advanced math courses score higher than students who take standard courses. As such, the differences in achievement by race may be wider among the advanced cohort, but the positive outcome is higher overall scores for students of both races. Therefore, it seems that uniform course selection is not the panacea for closing achievement gaps between the races. Other factors that affect African American males' performance in math, as defined by NCTM, include cultural experiences, social upbringing, teachers' expectations, and teaching strategies (Berry, 2005).

Much of the literature on the plight of African American males in math education focuses on the symptoms rather than the underlying problems. This narrow scope, unfortunately, heightens public awareness of African Americans' history of failure and dysfunctional behavior, resulting in race being classified as the primary reason for African American males' underachievement (Gordon, Gordon, & Nembhard, 1994; O'Connor, Lewis, & Mueller, 2007; Stinson, 2006). Blaming skin color alone for African Americans' underachievement suggests that students' academic futures are predestined before they leave the womb. Fortunately, many researchers reject the blaming of nature and insist that students' nurturing and socialization experiences are crucial factors in their academic failures, prompting some researchers to shift their focus from race to "the racialized nature of students' mathematical experiences that most profoundly influences these outcomes" (McGee & Martin, 2011, p. 49).

When studying African American males in mathematics, Stinson (2006) urged researchers to move from focusing on the discourses that emphasize deficiency and academic rejection to focusing on the discourses that emphasize achievement. Such initiative, he claimed, would contribute to the development of sound educational practices that close achievement gaps. Most research on equity education conducted from 1982 to 1999 focused primarily on negative outcomes and not enough on the impact of schooling experiences (Ladson-Billings, 2006; Lubienski & Bowen, 2000; Nasir & Niral, 2011). To fully understand African American males' struggles in education, research needs to focus on the causes of their problems rather than the symptoms.

Consequently, this study seeks to better understand the causes of African American males' math struggles by focusing on "the extent and manner in which personal characteristics of students (e.g., their gender, race, social class, ability, and family responsibilities) affect their participation and integration" into academic communities (Herzig, 2004, p. 202). Humans are continually shaped by the circumstances they encounter, both positive and negative. These experiences often change people's perspective as they reorder their priorities. It seems logical that the negative statistics on African American males are byproducts of their life circumstances. As such, blaming their skin color for their underachievement in mathematics is merely a convenient scapegoat.

Historically, the United States largely has ignored the plight of African Americans across its social strata, particularly in the area of education (Palmer, Davis, & Moore, 2010). Federal and state legislation, however, such as the No Child Left Behind Act of 2001 and Race to the Top, have mandated improved learning for all students. As a result, school officials specifically monitor the progress of at-risk populations – minorities, low income students, and special education students – to measure whether they achieved a year's worth of educational growth since their previous year's testing. Such mandates have prompted educators to seek best practices that meet the needs of today's diverse classroom populations.

Before educators can fully understand and address the plight of African American males, however, they must first understand how their lived experiences forged their destinies. Such understanding would identify factors that promote or inhibit their students' learning. Additionally, it would be worthwhile for educators to delve deeper into the effects of institutional climate to understand better the academic, social, and psychological experiences that appeal to African American males (Williamson, 2012).Therefore, more research is needed to identify both cognitive and affective motivators (Lewis, Menzies, Najera, & Page, 2009).

Delving into individuals' experiences, thoughts, and feelings requires qualitative research methods because they are critical for searching out the "subtle social cues" that influence student performance in the classroom (Riegle-Crum & Humphries, 2012, p. 314). Hollywood has clichéd the typical patient-doctor dialogue that begins when the doctor says, “Okay, tell me where it hurts.” As routine as this dialogue seems, it does reiterate that before suffering can be alleviated patients must vocalize their concerns. Perhaps, then, the best approach to understanding the African American struggle, according to Terry (2010), is to simply “let them speak” by allowing them to verbalize what constitutes “meaning” and “relevance” in their own lives. “If we listen,” says Terry, “we all may learn” (p. 97).

African American activist, scholar, and educator W.E.B. DuBois (1868-1963) believed that the provision of quality schooling for African American males would make the world a better place. To achieve this goal, DuBois called for “a more complex examination of the schooling experience of African Americans” (Stinson, 2010, p. 2). Such inquiry, according to Ladson-Billings (1997), would be cathartic because “the telling statistics on the life chances of African Americans suggest that whenever we can improve the schooling experience for African American students, we have an opportunity to reverse their life chances” (p. 697).

Before schools can consider reversing the plight of African American males they must first examine critically what is happening to them in math classes. Unfortunately, according to Lattimore (2005), most policy-making attention has focused on curriculum, teachers, school climate, and organization, with very little research on policy revisions that consider students’ perspectives. Researchers and school officials shifting their focus to African American males’ math experiences would likely reveal serious problems that hinder their recruitment and retention in advanced math courses (McGlamery & Mitchell, 2000).

To garner the unique perspectives of African American males and to allow them the opportunity to establish voice throughout the research process, this study was a qualitative design. A focus group consisted of six participants from a pool of 11th grade African American males at a large Southeastern (U.S.) high school. The participants reflected on their mathematical journeys by completing surveys, participated in individual interviews, and created a scrapbook of digital metaphors that allows them to describe various aspects of their mathematical experiences. The researcher also observed each participant on two occasions as they participate in math instruction. By seeking their voice to understand better African American males' math experiences, this research sought to contribute to the existing body of knowledge that is either woefully quantitative or fails to consider students' perspectives. More importantly, this study seeks input from those (African American males) who would benefit most from academic initiatives and policies intended on bolstering students' math achievement.

Problem Statement

Ideally, the percentage of African American males in advanced math courses would equal their percentage of the school population. The reality is that African American males are disproportionately taking lower-level math courses than their White male counterparts (McGlamery & Mitchell, 2000). As a result, the number of African American males attending college is small when compared to not only Whites but also other ethnic groups (Williamson, 2012). Their underrepresentation, consequently, decreases the pool of African American applications for STEM occupations. Unfortunately, colleges and universities are dependent on high school officials to initiate changes that reverse African American males' histories of shunning the fundamental math- and science courses that serve as a platform for more advanced studies (Maton, Hrabowski III, & Schmitt, 2000). Until scholars shift their focus to underrepresentation research, which informs policy and serves as a catalyst for change within the school environment, African Americans will continue to be underserved in our nation's schools.

Purpose Statement

The purpose of this qualitative study was two-fold: (1) to determine the perceptions of African American males on the psychosocial factors and pedagogical strategies that result in the underrepresentation of African American males in advanced math courses, and (2) to provide insight into how their perceptions can help inform best practices for the recruitment and retention of African American males in advanced math courses. Because research is often used to formulate and re-write policy, this dissertation contributes to the body of knowledge that assists educators who desire to increase the motivation and involvement of African American males in advanced math courses.

Research Questions

This study's purpose motivated the following primary research questions:

(1) What do African American males identify as psychosocial factors contributing to their underrepresentation in advanced math courses?

(2) What pedagogical strategies are identified by African American males as more conducive to their learning mathematics?

(3) What are African American males' perceptions on how both psychosocial factors and teaching strategies affect their motivation to enroll in advanced math courses?

Significance of the Study

The results of this study contribute to the limited body of qualitative research on the plight of African American males in math education. Snipes and Waters (2005) found that within only the past few years have studies focused exclusively on the math education of African American students. Unfortunately, most studies of African Americans' experiences are quantitative (Nasir & Shah, 2011), thus lacking first-person perspectives of African American students' math experiences (Martin, 2007). This study's constructivist perspective will also serve as a response to other researchers' urgings for more first-person qualitative narratives (Lattimore, 2005; Nasir & Shah, 2011; Williamson, 2012).

Assumptions, Limitations, and Delimitations

The survey instruments, interview protocols, and observation protocols (see Appendix A) were motivated by emergent themes found in the review of literature. These protocols were valid because the qualitative researcher serves partially as researcher-as-instrument. Numerous peer reviewed journals, books, textbooks, websites, and related materials (see Appendix B) were studied until saturation of related themes emerged. As a result, the researcher established that the survey instruments and protocols would provide adequate qualitative data to answer the research questions.

The researcher acknowledged that his being a White male administrator at the participating school rendered him to be in a position of power and authority during his direct and indirect discourses with the participants. It was his goal to understand the factors that inhibit and promote African American males' success in mathematics. He also hoped to broaden educators' perspectives on African American males' math experiences. Ultimately, he hoped that school officials and others in power positions in academia would use the results of this study to enrich African American males' math journeys and, consequently, motivate them to pursue advanced math courses. By using multiple case study methods that allowed the participants to express their own unique perspectives and histories, the researcher sought to minimize his own personal biases and motivations. As such, the researcher's underlying motive for the study was to understand, not judge, the participants' experiences and recommendations.

Nevertheless, the racial and power differences between the researcher and the participants may have contributed to biasness within the study. The likelihood of students misbehaving during classroom observations, for example, tends to diminish in the presence of an administrator. Additionally, the participants may have sought to protect an ineffective teacher whose personality was endearing. Conversely, they may have attempted to sabotage an effective teacher who had a history of firm classroom discipline and high standards for students, factors that often alienate teenagers as they strive for independence and self-expression. Also, the participants may have felt obligated to inflate some of their negative experiences to compensate for the researcher's inability to relate to African Americans struggles and barriers to academic success.

Fortunately, the participants selected had no suspensions or expulsions on their high school disciplinary records, which, in the researcher's opinion, established a great deal of credibility regarding participants' responses. In fact, only one participant, Case Study #3, had a disciplinary event in the school's database. The infraction was such that neither suspension nor expulsion was warranted. Notwithstanding Case Study #3's minor incident, the participants' exemplary disciplinary records communicated to the researcher that they were students who respected good order and discipline within the school setting and, as such, followed the rules and policies. The researcher's role as assistant principal had not created any hostile feelings between him and the participants.

Definition of Terms

The following definitions of terms will assist the reader in understanding the complexities of qualitative research methods proposed in the study as well as specific definitions related to the context of this study:

1. *Advanced math courses*: Rigorous math courses not required for graduation that may be taken after students complete the required core courses: Algebra I, Algebra II, and geometry. For this study, precalculus, calculus, and statistics were identified as advanced math courses.
2. *American College Testing (ACT):* A standardized test that measures one's high school achievement and potential for success in college.
3. *Advanced Placement (AP)*: High school courses identified as having rigor equivalent to those offered for college credit.

4. *Afrocentric:* Contexts specifically related to the African culture.
5. *Case study*: An intense study that focuses on a particular unit or units bound within a specific context.
6. *Constructivism*: The belief that humans learn when new experiences challenge their existing beliefs.
7. *Coding*: The process of identifying and grouping participants' responses using convenient abbreviations, concept maps, colors, or other convenient symbols that allow for the identification of themes that emerge from a study.
8. *Data saturation*: The accumulation of data to the point that additional data would not contribute new information relevant to the study.
9. *Field notes*: Written summaries that detail in-the-field experiences and observations.
10. *Fieldwork*: Involves the researcher becoming immersed within the environment to allow for unobtrusive, unbiased data gathering.
11. *Grounded theory*: The establishing of a theory based on evidence gathered during a qualitative study.
12. *Inductive reasoning*: The process of examining various circumstances and facts that leads to the establishment of theories.
13. *Likert scale*: An instrument that allows individuals to respond to statements by indicating their degree of agreement or disagreement with each statement.
14. *National Assessment of Educational Process (NAEP)*: An assessment mandated by the United States' Department of Education to measure students' proficiency in math, science, reading, and writing.

15. *National Council of Teachers of Mathematics (NCTM)*: A professional organization for math educators that was founded in 1920. The organization has over 80,000 members worldwide.
16. *Participant observation*: Observation that allows the observer to actively participate with and among those being observed.
17. *Pedagogical strategies*: Teaching and assessment strategies that teachers use during instruction.
18. *Pedagogy*: Instructional strategies used during the teaching process.
19. *Problem-based learning*: A constructivist approach to learning that incorporates the learners' experiences and prior knowledge within a new context.
20. *Protocol*: A data gathering instrument used for research purposes.
21. *Psychosocial Factors*: Factors considered both psychological and social.
22. *Purposive sampling*: The process of selecting a sample believed to accurately represent a given population.
23. *Qualitative research*: An in-depth, holistic data gathering process that seeks to understands participants' lived experiences and their perceptions of those experiences.
24. *Scholastic Aptitude Test (SAT)*: A standardized test used to predict the likelihood of one's success in college.
25. *Triangulation*: The process of using multiple data-gathering sources to present a holistic view of a particular phenomenon.

Summary

The focus on African American males in math education is a relatively new research topic. The limited amount of research in this area is overwhelmingly quantitative in design, with the majority of research focusing on the negative aspects of African American achievement. Additionally, a great deal of existing research lacks African American males' first-person points of view regarding their unique math experiences.

The purpose of this study was to hear the voices of six male, African American juniors to determine the psychological and social factors that contribute to their cohort's underrepresented in advanced math courses. A review of literature identified peer and adult influence, cultural norms, teacher expectations, and the struggle to fit into the Eurocentric teaching model as factors inhibiting African American males' success in mathematics. This study sought to determine whether the participants in this study would support prior research findings or, more importantly, would provide new insights by telling their academic journeys.

Chapter I provides an overview of the study, including justifications for its design, its questions, and its purpose. Additionally, the study's limitations and potential biases are discussed. Chapter II provides a synthesis of related literature that was used to inform and build the general framework for this study. Chapter III describes the study's methods, including participant selection, data-gathering protocols, and analysis phases of the study. Chapter IV provides within- and cross-case analysis of participants' responses. Chapter V provides a synthesis of themes that emerged from the study. Emergent themes not found in the review of related literature served as platforms for further research.

CHAPTER II

REVIEW OF THE LITERATURE

This study sought to determine the psychological and social factors that result in the underrepresentation of African American males in advanced math courses. According to Lattimore (2005) and Oakes (1986), math classrooms have served as an atmosphere counterproductive to African American males' success because most African Americans, especially males, dislike the education experience, especially math education. This chapter's review of related literature seeks to provide insight regarding the factors that contribute to this disconnect. First, psychosocial factors, such as students' self-efficacy, teachers' expectations, racism, stereotype threat, peer influence, cultural norms and expectations, and alienation in higher level math courses, are presented. Then a review of literature focusing on African American males who have had success in mathematics, along with school initiatives that bolster success for African Americans, is presented.

Evidence of Underrepresentation

African Americans, although they total nearly 13% of the total workforce, represent about 5% of the math-based occupations such as mathematician, scientist, or technologist (Alliman-Brissett & Turner, 2010). Their lack of representation in STEM-related fields is a direct result of their underrepresentation in high school college preparatory classes. In 2006, for example, only 25% of African American high school graduates participated in their high school's college preparatory programs (Palmer, Davis, Moore, & Hilton, 2010; The Education Trust, 2006). The majority of the remaining 75% tend to cap their math experience with algebra and geometry, thus denying them the study of Algebra II, precalculus, and calculus (Woollery, Strutchens, Gilbert, & Martin, 2010). As a result, African Americans are vastly underrepresented on advanced placement (AP) examinations, and, according to Alliman-Bissett and Turner (2010), the few who take AP examinations leave solid evidence of achievement gaps along racial lines.

According to Polite (1999) and Riegle-Crumb and Humphries (2012), part of the blame is systematic because teachers and counselors disproportionately track African American males into lower-level courses, yet many of their White peers are placed in college preparatory courses that provide a foundation for entering STEM fields. In fact, African American representation is no better in schools that allow open enrollment into advanced math courses. In those schools, even the African American students who are mathematically savvy often self-enroll in lower-level courses (Corra, Carter, & Carter, 2011). Such involuntary and voluntary tracking of African Americans into lower-level courses contributes to their inability to sustain interest in STEM fields (Maton, Hrabowski, & Schmitt, 2000). Additionally, there are other, more subtle barriers to African Americans' success in math-based careers: actual and perceived racism, peer and parental influence, math efficacy, and teachers' and counselors' expectations (Maton, Hrabowski, & Schmitt, 2009).

The negative effects of tracking are not limited to African American males' being underrepresented in advanced math classes. They are also underrepresented in gifted programs (Palmer, Davis, Moore, and Hilton, 2010) and overrepresented in special education programs (White, 2009). Even worse, African American males are more likely to be incorrectly labeled as mentally retarded or identified as having a learning disability (White, 2009).

Psychosocial Factors

The American Heritage Dictionary of the English Language (1982) defines the term "psychological," in part, as "of, pertaining to, or derived from the mind or emotions; capable of influencing the mind or emotions" (Morris, 1982, p. 1055). It defines the term "socialization," in part, as "to place under government or group ownership or control; to fit for companionship with others; to convert or adapt to the needs of society; to take part in social activities. "Psychosocial factors," according to the Yale Medical Group, are those factors that affect a person psychologically or socially (Yale School of Medicine). The following review of literature focuses on the psychosocial factors that inhibit the success of African American males in math education.

"Acting white" and peer influence.

The reality of society's having different sets of expectations for White- and Black behaviors (Nasir & Shah, 2011) has contributed to African American males' readily accepting the notion that academic success is characteristic of the White culture (Lattimore, 2005). Such a mindset has resulted in African American males' rejection of schooling and academics as a means of providing for a better future (Nasir & Niral, 2011). Therefore, according to Murrell (1994), African American males who wish to do well in school, or who value academics, find themselves struggling with intrapersonal conflicts that suggest they are "selling out" their race by "acting White" (p. 559). The theory of “acting White” was proposed by Fordham and Ogbu (1986) to explain the African American culture’s disconnect from academics.

In addition to perceiving academics as a White domain, many African American males have also accepted the notion that one’s being pro academics is a sign of femininity (Whiting, 2006). To project an image of masculinity, therefore, the African American male culture’s rejection of academics has been compensated by their establishing a culture of opposition (Palmer, Davis, Moore, & Hilton, 2010). Murrell (1994) refers to this “cultural inversion” as a means of rejecting the specific behaviors and characteristics of the majority culture (p. 559). Fordham and Ogbu (1986) supported this assertion. They found that African American males, when given a choice, rejected so-called White behaviors, resulting in their refusal to participate in class discussions, comply with teachers’ instructions, and complete assignments.

African American males’ feeling disconnected from the school environment has prompted them to adopt bravado attitudes and display behaviors overtly masculine, such as “emphasized toughness, sexual promiscuity, thrill-seeking, and interpersonal violence” (Corprew & Cunningham, 2012, p. 574). Harris’s (1995) study revealed other outward manifestations of bravado such as physical posturing and wearing unique styles of clothing (Harris, 1995). Corprew and Cunningham (2012) identified these behaviors as efforts to thwart feelings of inferiority by providing a “protective mask” that serves to protect African American males’ self-esteem (p. 583).

The perception of academics as an environment best suited for the White culture is particularly stressful for academically successful Black males as they struggle with being rejected by their peer group and being accepted by the White majority. White

(2009), for example, found that African American males who are perceived as acting White are often excluded from their peer group and subjected to ridicule and other forms of harassment. To alleviate their burden of trying to fit in among the White majority, academically motivated African American males often alter their physical appearance and personalities to gain acceptance from their teachers and peers (Corey & Bowers, 2005). Therefore, “acting White” by embracing academics is often perceived as one’s rejecting the norms established by their peers (Palmer, Davis, Moore, & Hilton, 2010), thus affecting one’s identity, which “is deeply intertwined with processes of learning, because identity speaks to one’s sense of connection and belonging” (Nasir & Niral, 2011, p. 24).

According to Gadsden and Smith (1994), the preadolescent and adolescent years are the most sensitive years as students struggle with their sense of belonging. During these formative years, they found, students’ desires for interpersonal development and peer acceptance often trump their interest in academic quests. Such feelings result in their rejecting intellectual pursuits in favor of social networking, primarily because of their belief that academic preparation will have little, if any, influence on their lives (Gadsden & Smith, 1994).

Racism and stereotype threat.

Because the Unites States’ public schools are predicated on the European schooling model, and because the overwhelming majority of our nation’s teachers are White, racism and its byproduct, stereotype threat, are worthy of study. *The American Heritage Dictionary of the English Language* defines the term “racism” as “the notion that one's own ethnic stock is superior" (Morris, 1982, p. 1075). *Stereotyping* occurs when "a person, group, event, or issue is considered to typify or conform to an unvarying pattern or manner, lacking any individuality" (Morris, 1982, p. 1264). *Stereotype threat* "refers to being at risk to conforming, as self-characteristic, a negative stereotype about one's group" (Steele & Aronson, 1995, p. 797). White (2009) described stereotype threat as "stress caused by fear that a person's own behavior may confirm a negative stereotype about a specific group or face" (p. 4). As a group, African Americans tend to be adversely affected by the negative stereotypes and cultural perceptions that separate them from other ethnic groups, especially in settings where the group perceives it is stigmatized about its performance (Delpit, 2012).

Studies on racism and stereotype are especially useful for math educators because there exists a prevalent, although subtle notion that math is, by nature, simply easier for White males (Riegle-Crumb and Humphries, 2012). Such claims underscore the importance of educators' understanding the role of racism as it relates to African American children (Alliman-Brissett & Turner, 2010). Racist practices, whether overt or implicit, are often identifiable by the middle school years. Unfortunately, this inequity presents itself during those critical years when students are deciding to take pre-algebra or a basic math course. When African American males begin to realize that they are tracked into basic math at a rate equivalent to White students' being tracked into pre-algebra and algebra, they surmise that mathematics is a subject in which they cannot excel. Consequently, a dichotomy is formed that leads to a lifetime of African Americans' being marginalized from a progressive math education experience.

Their early exposure to this "glass ceiling" restricts African American males' opportunities in mathematics, thus creating a domino effect that influences not only future course selections but also career choices (Alliman-Brissett & Turner, p. 198). It is imperative, therefore, for educators and researchers of adolescents to focus on both the overt and subtle ways that racism impacts our nation's schools, for they manifestly create inequitable learning experiences for students (Matrenec, 2011). Such efforts to narrow the racial divide at the school level would have a positive impact on our children's futures. Without such efforts, according to Kelly (2009), the status quo remains the same, for as "whites hoard access to upper-track classes in individual schools, the larger black-white inequality in society at large would [continue to] be reinforced, since course taking is a determinant of educational achievement and future attainment" (p. 50).

Disparity in course-taking patterns is often predicated on race rather than ability. In fact, many researchers have found racism to be a central element affecting African Americans' placement in math courses. Nasir and Shah (2011) found this to be especially true in the underrepresentation of African American students in gifted and enrichment programs. At the other end of the spectrum, they found that African American males are far more likely to be diagnosed with learning disorders, such as attention deficit hyperactivity disorder (ADHD), and placed in special education programs. Kelly's (2009) study gives credence to researchers who believe that race is a predictor of student placement. He found that African American students were more likely to be enrolled in higher-level math courses if they attend predominately Black schools and, in terms of access to higher-level math courses, they were the most disadvantaged in predominately White public schools.

The placing of African American males in advanced math courses, however, does not preclude the effects of subtle, often unspoken stereotypical beliefs. Many African American males, for example, often perceive that their teachers and peers expect less of them in terms of academic prowess and success. As a result, according to a study by Matrenec (2011), African American males often feel the need to overcompensate their efforts to garner the same level of respect and appreciation afforded to their White classmates. The study focused on African American males who attended affluent, White schools in the suburbs of large metropolitan cities. Jamal, a participant in the study, expressed his constant struggle with stereotype threat: “I try to show everybody, not just teachers, students, like everybody that not all Black males or females, whatever, are all like what they think they are, as what the media shows them” (p. 231). Darryl, another participant, claimed that the African American male constantly has to prove his merit in a predominately White school:

> For me it’s always kind of been like I have something to prove, to show like since I do have so many White people around me showing me that not every Black person is like what they see on TV…that we do have goals, we are ambitious, that we like can be very intelligent….(p. 231)

Teachers’ expectations.

Teachers’ expectations differ along racial lines. Klopfenstein (2005) reported that even White teachers who are “warm toward Black students” tended to underestimate their abilities, made excuses for their underperformance in academics, and often admitted to feeling sorry for them (p. 418). Such responses, according to

Martin (2007) and Snipes and Waters (2005), are often forged by African American males' perceived proclivity for athletics rather than academics. In Martin's (2007) study, for example, Keith, a 37-year-old African American surgeon's assistant reflected: "I'd say because the expectations were low…because most African American males don't come through there wanting or having the desire to pursue mathematics" (p. 154). Snipes and Waters (2005) interviewed a former teacher and then-current math consultant in North Carolina, identified as Mr. Smith. When asked about teacher expectations along racial lines, Mr. Smith admitted that teachers had low expectations for African American students who enrolled in higher level math. According to Smith,

> We didn't do as good a job of recruiting Black kids into academics as we did in sports. The high school or football coach doesn't know if you can bounce a ball and chew gum at the same time or not, but he'll say, 'Come on out and I'll work with you.' Do we do that in math? No. We say this course is too hard for you. You should be in General Math. (p. 117)

Such unfair tracking and labeling of African American males has been identified as a byproduct of two subtleties: the "discourse of deficiency," which identifies the African American culture as one that is morally and economically bankrupt, and the "discourse of rejection," which is the assumption that African American males refuse to engage properly the educational environment (Stinson, 2006, pp. 494-498). When educators and others in power buy into these discourses, their behavior towards African American males reinforces the students' perceptions of their being academically inferior. Consequently, these outward manifestations of racism, no matter how subtle, create psychological barriers that impact students' self-efficacy and performance (Alliman-Brissett & Turner, 2010). For example, Irvine (1990) found that

African American males' perceptions of low teacher support would likely result in their failing both academically and personally. Such perceptions are often communicated by teachers by their actions rather than words. When Klopfenstein (2005) examined teacher feedback trends from the 1970s through the mid-1990s, he determined that across the decades Black students received more criticism and less positive feedback than White students.

Stereotype threat and the stigma of acting White are motivated by society's belief that pro-academic behaviors are monopolized by the White culture. Consequently, as previously mentioned (Harris, 1995; Corprew and Cunningham, 2012; Osborne, 1997), African Americans often create a defense mechanism within the school environment and in the larger society that causes them to disconnect both intellectually and emotionally. Such alienation, argued Ogbu (1978), not only affects their success but also results in the development of an "oppositional identity" that rejects the dominant group's values and cultural traits, thus establishing feelings and expressions of solidarity in response to harsh treatments and attacks on their culture (p. 68).

This desire to preserve a unique self-image, whether positive or negative, is more profound among African American males because, according to Osborne (1997), they are the only group that experiences serious and significant disidentification with academics. Unfortunately, such persona negatively affects teachers' perceptions of their academic abilities. For example, according to Neal, McCray, Webb-Johnson, and Bridgest (2003), African American students who walk with the "swaggered or bent posture, with the head held slightly to one side, one foot dragging, and exaggerated bent knee" often associated with their culture are viewed by educators as lower functioning, overly aggressive, and more likely in need of special education services (p. 50). The irony of such findings is that African American males adopt such coping strategies to offset their being ostracized in the school setting, yet these strategies further alienate them from their teachers and the White majority.

Positive role models' effects.

A *role model* is "a person whose behavior, example, or success is or can be emulated by others, especially by younger people" (role model, dictionary.com). Unfortunately, the lack of role models for African Americans is a critical contributor toward their limited math success (Thompson & Thompson, 2005). "Ideally," according to White (2009), "every student should have an advocate – a teacher, counselor, administrator or community leader – who listens and assists students where possible" (p. 7).

Such influence was even more emphasized in Irvine's (1990) research. He stated that teacher influence is so profound that by age six many students were more familiar with their teachers than with their own fathers. It is, therefore, no surprise that "teachers rather than parents are the most influential in developing positive stage-specific aspirations, expectations, and outcomes" (p. 575). With the vast majority of math teachers being White, however, it is often difficult for African American males to identify with them, for their cultural differences often deter rather than foster productive student-teacher relationships.

It is difficult, however, to alleviate such disconnects when African American male authority figures are virtually nonexistent in our public schools, particularly in math classes. Accordingly to a 2010 report by the National Center for Education Statistics, African American men comprise a mere 2% of the teaching force (Graham & Erwin, 2011). If only two out of every 100 teachers are African American men, then their representation in math classrooms is virtually nonexistent. The consequences of this reality, according to Corprew and Cunningham (n.d.), are far reaching. “One of the greatest deterrents to the overall success and development in school for adolescent African American males,” they argued, “ is the cultural incongruency between African American males and teachers and administrators” (p. 584). The lack of African American male educators is attributed to the majority who graduate high school without the requirements to attend college. This lack of preparation denies them the opportunity to enter the teaching field and serve as role models for their race and gender (Graham & Erwin, 2011, p. 399). Thus, the call for more African American male educators in today’s classrooms is thwarted by practices and circumstances imposed on the previous generation of African American learners. This cycle will continue to perpetuate the myth that mathematics is a White domain.

The absence of African American male math teachers also impacts the quality of math instruction. McGee and Martin (2011), for example, found that the lack of African American male math teachers created a cultural and pedagogical disconnect between African Americans and the traditional classroom. As such, the hiring of additional African American male educators would increase the likelihood of African

American males' receiving enriched learning experiences under the tutelage of a mentor who understands their cultural attitudes and behaviors (Whiting, 2006).

Rob, for example, a participant in McGee and Martin's (2011) qualitative study, was a Black male with a PhD. He perceived that successful Black math students must be exposed to successful Black math teachers, who could serve as a "visible success" within their minority and gender group (p. 58). Such tangible evidence of their own minority group's ability to excel in math-based careers, however, is predicated on African American males' being motivated to pursue mathematics during their formative years (Alliman-Brissett & Turner, 2010). The few who are encouraged to embrace mathematics and enter the teaching profession are not always well received by the African American community. Many, in fact, find their experiences as educators to be as challenging as those experienced when they were students.

Graham and Erwin (2011), for example, found that African American males who enter the teaching profession often experience negative feedback from their African American students that borders on hatred. To compound the problem, they found, many African American male teachers often view themselves through the eyes of their White students' parents, which often results in their feeling inferior or bothersome. This is particularly distressing, according to Klopfenstein (2005), because African American male teachers can provide both personal experience and institutional knowledge that may benefit African American students entrenched in a White-dominated environment.

Klopfenstein (2005) also lamented the fact that for many African American males, especially those who are poor, teachers serve as the only college-educated role models they know. She (2005) argued that their having an African American male teacher who was interested in their educational progress, understood the inner working of the public school system, and showed a genuine interest in their advancement would elevate their self-esteem and provide more enlightened classroom experiences (Klopfenstein, 2005).

For better or worse, teachers serve as role models for their students. As mentioned earlier (Irvine, 1990), teachers who have lower expectations for students negatively impact student success. The opposite is also true, for African Americans identify their best teachers as those who express care and provide encouragement about their future (Lee, 1996). Simple gestures, such as asking how they were doing in other classes or offering extra opportunities for tutoring, motivated students not to disappoint their parents and teachers (Berry, 2005). These findings verify that the availability of positive role models within an academic climate that welcomes all students, regardless of racial and cultural differences, sets the stage for learning.

Noguera (2003), for example, found that effective schools possess the following characteristics: (a) they had a clear sense of purpose, (b) stressed core standards within a rigorous curriculum, (c) had a commitment to educate all students in an environment beset with high expectations, (d) established a safe and orderly learning environment, (e) forged a strong partnership with parents and other stakeholders, and (f) cultivated a problem-solving attitude. Similarly, Berry and McClain (2009) found that students who possessed a positive math identity were highly motivated to succeed in mathematics, had strong beliefs in their math ability, and perceived their math teachers as caring individuals who had a genuine interest in their learning.

Noguera's (2003) and Berry and McClain's (2009) findings parallel Snipes and Waters' (2005) recommendations. They urged school officials to take notice of their minority students' course-taking patterns and focus their attention on motivating minorities and "hold their feet to the fire" and communicate to them that advanced courses are indeed harder, but the rewards will be worth the effort (p. 114). They urged educators to be especially supportive of minorities from broken homes because they are far less likely to have role models to encourage them to take harder courses.

McGlamery and Mitchell's (2000) study further emphasized the importance of influential role models on African American males' education experiences. They focused on factors that influence the recruitment and retention of African American males placed in predominantly White advanced math courses. Successful minorities, they found, had teachers with whom they had developed a rapport and who allowed them to participate actively in the classroom. This rapport, they found, fostered positive student-teacher interaction, gave students the opportunity to ask higher-order thinking questions, and fostered positive interaction among the students. Similarly, Murrell (1994) found that responsive teachers not only recognized but also capitalized on opportunities for African Americans to engage in discourse as part of the learning process. Such teachers presented opportunities using various methods: (1) by challenging students' existing knowledge by having them respond to more in-depth inquiry, (2) by allowing students to show off the information they possess through presentations and projects, (3) by having students justify their solutions, and (4) by communicating their appreciation for perseverance rather than giving up.

Murrell's (1994) findings agree with those from Ellington and Frederick's (2010) study of high-achieving, African American undergraduate mathematics majors. They sought to determine the factors that contributed to their success and persistence in mathematics. One participant in the study, Karen, credited her success to those teachers who made her work extra challenging math problems. Her acknowledgement contributed to their concluding that students in the best programs were taught by caring teachers who established high expectations and presented a challenging math curriculum.

Factors that foster students' positive dispositions toward mathematics are not limited to the confines of the schools and classrooms. Research on successful Black males in math education, for example, routinely credits positive parent involvement as crucial for children's academic success. Berry's (2005) study, for example, revealed five components that serve as positive support systems for students: (1) families stressing the importance of education; (2) parents serving as an academic resource; (3) parents' role as protector, defender, and advocate; (4) role models; and (5) the role of extended family. Similarly, Hrabowski, Maton, and Greif (1998) found that parents' provision of educational materials for their children at an early age provides a foundation for academic success. They also discovered that parents who academically prime their children for kindergarten with mathematics and reading skills routinely ensured their children's placement in accelerated classes, which ultimately leads to increased math success.

Berry (2005) also found that parents of successful African American students consistently stressed their belief that doing well in school was a mandate. They further established expectations for success by telling their children that they could achieve outstanding results. These parents were also more involved in school functions and assumed the roles of defender, supporter, and advocate for their children. Often, their assuming a more aggressive role in the priming of their children for success was motivated, in part, by their distrust of an educational system that devalued minorities by setting lower expectations for them. Their willingness to advocate for their children in such manner often results in their children's desiring to reciprocate by wanting to make their parents happy and proud of their academic credentials (McGee & Martin, 2011).

Eurocentric Pedagogical Methods

The United States' public school system is heavily influenced by the European education model, which was established for the instruction of Whites. This model was also predicated on the belief that Africans were intellectually inferior to Whites (Bridglall & Gordon, 2004). Consequently, African American males find themselves at a disadvantage due to the system's tradition of academic tracking, teacher-centered instructional methods, and an environment indifferent, if not hostile, to cultural differences among its student population. Tracking alone, according to Blair (1993) and Polite (1994), may be the greatest inhibitor to African American males' achievement in mathematics. Their being tracked away from higher-level math courses sends the message that they are inferior, lacking in knowledge and skills, and that teacher expectations for them are low. These perceptions often result in various class disruptions, along with disproportionate placement in special education, and incidence of violence, suspensions, and expulsions (Noguera, 2003).

Tracking.

Tracking students by academic ability begins as early as middle school. According to Simpson (2001), the rationale for tracking, or ability grouping, is to streamline teachers' workloads and improve student achievement. The result is students' receiving inconsistent exposure to college preparatory materials (Simpson, 2001). Unfortunately, students recognize such differences long before they enter high school. Hargrove and Seay (2011), for example, found that Black children typically begin their schooling with a sense of excitement and a propensity for learning. By 4th and 5th grade, however, African Americans often sense that they are being treated differently than their White peers. This perceived rejection by their teachers and administrators often results in their withdrawing from classroom experiences as they become skeptical of their position in the educational setting (Hargrove & Seay, 2011).

The differential treatment at such an early age results in most African American males' being tracked away from algebra, a course often identified as a "gatekeeper subject" to the STEM disciplines (Ladson-Billings, 1997). A study by Moses and Cobb (2001) indicated that African American's being denied access to algebra greatly contributed to their lack of college preparedness and high dropout rates (Moses & Cobb, 2001). Ladson-Billings (1997) also argued that African American males should not be tracked out of algebra, for it serves as the keystone to advancement to higher level math and, in turn, results in increased educational and economic opportunities.

The Eurocentric school model also creates an us-versus-them mindset that divides educators and parents. Kelly (2009), for example, found that African American parents are often marginalized regarding their participation in the children's course selections. Consequently, their children capitalize on this buffer by self-tracking into lower-level math courses. This self-imposed exposure to lower-level courses is primarily motivated by stereotype threat and their fear of being isolated in advanced math courses (Kelly, 2009; Tyson, Darity, & Castellino, 2005). Their preference for classrooms within which they feel most comfortable takes priority over their receiving a progressive math education experience.

Ineffective, traditional teaching methods.

Curriculum and instruction are critical factors in student achievement (White, 2009. Unfortunately, most math instruction in today's classrooms is patterned from the European teaching model that espouses traditional instructional methods, whereby the teacher presents information as students passively receive the learning. This model's emphasis on repetition and drill; convergent, right-answer thinking; and passive student involvement, according to Ladson-Billings (1997), caters to the middle-class culture, which is predicated on students' conforming to and accepting the rules of mathematics rather than challenging and questioning them. Such exacting approaches to teaching mathematics conflict with the African American culture's preference for affective learning opportunities that embrace "rhythm, orality, communalism, spirituality, expressive individualism, social time perspective, verve, and movement (Boykin & Toms, 1985; Ladson-Billings, 1997, p. 700).

The European model fails to recognize not only the learning differences between African Americans and Whites but also the biological differences. Some research (Lattimore, 2005; Loscocco, 1994) suggests that African American males' having higher levels of testosterone contributes to their being more kinesthetic and energetic than White children. Additionally, according to Tomes (2008), African Americans are extremely visual, which is a deficit in traditional classrooms that rely solely on lecture and procedural learning. These biological and physiological differences contribute to African American boys' diminished ability to sit passively and absorb instructional content (Loscocco, 1994). As such, to effectively engage African American males and create opportunities for success, math teachers must use teaching and assessment methods that meet individual student's needs by promoting active rather than passive learning.

Effective Instruction Identified

The goal of providing African American males access to quality teachers and a culturally relevant pedagogy should be supplemented by the desire to meet students' affective- and cognitive needs. According to Danielson (2002) and Gregory and Chapman (2002), the classroom experience is more meaningful and effective when it is safe, nurturing, inclusive, and collaborative. Such learning environments meet students' emotional needs and set the stage for success rather than failure. More specific details regarding students' affective needs are presented in Abraham Maslow's (1968) hierarchy of needs, which suggests that students reach their greatest potential when certain needs are met, beginning with the most basic:

- physiological needs: food, water, air, shelter, clothing;
- safety needs: security, freedom from fear, order;
- belongingness and love: friends, spouse, children;

- self-esteem: self-respect, achievement, and reputation; and
- self-actualization: to become what the individual has the potential to become.

Math teachers who provide learning experiences that are nurturing and accepting of individual's unique ideas and experiences view assessment as a comprehensive tool that not only critiques but also promotes learning. Assessment strategies within a differentiated classroom include a variety of methods, such as tests, quizzes, presentations, demonstrations, journals, portfolios, and rubrics (Gregory & Chapman, 2002). This assortment of assessment tools allows students to communicate their understanding of content using various formats. Even teachers who insist on using traditional assessment formats can analyze students' levels of understanding using multidimensional questioning strategies such as "cubing," which is evidenced by teachers' proposing questions with such introductory terms as tell, describe, explain, write, connect, design, develop, prepare, diagram, suggest, debate, and formulate (Chapman and Gregory, 2002).

Assessing students using different formats and questioning strategies is most beneficial when teachers have gained knowledge of their students (Chapman and Gregory, 2002). Teachers should plan lessons and assess students by capitalizing on their learning preferences. Some students are quite comfortable vocalizing their learning, while others prefer to write their thoughts. Some may be more artistic, while others struggle with two- and three-dimensional models. Some students prefer to move about the room and share their ideas with others, while others prefer to remain stationary. Thus, in many ways, learning and understanding is often influenced by students’ varied physical, emotional, and cognitive abilities. Dunn and Dunn (1987) categorized students’ different learning styles as auditory, visual, kinesthetic, tactile, and tactile/kinesthetic. These styles are characterized by their unique properties:

- Auditory learners: These learners absorb spoken and heard content easily. They prefer listening to lectures, stories, and songs.
- Visual learners: These learners absorb information they can see or read. They prefer to view illustrations, charts, graphs, and photographs. They find the use of color stimulating. Graphic organizers are powerful instructional tools for the visual learner.
- Tactile learners: These learners do best when handling materials, writing, drawing, and exploring experiences that are concrete.
- Kinesthetic learners: These learners prefer to learn by doing. For them, learning is maximized when they are allowed physically to engage themselves with the content and participate in relevant and meaningful activities.
- Tactile/Kinesthetic learners: These learners prefer to be physically engaged in the learning process. They enjoy the ability to move about the classroom as they collaborate with their peers, role play, and create models and simulations (Dunn & Dunn, 1987).

These different modalities indicate that learners possess different strengths and weaknesses. By supplementing traditional pedagogical strategies with field trips, videos, jigsaw exercises, research and problem-based activities, and other formats, math teachers provide a more holistic approach to learning and assessment (Gregory & Chapman, 2002).

Effective teachers realize that presenting material transcends the creating of "feel good moments" that tap into all students' strengths and learning styles. They understand, too, the importance of teaching a challenging curriculum that builds on students' experiences both within and beyond the classroom. As a result, many researchers (Boykin, & Allen, 2005; Ladson-Billings, 1997; Sheppard, 2009) endorse constructivist teaching methods, which posit that learning is an active, constructive process, rather than a passive absorption of facts (Constructivism, 2012). The constructivist classroom borrows from theories espoused by renowned education theorists such as

- John Dewey (1859-1952), who rejected the notion that teaching was the mere delivery of facts but was, instead, the integration of new learning into students' everyday lives and experiences (John Dewey, 2012);
- Lev Vygotsky (1896-1934), who stressed the importance of the learner-mentor relationship, whereby a student's continued experience with an expert in a field would close the learning gap as the novice grew to become the equivalent of his teacher (Lev Vygotsky, 2012);
- Jean Piaget (1896-1980), who viewed the act of learning as a process whereby one examines the new information and incorporates it into his existing cognitive schema (Jean Piaget, 2012); and

- Jerome Bruner (1915-), who also believed that learners incorporate new information based on their prior knowledge and experience (Constructivist Theory, 2012).

Effective teachers understand that prefabricated worksheets and textbooks do not always meet the needs of African American males. Word problems that cater to White, middle-class values and lifestyles, for example, are quite foreign to African Americans whose world views and experiences are markedly different from those of their White peers. A sampling of word problems taken from the first chapter of Larson, Kanold, and Stiff's textbook *Algebra 2: An Integrated Approach* focuses on experiences and scenarios quite unfamiliar with African American males growing up in low socioeconomic households:

- Example 4, page 5: One barrel of oil can generate 545 kilowatt-hours of electricity. In 1990, the 17,000 windmills in California could generate up to 1.5 million kilowatt-hours per hour. At peak capacity, how many barrels of oil could be saved each hour? Operating at 75% of peak capacity, how many barrels of oil could be saved in a year?
- Example 1, page 24: to study life in arctic waters, scientists worked in submerged Sub-Igloo stations in Resolute Bay in northern Canada. The water pressure at the floor of the station was 2184 pounds per square foot. How deep was the station floor?

These word problems are not inherently flawed, for they do provide evidence of how professionals utilize math skills on the job. Quality teachers who have knowledge of their students' experiences and backgrounds, however, are better positioned to provide these problems along with additional problems that are more authentic to African Americans' experiences.

Fortunately, some universities are allowing preservice math teachers to discover the benefits of meaningful context in the classroom. Sheppard (2009), for example, examined prospective teachers' experiences teaching mathematics to African American males. One prospective teacher discovered her students' proclivity for playing cards and incorporated card playing into the mathematics. Another prospective teacher found that drawings and manipulatives kept her student's interests. The biggest "wow" moment for one prospective teacher came when her student asked, "Why can't my teacher make it fun like you did?" (p. 230). Such "wow" moments naturally foster motivation while traditional methods require students to depend on self-discipline. The former instills an I-get-to-do-math attitude; the later promotes an I-have-to-do-math attitude.

Culture clash: Eurocentric structure versus African values.

As previously mentioned (Ladson-Billings, 1997), the African American culture is greatly influenced by rhythm and pattern, which are communicated through many communal outlets: music, writing, sports, expressive dialogue, dancing, and sartorial splendor. In contrast, mathematics, with its hierarchical structure and traditional abstract presentation, seldom offers meaningful, interpersonal connections to other ideas or forms of expression, a concept foreign to the African American utilitarian perspective (Herzig, 2004, Ladson-Billings, 1997; Sheppard, 2009). It is not surprising, therefore, that the Eurocentric model's emphasis on grades, individual accountability, and rote learning, has resulted in a cultural disconnect for African Americans whose mathematical identities, which are crucial to their academic success, are forged by culture, community, and experiences (Berry, Thunder, and McClain, 2011).

NCTM standards, in part, call for instruction that emphasizes the inclusion of students' various cultures and experiences, especially when students are asked to articulate their mathematical thinking, summarize data, and describe how math concepts connect to real-world problems (Murrell, 1994). In classrooms that espouse traditional, middle-class perspectives and teaching methodologies, however, African American males often find it difficult to articulate their understanding. A study by Gordon, Gordon, and Nenbhard (1994), for example, revealed that African American vernacular and other culturally specific styles of expression may serve as pitfalls as they strive to achieve in an environment predicated on cultural practices, linguistic forms, and learning styles that cater to European norms.

Unfortunately, African American males' need for culturally relevant subject matter that is presented in meaningful ways is often misidentified as apathy when they disconnect from traditional classroom instruction (Hurley, Boykin, & Allen, 2005; Ladson-Billings, 1997; Sheppard, 2009). Math teachers, according to a study by Woollery, Strutchens, Gilbert, and Martin (2010), often respond to this perceived apathy by adopting negative beliefs and practices toward African Americans, which have negative consequences on student motivation and achievement outcomes. The study also revealed that teachers' negative beliefs and practices toward African American males often manifest in their establishing differentiated expectations for students' success, which often results in their receiving unequal classroom experiences and diminished remediation opportunities.

Often, African American males adapt to the European- and African cultural disconnects by capitalizing on racial stereotypes (Ogbu, 1997). A study by McGee and Martin (2011), for example, focused on a then-successful African American male who regretted his "act[ing] Black and dumb" by scratching his head, staring "buckeyed," and pretending to look to his White peers for the correct answers (p. 54). His reasoning for such behaviors support Steele and Aronson's (1995) assertion that African Americans often decrease their efforts and performance in situations that may confirm negative stereotypes often associated with their race.

Reversing the Trend: Rethinking the African American Male

Holistic remediation efforts.

The pattern of academic achievement for African American males can be reversed if schools make a concerted effort to do so. Simply enrolling them in advanced placement math courses is not sufficient. Noguera (2003), for example, opined that a change in mindset must occur before authentic action-oriented remediation can take place:

> To the degree that we accept the idea that human beings have the capacity to resist submission to cultural patterns, demographic trends, environmental pressures and constraints, bringing greater clarity to actions that can be taken by schools and community organizations could be the key to changing academic outcomes and altering the direction of negative trends for this segment of the population. (p. 433).

Delpit (2012) claimed that remediation programs in schools must consider both academic and psychological factors that either inhibit or promote learning. Affective changes in the school culture can set the stage to prepare and motivate incoming freshmen to take advanced math courses their senior year. As an example, Delpit (2012) suggested that placing students in remediation courses only serve to reinforce the teacher's belief, as well as the student's belief, that he is, indeed, performing below expectations. Instead, she recommended that schools remove the moniker "remediation" and replace it with a name that suggests an accelerated program for building requisite skills for future success.

In addition to shifting from a culture of remediation to a culture of success, schools must also provide comprehensive support systems that guide and encourage African American males on a consistent basis. Maton, Hrabowski, and Schmitt (2000) conducted a study on African American college students who excelled in the sciences. They found that a school's consistent monitoring and advising of students regarding such factors as their strengths and weaknesses, academic needs, options for program completion, and the pros and cons of taking certain courses ensured greater success. They also found that high levels of support and motivation included "high faculty expectations for African American students' success, hands-on research experience, academically supportive friendship networks, involvement with faculty, tutoring, and emotional support during times of stress and difficulty" (p. 631). Knowledge and skill development, they found, increased when African Americans had access to peer study groups, practiced strong study habits, used time management skills, were involved in higher order thinking problems, and made use of on-campus resources.

When Wright (2011) examined the everyday practices of African American students in STEM learning, his findings led him to agree with Gay's (2000) characteristics of successful schools for African Americans. Gay (2000) credited district- and school-level support for diversity in the curriculum, activity-based math- and science instruction, the availability of math- and science clubs, math competitions, science fairs, career awareness programs, increased professional development for teachers, and increased instructional time for math and science classes as viable initiatives for success.

Similar results were found in Schwartz and Washington's (2002) survey of 229 African American freshmen at a historically Black university. They found that high school grade point average (GPA) and class rank, combined with nonacademic factors, such as intrinsic motivation, social integration on campus, feelings of belonging in the academic arena, and the belief that education was critical for improved economic and career opportunities were contributors to student success. In fact, these factors are more indicative of African American males' persistence in college than their ACT scores (Williamson, 2012). These studies indicate that successfully reversing the negative trends about African American males in mathematics would require a long-term commitment from teachers, counselors, parents, administrators, and community leaders.

Establishing communities of African American scholars.

Some research has revealed strategies that help foster a sense of community among African American students on college campuses. Williamson (2012), for example, encouraged educators to consider four areas to ensure better recruitment and persistence among its minority populations: (1) improve communication on campus between African American males, thus removing what is often referred to as "Black Distance"; (2) provide academic advising training sessions for faculty; (3) cultivate relationships between African American STEM majors and African American faculty members and administrators; and (4) include the students' families in the academic environment (p. 67). Hood's (1992) study had African American STEM majors reveal pitfalls to their group's academic success. The participants attribute the high attrition rates of African American STEM majors to three factors: (1) feelings of isolation from being the only Black person in class; (2) traditional, passive pedagogical methods; and (3) not having access to counseling and tutoring.

Training by top-notch teachers.

According to a study by Palmer, Davis, Moore, and Hilton (2010), school officials often overlook the quality of teachers who are assigned to teach high school introductory math courses. Their study sought to determine what was needed to increase African American males' participation and persistence in college. As such, their first recommendation was that school administrators make every effort to ensure that the most qualified teachers were teaching African American males. Despite such finding, Peske and Haycock's (2006) study found evidence that novice teachers who are not as effective as seasoned teachers were more likely to be assigned to teach lower-level math courses in schools with high poverty levels and large minority populations. If one were to consider such logic outside the context of education, it would appear counterproductive if not irresponsible. For example, suppose a patient entered the hospital suffering from a devastating illness. It is likely that the patient would be referred to a specialist who had years of training and experience treating such illnesses. It would be ludicrous to entrust the patient's care to a first-year intern who lacked experience dealing with critical issues. If school officials truly believe that the plight of African American males is critical, they should place experienced, effective teachers in lower-level courses rather than allow them to teach advanced courses because "they paid their dues."

Summary

The review of literature revealed several themes that influenced this study's design. It was expected that racism and stereotype threat would emerge as prominent themes throughout this study. Although peer influence certainly impacts decision-making among teenagers, the researcher believed the participants would downplay this influence because independence is also a primary goal among high school students. The researcher had no preconceived notions regarding the effect of adult influences on the participants' learning and course-taking decisions.

The researcher also believed that two other themes would likely emerge, but he believed they would be more inconspicuous because the participants probably accepted them as norms: (1) their identifying the lack of minority representation in their high school math departments and (2) their feeling disconnected from the Eurocentric school model. Because the more inconspicuous themes would not likely emerge voluntarily, the researcher prompted participants with key questions that required them to reflect on existing biases that had been ingrained to the point that they seemed normal rather than overtly inhibitive.

While differentiated instructional strategies have shown to improve student achievement, most math teachers, according to the research (Hurley, Boykin, and Allen, 2005; Ladson-Billings, 1997; Murrell, 1994), cling to traditional teaching strategies that tend to alienate African American males. As such, the researcher expected to observe the participants in traditional math classrooms. He also expected the participants to be highly critical of lecture and other activities that foster individual rather than communal learning.

The researcher also hoped that the participants would benefit from the study by having them ponder their own learning styles and how those styles often conflict with their teachers' methodologies, particularly in math classrooms. Consequently, they participated in various reflective thinking exercises motivated by the review of literature. Such exercises, ideally, would heighten participants' awareness of influences both within and beyond their control, thus making them more informed as they continued their schooling experiences.

CHAPTER III

METHODOLOGY

Purpose of the Study

The purpose of this qualitative study was two-fold: (1) to determine the perceptions of African American males on the psychosocial factors and pedagogical strategies that result in the underrepresentation of African American males in advanced math courses, and (2) to provide insight into how these perceptions can help inform best practices for the recruitment and retention of African American males in advanced math courses. There were three essential research questions that framed the study:

(1) What do African American males identify as psychosocial factors contributing to their underrepresentation in advanced math courses?

(2) What pedagogical strategies are identified by African American males as more conducive to their learning mathematics?

(3) What are African American males' perceptions on how both psychosocial factors and pedagogical strategies affect their motivation to enroll in advanced math courses?

Theoretical Framework

Critical theory and critical race theory served as theoretical frameworks for this study. Cresswell (2007) defined *critical theory* as "the study of social institutions and their transformations through interpreting meanings of social life; the historical problems of domination, alienation, and social struggles; and a critique of society and the envisioning of new possibilities. C*ritical race theory* is "research that focuses attention on race and how racism is deeply embedded within the framework of American society" (p. 247). The critical theory framework, according to McGlamery and Mitchell (2000), is essential for examining why inequalities exist in math education because it evaluates various forms of cultural and institutional power.

Berry's (2008) qualitative research used critical race theory to allow eight successful African American math students to chronicle their mathematical experiences (Noble, 2011). "Critical race theory," said Berry, "acknowledges that [the African American] voice is legitimate and provides a forum in which their voices can be heard" (p. 47). This study, with its emphasis on the participants' points of view, also reflects a constructivist theoretical perspective because the participants' lived experiences serve as foundations on which their present circumstances are established (McGlamery & Mitchell, 2000).

Qualitative Research

Qualitative research may be defined "as a family of approaches whose goal is understanding the lived experiences of persons who share time, space, and culture" (Frankle & Devers, 2000, p. 113). This method is appropriate for developing a complex understanding of a problem or phenomena within a particular group or population whose voices have been silenced (Creswell, 2007). Researchers often use qualitative analysis to seek relationships among phenomena to develop generalizations that support the establishment of a theory (McGrath, 1970).

The emic perspective.

According to Merriam (1998), qualitative research involves examining a particular problem or phenomena from an insider's perspective, which is often referred to as the *emic perspective*. The purpose of such inquiry, she argued, allows the researcher to "[understand] the meaning people have constructed, that is, how they make sense of their world and the experiences they have in the world" (p. 6). Such immersion into the participants' worldview creates a more intimate, naturalistic condition that differs from the laboratory settings often characteristic of quantitative designs (Creswell, 2007). In fact, qualitative researchers often view their participants as collaborators in the research process because both the researcher and the participants work in tandem to create new knowledge (Moch & Gates, 2000).

A holistic approach.

With its holistic focus and orientation toward discovery, qualitative research is often described as a mosaic or a tapestry whose design begins to emerge as the research process unfolds. Creswell (2007) described qualitative research as a somewhat nebulous research process that consists of "minute threads, many colors, different textures, and various blends of materials" (p. 35). Similarly, Denzin and Lincoln (2000) compared the qualitative researcher to a quilt maker. As a quilt maker uses different colors and textures and sizes of material to generate a montage, the qualitative researcher, likewise, makes use of a variety of instruments and strategies to create a detailed description of a particular problem or phenomenon. Others have compared qualitative research to a "mixed forest" in which "distinct trees representing different species" contribute both individually and collectively to the character and integrity of the landscape (Lancy, 1993; Merriam, 1998, pp. 5-6).

Qualitative instruments.

The data gathered during a qualitative study are subjective, or interpretive, because they are based on individual participant's experiences (Gay, Mills, & Airasian, 2009). Denzin and Lincoln (2000) argued that no particular data-gathering protocol is necessarily more robust than another. The more popular qualitative instruments include field journal notes based on first-hand observations, participants' responses to interview questions, and the examination of documents and artifacts (Gay, Mills, & Airasian, 2009). Each piece of information serves to contribute to the mosaic that creates a picture of the phenomena being studied.

In terms of instrumentation, the researcher is the primary collection instrument (Creswell, 2007). Denzin and Lincoln (2000) used the term "bricoleur," meaning "Jack of all trades" to describe the qualitative researcher. Likewise, Stake (1995) identified the qualitative researcher as one who takes on many roles throughout the study: teacher, advocate, evaluator, biographer, and interpreter. As information is gathered and assimilated, the researcher uses inductive analysis to generate categories, themes, and patterns. The categories are typically unknown before the onset of research. Instead, they are allowed to develop as part of the emergent nature of the qualitative design (Denzin & Lincoln, 2000).

Case study methodology

Gerring (2007) and Garson (2012) described case study research as a time-honored approach that is well-established in the social sciences, including education. In education, the cases of interest are people and programs (Stake, 2007) that function within a bounded system, such as classrooms, college campuses, or school systems (Creswell, 2007). Case studies are descriptive because they gather information from many sources to answer a fundamental question: What are the characteristics of this particular entity, phenomenon, or person? (Gay, Mills, & Airasian, 2009; Hancock & Algozzine, 2011).

Although case studies typically involve the thorough investigation of a case to understand better a larger population, case study research may incorporate a sample of cases (Gerring, 2007). Merriam (1998) described cross-case studies as those involving the collecting and analyzing of data from multiple cases. In cross-case studies, two stages of analyses are used: (1) the within-case analysis and (2) the cross-case analysis. The within-case analysis seeks to develop a comprehensive understanding of each case. Once each case has been thoroughly examined, cross-case analysis begins, which allows the researcher to identify patterns and themes that cut across unique experiences after first garnering a full understanding of the individual cases (Patton, 2002).

Research Approach and Design

Holistic inquiry in the natural setting.

As a means of gathering firsthand information, the qualitative researcher often assumes the role of participant observer to shadow and observe participants within a particular setting (Frankel & Devers, 2000). Originally created in the late 19th century for the study of small, homogeneous cultures, participant observation allowed ethnographers to present the results of their observations through the use of scholarly papers and personal memoirs (Denzin & Lincoln, 2008), which provide first-person descriptions of particular events and phenomena. Such descriptions are critical, according to Kidder (1981), when observations meet certain criteria: (a) they are used for a specific research purpose, (b) are planned deliberately, (c) are systematically recorded, and (d) are “subjected to the checks and controls of validity and reliability” (p. 264).

Unlike the aloof, objective, and neutral characteristics of quantitative research, participant observation, according to Denzin and Lincoln (2008), embraces the affective domains within a specific context to establish a more intimate, subjective, and engaging experience for the participant and the observer. To establish meaningful dialogue with the participants and gather information within an authentic context, qualitative researchers collect data in the field where participants are experiencing the phenomena being studied (Creswell, 2009).

Qualitative researchers use triangulation to provide more comprehensive knowledge about their subject (Miller & Fox, 2004). Gay, Mills, and Airasian (2009) defined *triangulation* “as the process of using multiple methods, data collection strategies, and data sources to obtain a more complete picture of what is being studied and to cross-check information” (p. 377). In addition to direct observation, other prevalent data gathering resources for qualitative research include surveys, in-depth interviews, and participants’ writings.

Surveys are an effective way for researchers to obtain baseline data (Anderson, Herr, & Nihlen, 1994). This initial data is used to assess continuity with participants' subsequent responses. According to Schonlau, Fricker, and Elliott (2002), surveys may be considered under the following conditions:

- when the researcher is using a convenience sample;
- when the participants have access to the researcher;
- when the participants represent a small slice of the total population; and
- when candor may be more reliable due to sensitive topics, such as racism.

The interview, according to Merriam (1998), is a hallmark of qualitative research, with its most common form being the person-to-person interview. Although interviews are often conducted using conventional conversation parlance, the primary goal of the research interview is to gather specific information. As such, interviews may be characterized as a "conversation with a purpose" (Dexter, 1970, p. 136). The purpose of interview questions is to allow the researcher to better understand people's thoughts and feelings regarding their experiences, and such abstractions are seldom inferred from observation and other, more impersonal data gathering procedures. According to Patton (1990):

> We interview people to find out from them those things we cannot directly observe….We cannot observe feelings, thoughts and intentions. We cannot observe behaviors that took place at some previous point in time. We cannot observe situations that precluded the presence of an observer. We cannot observe how people have organized the world and the meanings they attach to what goes on in the world. We have to ask people questions about those things. The purpose of interviewing, then, is to allow us to enter into the other person's perspective." (p. 196).

The qualitative researcher may also glean a lot of useful information from participants' introspective writings in diaries and journals. This reflective process, according to Colley, Bilics, and Lerch (2012), promotes critical thinking as participants delve into their inner thoughts about specific thoughts. Such interpersonal reflection, according to Brockbank and McGill (1998), also promotes "creation of meaning and conceptualization from experience" (p. 56).

Multiple case studies and cross-case analysis.

Each participant in this research was an individual case. Because this study contained multiple cases, cross-case analysis was used. Data collection and analysis techniques for case studies are similar to those methods used in grounded theory research (Locke, 2000). Grounded theory researchers use open coding, which is a brainstorming technique that allows the researcher to remain open to emerging themes and patterns as data are gathered and synthesized (Corbin & Strauss, 2008). This process allows the researcher to decompose data to establish similarities and differences among the cases. Often, such analysis reveals themes not found in prior research.

The process of coding begins by asking key questions (Gay, Mills, & Airasian, 2009). The questions framed for this research study were:

(1) What do African American males identify as psychosocial factors contributing to their underrepresentation in advanced math courses?

(2) What pedagogical strategies are identified by African American males as more conducive to their learning mathematics?

(3) What are African American males' perceptions on how both psychosocial factors and pedagogical strategies affect their motivation to enroll in advanced math courses?

Site Selection and Research Sample

This study took place at a large, Southeastern (U.S.) comprehensive high school. The site served nearly 1,970 students and is located approximately 20 miles from a major metropolitan city. The student population was 65 % White, 16 % African American, 12 % Hispanic, and 6 % Asian, with less than one percent identified as Multiracial or Native Hawaiian/Pacific Islanders. The school was comprehensive because of a number of factors: (a) the numerous advanced placement (AP) course offerings in mathematics, language arts, foreign language, and history; (b) diverse athletic programs, including football, boys and girls basketball, boys and girls soccer, wrestling, cheerleading, track, baseball, softball; (c) band and choir selections; and (d) numerous course offerings in vocational studies, such as auto mechanics, agriculture, child-care, and culinary arts. This school was selected for a variety of strategic reasons:

- The underperformance of African Americans on standardized math tests has been identified as one of its primary weaknesses to be addressed for school improvement.
- The school offered a wide range of advanced math courses beyond Algebra II, including advanced algebra, precalculus, statistics, and calculus, thus controlling for availability of advanced courses for African American males.

- The school provided an opportunity for open enrollment as long as students successfully completed the requisite course requirements, thus controlling for the effects of tracking students into lower-level courses.
- The researcher, an assistant principal at site, previously taught AP Calculus there. During that eight year span, he never had African American males in his calculus class even though he had established a good student-teacher relationship with many African American males who had taken his advanced geometry classes.

Minorities' academic status and representation

The school's math department had 18 teachers – 10 females and eight males – all of whom were Caucasian, not uncommon according to the review of literature findings. An analysis of enrollment percentages in math courses at the site underscores the fact that African American males were not adequately represented in advanced math courses (see Table 1). This underrepresentation in advanced classes may explain the trend analysis of ACT composite scores for the junior class, which reveals that African Americans perform lower than any other ethnic group, (see Table 2).

Table 1
Within-Course Enrollment Proportions for White and African American Males at Site

Course Name	White Males	African American Males
Resource Math (All)	.39	.22
Inclusion Math (All)	.40	.13

Table 1 (continued)
Within-Course Enrollment Proportions for White and African American Males at Site

Course Name	White Males	African American Males
Bridge Math	.26	.12
Algebra I	.31	.10
Geometry	.31	.10
Algebra II	.36	.09
Advanced Algebra (ACT Prep)	.29	.07
Advanced Honors Algebra II*	.52	.05
Algebra II Honors*	.35	.05
Geometry Honors*	.32	.05
AP Calculus AB*	.38	.03
Geometry Advanced Honors*	.36	.02
Precalculus*	.54	.02
AP Calculus BC*	.64	.00
Statistics Honors*	.50	.00

Note. Courses marked with an asterisk (*) denote advanced math courses. African American males comprise 8% of the school's population; White males comprise 33% of the school's population.

Table 2
ACT Composite Scores by Ethnicity for Junior Class at Site

Population	Number Tested	Average
All Students	437	19.0
Black/African American	55	16.1

Table 2 (continued)
ACT Composite Scores by Ethnicity for Junior Class at Site

Population	Number Tested	Average
White	295	19.7
Hispanic/Latino	44	18.8
Asian	17	18.1
Native Hawaiian/Pacific Islander	0	*

Note. Adapted from the "ACT Profile Report – High School" published by the [state's name removed] Department of Education.

The 2012 ACT average in mathematics for this site was 19.9 for those who took courses at or above core requirements and was 18.3 for those who took courses at or below core requirements. This demonstrates a correlation between one's taking of advanced math courses and higher ACT math scores. A four-year trend analysis of ACT composite scores by race showed that the school has a history of African American students performing below average when compared to other ethnic groups in their graduating class.

In the 2009 graduating class, the average composite score for the class was 19.2, with African Americans scoring 16.6. In the 2010 graduating class, the average composite score was 18.8, with African Americans scoring 16.0. In the 2011 graduating class, the average composite score was 19.1, with African Americans scoring 16.1. Across all four graduating classes, African Americans scored lowest among all ethnic groups. Throughout those years, African American females consistently scored higher than African American males. Also, African American females' representation in advanced math courses during those years was higher than their male counterparts' representation.

Participants and purposive sampling.

The participants for the study were African American male juniors. The junior class was selected because its students had the capacity to enroll in an advanced math course or a remedial math course for their senior year. Of the 530 males in the junior class, 43 were Black, comprising 8% of the junior class population. White males comprised 38 % of the junior class. Within that class, 10 % of the White males were enrolled in precalculus, yet no African American males were taking precalculus. Taking precalculus during the junior year allows students to progress to one or more of the following courses his senior year: AB Calculus, BC Calculus, or Statistics. Because no African American males were enrolled in precalculus their junior year, there would be no African American male representation in advanced math courses the following year. Also in this junior class, 12 % of African American males received special education services, while 55 % of White males received special education services. These percentages contradict researchers who claimed that African American males are overly targeted for special education services.

For this study, advanced math courses were identified by the researcher as those that transcend the typical Algebra I, Algebra II, and geometry core in terms of rigor: precalculus, AB- and BC Calculus, advanced algebra, and statistics. At the time of the study, 44% of the White population was enrolled in advanced math courses, while 39 % of the Black population was enrolled in advanced math courses. The breakdown by gender, however, presents an even wider gap for males. Forty-eight percent of the White males were enrolled in advanced math courses, while only 31 % of the African American males were enrolled in advanced math courses. As the math courses become more difficult, however, African American representation sharply declined, especially among the males, as seen in Figure 1.

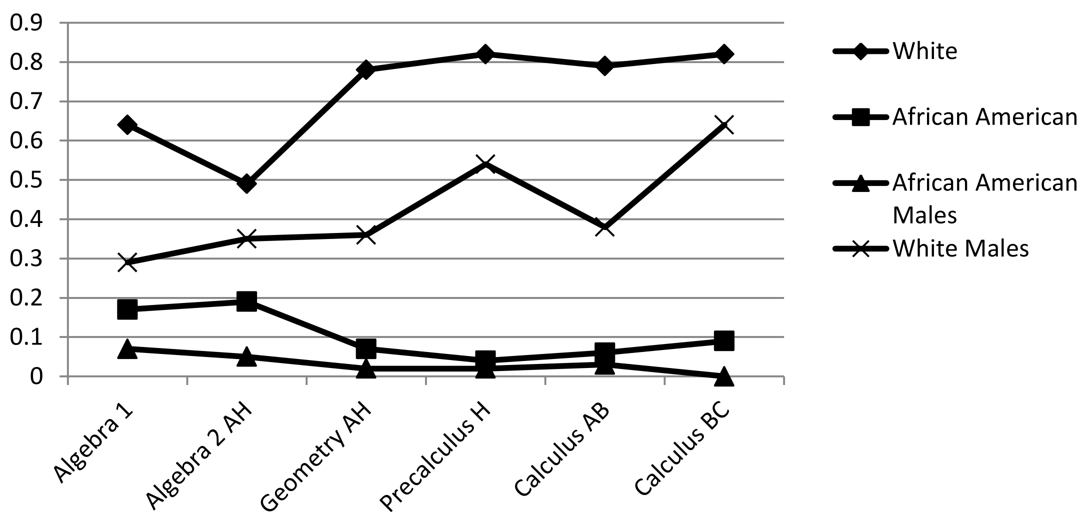

Figure 1. Within-course percentages between White and African American students at the participating site. Note. This school does not offer an Advanced Honors Algebra I course. AH stands for advanced honors, and H stands for honors.

Participant selection was based on purposive sampling, which is “the process of selecting a sample that is *believed* to be representative of a given population” (Gay, Mills, &Airasian, 2009, p. 134). For this study, the defined population was African American males juniors. To establish a pool of dependable candidates, the researcher removed from consideration any student identified as having suspensions or expulsions on his disciplinary record. Initially, 12 students were invited to an informational meeting and presented with an overview of the study. All were asked to take an informational packet, which consisted of consent forms and an introductory letter to parents and potential participants (see Appendix H). All participants were informed that they would be given a $100 gift card for their participating in the study. The first six participants who returned their consent forms were selected for the study. All documents pertaining to the study were secured at all times, and the students' names and other identifiable information were hidden throughout the reporting and publication processes.

Instrumentation

Inductive inquiry.

The review of literature revealed many themes regarding the underrepresentation of African American males in advanced math courses. The themes that were used to generate questions on the data-gathering protocols include,

- peer influence (White, 2009; Corey and Brewer, 2005);
- the notion of acting White (Fordham and Ogbu, 1986; Murrell, 1994);
- cultural clashes with the traditional, European school model (Berry, Thunder, and McClain, 2011; Ladson-Billings, 1997);
- schools' histories of tracking African American students into lower-level math courses (Hargrove and Seay, 2011; Simpson, 2001);

- African Americans' feelings of isolation from their peers while in predominantly White advanced math classes (Hood, 1992);
- the lack of minority role models in math education (McGee and Martin, 2011; Thompson and Lewis, 2005; White, 2009):
- teachers' low expectations for minorities (Irvine, 1990);
- racism, both overt and tacit (Alliman-Brissett and Turner, 2010; Morris, 1982l); and
- stereotype threat (Delpit, 2012; Steele & Aronson, 1995).

To establish triangulation, several data-gathering resources were used (see Table 3). These resources may be referred to as *primary*, *secondary*, or *tertiary sources*. Primary sources are original materials, such as artifacts, e-mails, photographs, interviews, and surveys (Appendix A). Secondary sources are those written upon reflection and are often evaluations or interpretations of original sources, such as journal articles, websites, biographies, and magazine and newspaper articles. Tertiary sources are a "distillation of primary and secondary sources," such as almanacs, manuals, textbooks, and guidebooks (University of Maryland, 2013). This study utilized several primary sources: surveys; photographs; participants' writings; audio recorded, transcribed interviews; field notes taken during direct observation; and items from participants' cumulative records, specifically, their ACT scores and class schedules. Secondary sources included peer reviewed journals, books, and websites. Tertiary sources included textbooks on research methods.

Table 3
Triangulation Matrix

Research Question	Baseline data For Cross-Case Interdependence	Data Source 2 Taped Interviews	Data Source 4* Student Products	Secondary Sources
(1) What do African American males identify as psychosocial factors contributing to their underrepresentation in advanced math courses?	Online Questionnaire 1, questions 1-10	Individual Taped Interview (Protocol and Transcribed)	Digital Metaphors	Peer Reviewed Journals Books Textbooks Web Sites
(2) What pedagogical strategies are identified by African American males as more conducive to their learning mathematics?	Online Questionnaire 2, questions 1-10	Individual Taped Interview (Protocol and Transcribed)	Digital Metaphors	Peer Reviewed Journals Books Textbooks Websites
(3) What are African American males' perceptions on how both psychosocial factors and pedagogical strategies affect their motivation to enroll in advanced math courses?	Online Questionnaire 3, questions 1-10	Individual Taped Interview (Protocol and Transcribed)	Digital Metaphors	Peer Reviewed Journals Books Textbooks Websites

**Note.* Data Source 3 consisted of direct observations within the math classrooms. Data gathered were used to answer all three research questions.

Surveys as baseline data.

Baseline data are initial data collected for comparison with subsequently attained data (baseline data, businessdictionary.com). First, baseline data was collected using Likert-type surveys. Each survey had 10 questions that allow students to respond according to the following scale: (1) = Fully Disagree, (2) = Somewhat Disagree, (3) = Neutral (no opinion), (4) = Somewhat Agree, and (5) = Fully Agree. The statements on

Survey 1 pertain to psychosocial factors that influence African American males' pursuit of advanced math courses. The statements on Survey 2 pertain to pedagogical strategies used in math classrooms. The statements on Survey 3 pertain to recruitment efforts that may influence the enrollment of African American males in advanced math courses. All questions were motivated by dominant themes found in peer reviewed journal articles related to African Americans in math education.

Direct observation in the field.

The researcher for this study was an assistant principal at the participating site, thus making him familiar with the school's routines and providing him easy access to school facilities. Therefore, potential inhibitors for observation and data gathering, such as scheduling conflicts with the facility, permission to use its resources, and potential monetary considerations (McGrath, 1970) were minimal. The participants' close proximity to the researcher also provided them ample opportunities to reschedule meetings and seek clarification regarding procedures. The researcher also provided a secure location within his office where the participants could drop off and pick up protocols, permission slips, and other information pertinent to the study.

For this study, the researcher observed participants on two separate occasions within their math classrooms. Although the participants knew they would be observed, they had no advanced notice regarding specific dates and times. Each observation lasted at least 30 minutes depending on the class activity. As long as the activities involved peer interactions or responding to teachers' questions, the observations continued. After 30 minutes, if participants engaged in independent seatwork, the observations concluded. This time frame allowed the researcher to observe each participant's style of dress and grooming, describe each participant's demeanor, describe his peer-to-peer interactions, identify the teaching methods used, and document other factors that influenced outcomes in the math classroom (Appendix A).

Also during the observations, the researcher sought evidence of differentiated instructional strategies that transcend the Eurocentric lecture model, strategies that provide visual reinforcements, multiple forms of student expression, meaningful and relevant contexts, and varied, performance-based assessments – methods that tend to bolster students' self-efficacy (Serdyukov & Ryan, 2008). Specifically, these differentiated strategies as outlined by Gregory and Chapman (2002) were sought:

- teachers communicating that they have a knowledge of their students' interests and experiences as indicated by their providing meaningful contexts and activities more holistic in nature; and
- teachers providing multiple learning and assessment opportunities that allow students to showcase their knowledge using various formats, such as writing prompts, problem-based activities, presenting to their peers, and working both independently and within groups.

Digital metaphors: A visual analysis.

Each participant created a scrapbook of digital metaphors. A *metaphor*, according to *The American Heritage Dictionary*, is "a figure of speech in which a term is transferred from the object it ordinarily designates to an object it may designate only by implicit comparison or analogy" (Morris, 1982, p. 825). Such imagery transference, according to Kramsch (2003), has been effectively used in education research to assist teachers in articulating and constructing their individual classroom experiences. In a manner reminiscent of the phrase "A picture is worth a thousand words," Bullough and Stokes (1994), citing Olney (1972), argued that images require articulation, and articulation requires the telling of a story or some personal narrative that offers a glimpse of the narrator's interpretation of situations or events. The subtle blending of images and stories, they said, provides a rich avenue for both collective and individual self-exploration.

According to Taylor (1984), the use of metaphors as a research tool provides unique insight into individuals' self-perceptions (Taylor, 1984). Their usage has become more prominent as technological advances provide convenient avenues for researchers to incorporate them into their studies. Emmison (2004), for example, credits the emergence of metaphors in qualitative research on the availability of digital media such as smart phones, digital cameras, and camcorders, particularly in the studies of architecture, anthropology, geography, and cultural mores and customs. For this study, the participants took pictures using their cell phones or selected pictures from online sources, such as Google images, to provide metaphors that encapsulated their response to various reflective statements, such as

- *"My math teacher thinks I am…"*
- *"A perfect math class reminds me of…"*
- *"When I think about how I fit in in math class, I am reminded of…"*

Audio recorded person-to-person interviews.

For this study, the researcher also used open-ended interview questions (Appendix A). All of the questions were motivated by themes found within the review of related literature. Each interview was transcribed (see Appendix G) using the process of denaturalism, where "interview noise," such as mispronounced words, utterances, pauses, and stutters, are omitted (Oliver, Serovich, & Mason, 2005, p. 1273). Denaturalism is a viable method that has been used in critical analysis and grounded theory research (Dijk, 1999; Fairclough, 1993; Oliver, Serovich, and Mason, 2005). According to Cameron (2001), it is especially useful when the focus of the study is about the meanings and perceptions that motivate the language rather than the participants' dialects and accents. Because the research questions for this study focused on the participants' experiences in math education, the denaturalized transcription style was used.

Data Collection and Timelines

Data gathering commenced immediately following the study's approval by both the university's Institutional Review Board (IRB) and the participating school's district. The university's approval was granted on April 25, 2013; the school district granted approval on March 22, 2013. The institutions' approval letters are found in Appendix I. Data were gathered from April 2013 through May 2013. Once the researcher exhausted all efforts to gather the necessary data from the participants, data analysis began from May 2013 through July 2013. The tentative timeline of data gathering events is found in Table 4. The researcher understood that the timeline was tentative due to participants' availability and the school's unforeseen, end-of-year events.

Table 4
Timeline of Events for Data Gathering

Event	Timeline
Obtain permission form site principal	Week of April 15
Submit paperwork for IRB approval	Week of April 22
Initial meeting with potential participants	Week of April 29
Participants complete baseline surveys	Week of May 6
Meet to explain and assign digital metaphors project	Week of May 6
Audiotaped individual interviews	Week of May 24
Direct observation during math classes	Begin Week of April 29

Saturation through Triangulation

Research Question #1: What do African American males identify as psychosocial factors contributing to their underrepresentation in advanced math courses?

The researcher developed this question to understand better the nonacademic factors that serve as barriers to African American students' participating in advanced math courses. The researcher taught advanced geometry and advanced placement calculus at the participating school from 1993-2000. During these years, only one African American student, a female, took calculus. Even the brightest among his African American geometry students would shun the taking of precalculus and calculus. Casual observations during this time led him to surmise that peer influence, a lack of parental support for higher-level math, and an overwhelming desire to focus on sports and other extracurricular activities prompted African American males to avoid taking advanced mathematics their senior year.

The review of literature revealed many other causes that result in African American males' being underrepresented in advanced math courses: racism, teachers' pedagogical strategies not conducive to the African American culture, the stigma of "acting White," and the Eurocentric model under which today's schools operate. The audio taped, transcribed interview offered participants several opportunities to express their views regarding potential psychosocial barriers:

- Item #3: Tell me about a math teacher who created an enjoyable experience for you;
- Item #4: Tell me about a math teacher who created a negative experience for you;
- Item #5: To whom do you look when you plan your educational roadmap?
- Item #8: Describe your parents' roles in your school planning;
- Item #11: Many African American males opt to take easier math courses or refuse to participate because they don't want to be seen as "acting White." What do you think that means?
- Item #12: Do you believe that racism plays a part in African American males choosing not to take advanced math courses, such as trigonometry, precalculus, and calculus? Explain.

Questionnaire 1 was a Likert-type scale that asked ten questions about psychosocial factors that discourage African American students from taking advanced math courses. The scale ranged from “1= Fully Disagree” to “5 = Fully Agree.” Some of the questions on this item included:

- Item #1: I believe math is easier for White people;
- Item #2: I believe math teachers have lower expectations for Black males; and
- Item #7: I believe my teachers find me intimidating.

The participants’ creating scrapbooks of digital metaphors allowed them to photograph or select images about which they could dialogue to explain how they relate to psychosocial factors they experienced on their math journeys. The participants’ digital metaphors also allowed them the opportunity to self-reflect about their past mathematics experiences, their strengths and weaknesses, and other factors that influenced their dispositions toward math education. Some of the metaphors that focused on psychosocial inhibitors included:

- Metaphor #1: “When I think of mathematics, I am reminded of….”
- Metaphor #2: “My math teacher thinks I am.…”
- Metaphor #6: “When I think about how I fit in in math class, I am reminded of.…”
- Metaphor #8: “My peers are important to me because.…”
- Metaphor #9: “Most math classes remind me of.…”

The classroom observation protocol had several items that pertain to psychosocial effects that promote on inhibit their learning of mathematics, including:

- Item #3, which identified the grouping structures used during the lesson, if any;

- Item #6, which chronicled the students' levels of class participation;
- Item #8, which documented evidence of nonconformity or disruptive behavior, if any; and
- a checklist to helped identify the participants' positive and negative peer-to-peer interactions and overall demeanor.

Research Question #2: What pedagogical strategies are identified by African American males as more conducive to their learning mathematics?

The interview allowed the participants to express their views about pedagogical strategies that influence their mathematics learning:

- Item #3: Tell me about a math teacher who created an enjoyable experience for you;
- Item #4: Tell me about a math teacher who created a negative experience for you;
- Item #9: Think about the way most teachers teach mathematics. If you could tell them what they are doing right, what would you say?
- Item #10: Think about the way math teachers teach mathematics. If you could tell them what they are doing wrong, what would you say?

Questionnaire 2 had the participants respond to ten Likert-type questions that focused on participants' beliefs about pedagogical strategies that appeal to their mathematics learning. These questions included:

- Item #1: Math teachers make the class too competitive by focusing on right/wrong answers;
- Item #4. I prefer to work on group assignments;
- Item #6. I learn better when I talk to my classmates;
- Item #9. Teachers assign too much busy work.

The scrapbook of digital metaphors allowed participants the opportunity to describe, through their photos, the ideal math classroom, how their teachers perceive them, their future plans, and factors that influenced their past math experiences. Metaphors that addressed teaching strategies that African American males may find beneficial were included:

- Metaphor #4: "A perfect math class reminds me of…"
- Metaphor #7: "I wish my teachers knew this about me…"
- Metaphor #8: "My peers are important to me because…"
- Metaphor #9: "Most math classes remind me of…"
- Metaphor #10: "I would take more math if I had access to…"

The classroom observation protocol contained several items that pertained teaching strategies used during instruction, including:

- Item #3, which described the grouping structures used, if any;
- Item #4, which identified evidence of differentiated instruction, if any; and

- Item #10, which chronicled the participant's interactions with his peers and teacher.

Research Question #3: What are African American males' beliefs on how both psychosocial factors and teaching strategies affect their motivation to enroll in advanced math courses?

This question sought to determine how psychosocial factors and pedagogical strategies motivate or discourage African American students in math education. Several questions during the interview provided insight into how students link the psychosocial and pedagogical factors to their own motivation in mathematics:

- Item #2: When choosing to take a math course, who do you turn to for advice before making your decision?
- Item #5: To whom do you look to when you plan your educational roadmap?
- Item #7: Why do you believe African American males avoid advanced math courses?
- Item #8: Describe your parents' roles in your school planning.
- Item #13: What type of school resources would make you more confident in taking advanced math courses?

Survey 3 had participants respond to ten Likert-type questions that focus on how psychosocial and pedagogical strategies affect African American males' motivation to take higher-level math. The scale ranged from "1 = Fully Disagree" to "5 = Fully Agree." Some of the questions on this item include:

- Item #1: Should schools do more to encourage African American males to take advanced math courses.
- Item #2: I believe math is important for future job success.
- Item #3: If my friend chose to take an advanced math class, I would more likely to take it, too.
- Item #8: My counselors encouraged me to take harder math classes.

The scrapbook of digital metaphors allowed participants to identify and dialogue about the psychosocial and pedagogical factors that they perceived would encourage them to enroll in advanced math courses. Some of the questions answered in the scrapbook of digital metaphors include:

- Metaphor #4: A perfect math class reminds me of…
- Metaphor #6: When I think of my future, I see…
- Metaphor #7: I wish my math teacher knew this about me…
- Metaphor #10: I would take more math if I had access to...

The scrapbook of digital metaphors offers a variety of items that allow the researcher to identify psychosocial and pedagogical elements that appear to motivate the participants during the instructional process:

- Item #1 detailed the participant's movements throughout the classroom
- Item #2 provided a snapshot of the class's demographics by gender and race
- Item #3 identified the types of grouping structures used during instruction, if any

- Item #4 identified differentiated learning methods used, if any;
- Item #5 determined how often the participant is called on during instruction;
- Item #6 documented the participant's level of participation throughout the lesson;
- Items #7 and #10 documented the participant's contributions to discussions and quality of peer interaction during instruction.

Summary

This study's purpose was to identify the beliefs of African American males on the psychosocial and pedagogical factors contributing to the underrepresentation of African American males in advanced high school math courses. The study focused on three research questions:

1) What do African American males identify as psychosocial factors contributing to their underrepresentation in advanced math courses?

(2) What pedagogical strategies are identified by African American males as more conducive to their learning mathematics?

(3) What are African American males' perceptions on how both psychosocial factors and pedagogical strategies affect their motivation to enroll in advanced math courses?

This study was conducted at a large, Southeastern (U.S.) comprehensive high school. The participants were six African American male juniors. Each participant was a case study, which allowed for qualitative methodologies. As such, several qualitative instruments were used for this study: Likert-type surveys, observation protocols, field notes, digital metaphors, and audio-recorded, transcribed interviews. To determine similarities and differences among the case, and to assess the continuity of emergent themes, with- and cross-case analyses were used.

The researcher for this study was a former math teacher and current assistant principal at the participating school. Thus, to minimize the effects of potential bias and other irregularities, the researcher sought triangulation through multiple data gathering instruments. Additionally, he used purposive sampling to select participants who generally conformed to school policies and procedures, which increased the likelihood of their having a cooperative disposition toward the researcher and the study.

CHAPTER IV

DATA ANALYSIS

Background

This study followed qualitative research methods using six case studies. Each case study focused on the math experiences of an African American male. All of the participants were in the final months of their junior years. A large suburban high school located approximately twenty miles from a Southeastern (U.S.) metropolitan city was selected as the participating site. The participants were chosen using purposive sampling based on the following criteria: they had to be male, African American juniors, with no suspensions or expulsions on their high school disciplinary records. Initially, the researcher selected twelve potential participants from a roster of African American male juniors. These potential participants met with the researcher in the school's cafeteria and were given an overview of the study, their potential roles, and the study's timeframes. After the meeting, all of the students who were interested in completing the study took home introductory letters and permission forms created by the researcher (see Appendix H), along with parental informed consent and assent documents from the supporting university's IRB office (see Appendix I). The students were given three days to return the signed documents.

The researcher selected the first six participants who returned their signed documents. After the cases were selected, the researcher met with each participant to set up meetings for the completion of surveys, to explain and assign the digital metaphor scrapbooks, to discuss the purpose of the two classroom observations, and to discuss the upcoming interview process. All data gathering protocols are located in Appendix A.

The participants first completed the three Likert-type surveys as an at-home exercise. When the participants returned the surveys, they were given their digital metaphor scrapbooks to complete, along with a second explanation on how to complete the exercises. When each participant returned his digital metaphor scrapbook, the audiotaped interview was scheduled. Each interview was conducted in a private office within the participating school. Transcriptions of the audiotaped interviews are found in Appendix G. During this interim, each participant was observed during his math class on two separate occasions over a two-week period, with each observation lasting at least thirty minutes depending on the class activities. After the initial 30 minutes of observation, the researcher continued his observation if the participant continued to interact with his teacher or peers. If, however, independent seatwork was planned for the remainder of the period, the researcher concluded the observation.

Within-case Analysis of Each Participant's Responses

Prior to each participant's within-case analysis, a descriptive narrative of each participant will be provided, followed by a description of events that occurred during each classroom observation. Each within-case analysis is grouped according to the following themes:

- participant's perceptions regarding the impact of racism, stereotype threat, and the stigma of "acting White;"

- his perceptions regarding adult and peer influences on his educational decision-making;
- his instructional motivators and inhibitors in math classes;
- his disposition towards his future;
- his senior year math course selection and rationale; and
- his suggestions for attracting more African American males to advanced math courses.

The following abbreviations are used for citations: CO for classroom observations, FN for field notes, SU for survey responses, DM for digital metaphor scrapbook, and TI for transcribed interview. To better ensure the data's authenticity, participants' written responses were not adjusted to compensate for grammatical errors. The transcribed interviews were done using the denaturalism format, which allows for the omission of inaudible language, utterances, coughing, pauses, and other non-pertinent noise.

Descriptive Narrative of CS1

Case Study #1 (CS1) was an African American male during his junior year of high school. This student was on the school's free and reduced lunch program. CS1 was also a member of the school's football team. He was tall, presenting an athletic stature, and dressed casually. During the first classroom observation, he wore a gray t-shirt, jeans, and brown penny loafers. During the second observation he wore a purple hoodie, khaki shorts, black socks, and tennis shoes. His appearance allowed him to blend in with other students in the class. CS1 conformed to the school's dress code standards, which mandate that students wear their pants at the waist.

During his freshman year, he took both Content Math and Algebra I, passing both courses with an 80 average and a 77 average, respectively. Content Math is reserved for students who lack the requisite math skills for success in Algebra I. During his sophomore year, he passed Algebra II with a 77 average. During his junior year, CS1 was enrolled in standard geometry. He passed this course with a 77 average. CS1 choose to take Bridge Math for his senior year math course. Bridge Math is a course that provides an overview of Algebra I, Algebra II, and standard geometry. Most students take this course their senior year to obtain their state-mandated fourth math credit. CS1's ACT math score at the time of the study was 16. His mid-term cumulative GPA was 2.44.

CS1's classroom experiences during two observations.

Classroom observations of CS1 prompted the researcher to characterize the participant's positive peer-to-peer interactions as caring, considerate, pleasant, thoughtful, and task-oriented. His personal attributes were identified as curious, passive, reserved, serious, and shy. The only negative behavior noted by the researcher occurred during the first observation. As the teacher worked homework problems at students' requests, CS1 was completing his homework assignment, thus missing out on instruction. As the teacher worked the problems at the board, CS1 hurriedly thumbed through his textbook and wrote feverishly to complete the assignment before she collected it. After approximately 15 minutes of discussion, the teacher collected the homework and distributed test materials.

During the test, CS1 seemed pensive as he entered data into his calculator and solved each problem. The teacher had provided a list of essential geometry formulas on the board for students to use during the test. CS1 occasionally glanced at the board to refer to the formulas.

During the second observation, CS1 was conversing with one of his classmates prior to the tardy bell. CS1 had been absent for a few days and the peer was explaining how to draw the geometric designs from the previous night's homework. The class activity for the day required the students to choose a set of geometric designs to graph on graphing paper. The assignment was not a group assignment, yet students were not discouraged from quietly talking, sharing ideas, and exchanging feedback during the activity. As before, CS1 conversed with his Hispanic female neighbor. "How do you do this one?" he asked her. She turned around, pointed to his sheet and replied, "These have to add up to 10." She then counted aloud to 10 while pointing to his graph. Catching on to the pattern, CS1 replied, "Aww!" (Appendix E, CO).

Later the Hispanic female turned to him and said, "Which one should I do? I did this one." CS1 replied, "I did, too. I like that," referring to a particular diagram. She then asked, "Do you have to do this one?" CS1 replied, "You have to do the first and last. You didn't do that [drawing]," he said while quietly laughing (Appendix E, CO). Later she showed him her completed diagram. "It looks good," he said (Appendix E, CO). Toward the end of the exercise, while others in the class were finishing the assignment, CS1 made a trip to the wastebasket to discard some materials. He stopped to read information on one of the bulletin boards. As he returned to his desk, he again spoke with his teammate. “I am still hurting,” he said, referring to the effects of a pervious football workout (Appendix E, CO). Before sitting down, he showed his work to his teacher and commented, “You can’t even see my lines.” The teacher agreed: “Let me get you a coloring pencil,” (Appendix E, CO). He thanked the teacher as she handed him the coloring pencil.

Throughout both observations, CS1 interacted very little with his peers, reserving most dialogue for the Hispanic female who sat in front of him. As they conversed, he spoke barely above a whisper. CS1 would not want his teachers to misinterpret his passive and often distracted demeanor. Digital Metaphor #2 had him respond to the statement, “My math teacher thinks I am….” He replied, “Distracted,” then wrote, “Teachers have a way of thinking I am not paying any attention to them…which is not true because clearly I could answer their questions correctly” (Appendix D, DM).

CS1’s geometry teacher was a White female with 9 years’ experience teaching mathematics. This teacher was currently completing an improvement plan, with the assistance of one of her administrators, due to her students’ low end-of-course test scores. Her teaching method is best described as traditional, with lecture being the primary mode of content delivery, no evidence of ability grouping during activities, and with no evidence of differentiated instruction. All students received the same instruction, activity assignments, and homework assignments. She did, however, work problems at students’ requests.

The classroom was neatly arranged with students' desks situated in neat rows facing the white board. The teacher had a friendly disposition and interacted with her students on a regular basis as they worked on class activities. She continuously monitored students' progress, offered individual suggestions, and provided feedback on the accuracy of students' work. She demonstrated a genuine concern for her students as evidenced by her inquiry into CS1's absences as she casually passed his desk during the instructional activity. As they conversed, the teacher made direct eye contact, nodded, and smiled.

CS1 credited his teacher for his understanding of geometry because she explained things in detail as she "[wrote] everything down [to] show us how to do it. Her not showing me how to do it pretty much confirms a failing grade" (Appendix G, lines 52-53, TI). When asked about his favorite learning experience in math classes, he replied, "Probably the Pythagorean Theorem. This is helpful to me. I still don't understand it. She is going to show me how to do it" (Appendix G, lines 24-26, TI).

CS1 thematic analysis: racism, stereotype threat and "acting White"

CS1 did not perceive racism, stereotype threat, or the stigma of "acting White" as impediments to his success. Several items on the baseline surveys sampled his opinion on these themes. He disagreed with the following survey statements:

- Mathematics is easier for White people (he wrote in the margin "Math is most Blacks' favorite subject");
- Math teachers treat me differently because I am African American (he wrote in the margin that "we are all treated equally"); and

- My mathematics teacher finds me intimidating (Appendix C, SU).

He was neutral regarding the statement, White people worry too much about their math grades, stating that “some do, but others are slackers” (Appendix C, SU).

Unlike African American participants in prior research (Riegle-Crumb and Humphries, 2012), CS1 believed that one’s math prowess was predicated on work ethic, not skin color. Similarly, he did not entertain the notion that the schooling environment was one in which he was inferior to Whites (Ogbu, 1978); in fact, he never indicated having any aversion to school generally or mathematics particularly. CS1 claimed that mathematics was one of his favorite subjects, even though it often presented a challenge. He wrote, “I love math and it is my favorite subject although it can be challenging at times but I strive to pass it. Everything is easy if you actually try it and nothing is impossible” (Appendix D, DM). He wrote that whenever he thought about mathematics, he was reminded of college. He said that “mathematics is a very important part of our education, and we are going to use it every day”(Appendix D, DM), a response that runs counter to other studies that found African American males cognitively and emotionally disconnected from the school environment (Gadsden & Smith, 1994; Palmer, Davis, Moore, & Hilton, 2010) .

CS1 also stressed the importance of applying himself in mathematics consistently during his high school years because “to make it into college, you have got to pass the first stages, and that is high school, so what you do here is going to reflect on what happens on the next level” (Appendix D, DM). When asked if he often thought about his future education, his reply was a short, yet emphatic, “Yes, sir!” (Appendix

G, line 69, TI). His positive disposition toward mathematics and his casually dialoguing with his teacher during instruction suggests that he suffered from neither the "discourse of deficiency" nor the "discourse of rejection" that often marginalizes and undervalues African Americans' contributions in the classroom (Stinson, 2006).

Some researchers (Fordham and Ogbu, 1986; Murrell, 1994) blamed stereotype threat and the stigma of "acting White" as underlying factors that restricted African Americans' participation in math classes. CS1, however, was quite comfortable in the math classroom, for he wrote that "my math class is fun, so no need to be a fake person around [his classmates]" (Appendix D, DM). When asked to respond to the interview statement, "Some people have said that African American males opt to take easier math courses or refuse to participate because they don't want to be seen as 'acting White'," CS1 replied,

> I don't think that is true because we are both smart. I mean, we are just as smart as them. I am not trying to be negative, but we try, we do our best, and we are going to succeed in whatever we do... [and those people who believe that the statement is true] are those who are jealous and not trying. They just don't want to see African Americans succeed, I guess. I think they say stuff just to say it" (Appendix G, lines 103-113, TI).

When asked whether racism was a motivating factor in African American males avoiding advanced math classes, he replied, "No, sir. I think they just don't want to do it. They just want to take the easy way out" (Appendix G, lines 114-118, TI). When asked to respond to the survey statement, "As an African American student, I have to work harder in math class than White students in order to be appreciated," he indicated a "neutral" response, and stated in the margin, "I believe we all have equal chances" (Appendix C, SU).

CS1 thematic analysis: adult and peer influence.

CS1's educational decisions were motivated more by adults rather than his peers, which contradicts Gadsden and Smith's (1994) argument that African American males often reject academics for social acceptance. His sphere of influence clearly reflected compartmentalization, with his dependence on parents, teachers, and principals regarding educational decisions, and his dependence on his peers for social interaction, support during times of crises, and other non-academic needs. He indicated that his peers' taking certain courses would not influence his decisions because "I am gonna do what is best for me" (Appendix C, SU). In fact, when determining which courses were best for his future, CS1 claimed that his peers "never influenced my courses idea" (Appendix C, SU). He did state that his parents would likely have input "because they know what can challenge me" (Appendix C, SU).

According to CS1, his parents perceived that math provided a means for a successful future: "Education is the key to my parents and me because I am going to be the first child of theirs to graduate and I'm blessed to say I won't let them down….My parents brought me here to pass school, do right, never do drugs, and live a successful life" (Appendix D, DM). When asked which factors influenced him to take Bridge Math his senior year, he answered, "My parents helped me out talking about how I will use math in everyday life, and how I should take it (Appendix G, lines 64-66, TI). He said his parents' advice mattered most regarding his education decisions because "they talk about how they want me to succeed in life and how education is important" (Appendix G, lines 70-73, TI). Upon reflection, he again mentioned his mom "because she went to college," then added, "I might talk to my teacher or principal because they have master's and stuff" (Appendix G, lines 74-78, TI)

CS1's life was not one absent of healthy, positive peer relationships, for he indicated that his friends served as a trustworthy support network on which he could depend during life's struggles. He acknowledged that his friends' presence in class was "fun" (Appendix G, lines 17-21, TI). His responses suggest that his parents were most influential in his academic decisions, while his friends serve as social connections in his nonacademic pursuits.

CS1 thematic analysis: instructional motivators and inhibitors.

CS1 was motivated in math class by the following: cooperative learning experiences, math problems that were relevant to students' interests, a positive classroom teacher, and external motivators, such as grades. CS1 was not motivated by traditional methods of teaching, such as lecture, laborious note taking, and "busy work." He fully agreed with the following survey statements:

- I prefer to work on group assignments during mathematics class;
- Math teachers lecture too much; and
- Teachers assign too much busy work in math class.

He wrote that a perfect math class reminded him of "being happy," then added, The key to a fun math class is happiness and being positive….So, try to go to class with a smile on your face and see how long that is gonna last throughout the day if you are not positive" (Appendix D, DM). When asked what made math classes exciting or boring, he replied, “Having my friends around me and the teachers just having fun and showing us how to learn” (Appendix G, lines 18-21, TI). He agreed that art and music would enhance the teaching of mathematics. He said that listening to music elevated his concentration.

CS1 was also motivated by extrinsic rewards: “I would take more math courses if I got paid for it,” he wrote (Appendix D, DM). Getting paid for something, he said, motivates one’s train of thought and passion toward the endeavor. In addition to money, CS1 was also motivated by grades: “I love making good grades” (Appendix C, SU). CS1 indicated that relevance was also an important motivator. He urged math teachers to stress the importance of mathematics in students’ everyday lives, especially in areas in which they are interested, such as sports. Although he indicated that discussing careers that use mathematics would “possibly” interest him (Appendix C, SU), CS1 “fully agreed” with the following survey statements:

- I believe mathematics is important for future job success, and
- I believe that a good mathematics background will lead to a better paying job.

CS1 thematic analysis: disposition towards his future.

CS1 discounted the notion that African American males were destined to a life of crime, poverty, and public alienation as suggested by Williamson (2012). He chose to believe, instead, that “everyone can do what they set their minds to do. If you try hard, you will succeed” (Appendix G, lines 143-144, TI). He further accentuated his optimism about his future and the importance of school in establishing his goals: “School is a challenge I think to see if you will actually do what your taught or to just give up and drop out. I came to far in life to give up now, so I am going to finish what I started to make myself and family proud of me" (Appendix D, DM).

CS1 perceived that he would have a successful future. His appreciation for fun and athletics as learning motivators transcended his schooling experiences. He wrote, "I am a positive guy….My future is going to be great," then added, "Being a professional athlete was one of my goals, because me and my brother always played together, then if I don't do that I want a well-paying job" (Appendix D, DM). His parents' influence, in addition to helping him with his educational roadmap, motivated his desire to reciprocate for their contributions in his life: "Mainly I want to give back to my parents for the support and love that they showed me my entire life" (Appendix D, DM).

CS1 thematic analysis: senior year math course selection and rationale.

CS1 was neutral regarding his guidance counselor's and teachers' encouraging him to take more challenging math classes. He also disagreed that he would make better course-taking decisions if school officials conferenced with him. "I am a smart guy," he wrote, "and can make choices myself" (Appendix C, SU). It was evident, however, that CS1 failed to realize the benefit of interacting with school personnel regarding course-taking decisions, for he opted to take Bridge Math his senior year because "there aren't any other subjects to take" (Appendix G, lines 56-63, TI). The participating school offered several advanced math courses, such as precalculus, advanced algebra, advanced algebra honors, statistics, and AB and BC calculus.

CS1 thematic analysis: suggestions for attracting more African American males to advanced math courses.

CS1 responded “neutral” to the survey statement, “More African American males would take advanced math if the classes were taught by African American men,” then wrote in the survey’s margin, “I don’t agree with that” (Appendix C, SU). When asked what school officials could do to attract more African American males to advanced math courses, he made two recommendations: 1) the schools should provide more after school tutoring and 2) they should offer school activities that incorporate sports and mathematics. He also recommended that schools provide external motivators, such as food, to entice the students to attend.

Descriptive Narrative of CS2

Case Study #2 (CS2) was an African American male during his junior year of high school. CS2 was on the school’s free and reduced program. He was a member of the school’s football team. During all observations and meetings he was neatly dressed in casual style. During the first classroom observation he wore a red and white striped, Polo-style shirt, white dress shorts, red and black striped socks, and black tennis shoes. He also wore several rubber wrist bands, including one that sported the participating school’s colors and logo. During the second observation he wore a red shirt, jeans, and tennis shoes. CS2 conformed to the school’s dress code standards, which mandated that students wear their pants at the waist.

During his freshman year, he took Algebra I, barely passing the course with a 71 average. During his sophomore year, he passed Algebra II with a 72 average. CS2 was enrolled in standard geometry his junior year. He passed standard geometry with a 72 average. CS2's ACT math score at the time of the study was a 16. His mid-term cumulative GPA was a 2.08.

CS2's classroom experiences during two observations.

Classroom observations of CS2 prompted the researcher to characterize the participant's positive peer-to-peer interactions as considerate, enthusiastic, pleasant, and thoughtful. His personal attributes were identified as active, ambitious, assertive, extroverted, and serious. During the researcher's first observation, the teacher began class by working various homework problems at students' requests. During this time, CS2 took notes and maintained consistent eye contact with the teacher. At one point, CS2 asked for clarification on a problem. Later, when the teacher called on CS2 to provide the correct formula for the problem, he incorrectly cited the Midpoint Formula. The teacher then recommended that he use the Pythagorean Theorem. After working all of the requested problems, the teacher asked the students to move to their groups for an activity. Although CS2 had his textbook, calculator, and pencil, he did borrow paper from a classmate.

His classroom teacher had them working in small groups consisting of three to five students. The activity included a worksheet on finding the area of various geometric shapes, primarily triangles. CS2 immediately assumed group leader status, for he was the group's primary contact with the teacher throughout the lesson. "When trying to find the height, do we use [this formula]?" he asked his teacher (Appendix E, CO). The teacher approached the group and answered CS2. The teacher then provided some additional information about how to determine the best formula for each type of problem. As the teacher explained, CS2 repeatedly nodded, indicating that he understood the information. When the teacher left the group, CS2 immediately pointed to the diagram on his paper and explained to his peers how to find a triangle's base length. When a peer asked CS2 a question about the problem, CS2 replied, "No, they are not congruent" (Appendix E, CO). The three other members in CS2's group watched and listened to him intently as he explained the proper mathematical procedures for finding the area of a triangle. One peer asked, "Is the base four [units long]?" CS2 replied, "Yeah" (Appendix E, CO).

After a few seconds of quiet contemplation, CS2 turned to the same peer and said, "I think what you said first is right because…" (Appendix E, CO). CS2 then raised his hand and approached the teacher, who was circulating throughout the room monitoring each group's progress on the activity. After CS2 and the teacher conversed briefly, they both returned to the group. As the teacher listened, CS2 told the group, "That ain't right." He turned to the teacher and asked, "Is it the Pythagorean Theorem?" (Appendix E, CO). He then addressed another peer while pointing at the problem, "I think this one is just like [problem] two" (Appendix E, CO). CS2 then referenced his textbook to find a similar example. After closing the book, CS2 pointed to the board and said to one of his group members, "Did you see that [formula]?" (Appendix E, CO).

The second observation involved another group activity. This time, CS2 was working with two Hispanic males. As before, CS2 assumed group leader status, often smiling at his peers and involving them in discussions about the homework problems –

although he did most of the talking. As the teacher worked some of the homework problems on the white board, CS2 diligently took notes, using his calculator as the teacher explained some of the problems. CS2 turned in his homework as the teacher collected it.

Once the class transitioned to the group activity, CS2 immediately began to explain the problems to his peers, both of whom appeared to understand little English as they seemed confused and dependent on CS2 for assistance with the problems. Early into the activity, CS2 looked at his peers and said, "One squared is one, seven squared is 49, so it is 50!" (Appendix E, CO). The peers nodded and wrote as CS2 explained. Then he called his teacher's name aloud, signaling with an arm movement that he needed the teacher to approach the group. "I don't know if we do it like this or use the tangent," he said to a peer, "I am going to ask him" (Appendix E, CO). The teacher glanced at CS2's work and said, "No, that is not a 90 degree angle. Which one? Think about it" (Appendix E, CO). Moments later, CS2 seemed to have caught on. After making some inaudible comments to the teacher, the teacher replied, "Right, use the inverse. Good" (Appendix E, CO). CS2's peers gazed at his paper as he continued to solve the problem.

CS2's geometry teacher was a White male with 7 years' experience teaching mathematics. His teaching style was a combination of traditional- and constructivist methods. During both observations, he began class by going over homework problems at students' requests, working the problems while occasionally questioning the students. He used small group activities during both lessons. When students asked questions during the group activity, the teacher seldom provided an immediate answer, often requiring the students to ponder the problem further.

CS2 described this teacher as “a really good teacher” who “knows what he is doing” (Appendix G, lines 29-30, TI). CS2 indicated that he appreciated his teacher’s willingness to tutor both before and after school. He said he benefitted from the tutoring because it was during these sessions that the teacher “shows me the steps” (Appendix G, line 32-33, TI). When asked if he had any negative things to say about his geometry teacher, he replied, “He knows that I try, and he is always on top of me, so I have nothing negative to say about him” (Appendix G, lines 96-98, TI).

Digital Metaphor #2 had CS2 respond to the prompt, “My math teacher thinks I am….” He finished the statement with, “Dumb” (Appendix C, SU). He explained his choosing a graphic of the word “Dumb”: “I can play dumb but this year I am trying my best at geometry. The subject can be hard and challenging” (Appendix D, DM). In the narrative he describes his teacher as brilliant, then added, “but it seems to me that he thinks I don’t put all my effort into my work. I can never seem to get things correct in his class. That is why I believe he thinks im dumb” (Appendix D, DM). He also perceived that his teacher did not believe that he worked hard enough. “[My teachers] say that to me all the time but they don’t realize the effect it has on me” (Appendix D, DM).

CS2 thematic analysis: racism, stereotype threat, and “acting White.”

CS2 did not perceive racism, stereotype threat, or the stigma of “acting White” as impediments to his success. Several items on the baseline surveys sampled his opinion on these themes (Appendix C, SU). He disagreed with the following survey statements:

- Mathematics is easier for White people,
- Math teachers have lower expectations for African American males, and
- Math teachers treat me differently because I am African American.

Although CS2 did not perceive racism to be an inhibitor to his math success, he did believe that stereotyping often undervalues African American's contributions in the classroom. When the researcher asked CS2 whether he believed that African American males avoid advanced math courses, he replied, "No and yes. Some African American males, they just want the easy way out (Appendix G, line 137, TI). He also perceived that many African American males are intelligent, but they do not wish to show it. When asked why other people believe that African American males avoid the advanced math courses, he suggested that they were influenced by stereotypical views:

> Because they basically see it. You know, most don't show that they are trying. When they see an African American male, with his pants sagging, they think he is a drug dealer and doesn't have a high education. (Appendix G, lines 142-144, TI)

CS2 thematic analysis: adult and peer influence.

When the researcher asked CS2 whose advice mattered regarding his educational decisions, he replied,

> Coach W---. I talk to Coach W---. He is my football coach. He explains to you. One day during class we were talking about World War II, and he just stopped and was like, 'Life is gonna be pretty crappy if you don't get your work together now. If you just slack off and at like take the easy classes, whatever you want to be or do, you might as well strike that out. Because if you don't push yourself, then nothing is going to come easy.' (Appendix G, lines 118-123, TI)

CS2 indicated that he does not regularly seek input from his parents regarding course-taking decisions, but when pressed to name anyone from whom he sought advice on important educational decisions, he replied, “My mom. She tells me to do my best….” (Appendix G, line 125, TI). He also said he would seek his youth minister’s advice on important educational decisions because their lives had many similarities. “We have been through the exact same things,” CS2 stated, “so he tells me what colleges I should go to. I want to be a successful business major” (Appendix G, lines 128-131, TI).

CS2 indicated that his he and his friends often discussed their college goals. Digital Metaphor #8 had CS2 respond to the prompt, “My peers are important to me because….” The photo he used to capture the essence of this prompt was photocopied from his high school yearbook. The photo showed several of his classmates standing in the students’ pep section during a football game. In the caption, CS2 wrote,

> These students are very important to me because of the care we show to one another. We are bright, talented, well minded kids. Sometimes student are the ones who keep other students coming to school. We are always winners in my book. (Appendix D, DM)

Even though CS2 perceived friends to be a valuable support system, he indicated that their taking certain courses would not influence his course-taking decisions.

Even though CS2 credited his football coach for offering motivation regarding life’s lessons and the perils of taking the easy way out, he seemed to believe that teachers and counselors had offered little motivation for taking harder classes. He stated that his math teacher “doesn’t care” whether he took harder classes. He responded "neutral" to the survey statement, My counselors encourage me to take harder math classes.

CS2 thematic analysis: instructional motivators and inhibitors.

CS2 seemed to prefer a blending of traditional, Eurocentric teaching methods and constructivist teaching methods. He responded "neutral" to the survey statements, I prefer to work on group assignments during mathematics class, and, I learn better when I can talk to my classmates during math assignments. He disagreed with the following survey statements:

- Math teachers lecture too much.
- I have too much energy to sit still for an entire math period, and
- Teachers should use music and art to make math more fun.

CS2 compared the perfect math class to a circle because it 'is smooth, round, and has no dents," unlike many classrooms where it is "hard to learn because of the distractions" (Appendix D, DM). Although CS2 seemed comfortable working in small groups during both observations, his responses to the survey questions and on the digital metaphor prompt were akin to the beliefs of traditionalist teachers who view constructivist teaching methods as chaotic and unpredictable.

The surveys showed that CS2 preferred challenging, relevant assignments. He perceived that math teachers assigned too much busy work. He also suggested that mathematics was a subject that required the memorization of facts that had no use beyond the classroom. As a math student, he described himself as a soap-drenched sponge who attempted to “soak up all” the information and “hold it in” (Appendix D, DM). He perceived that discussing careers that use mathematics would interest him because he was “planning on going to college for business and that uses math” (Appendix C, SU). In one of his digital metaphors he stressed the importance of math software on his future plans. He selected a photo that displayed business software uploaded on a computer screen. “The slide shows business documents. If I truly had business documents I would be mentally focused more on math. I always wanted to go to college in the field of business” (Appendix D, DM).

CS2 seemed to enjoy challenging math experiences that involved competition with his peers. When asked to reflect on favorite aspects of his math journey, he mentioned his 8th grade teacher’s using math BINGO. He also commented that his 8th grade teacher’s using games “got me started a bit” (Appendix G, line 10, TI). After struggling in Algebra I during his freshman year, CS2 was enrolled in Fresh Start his second semester. Fresh Start is an elective course designed to strengthen students’ basic skills while they completed the second semester of Algebra. In this course, he met a teacher’s assistant who challenged him with timed tests over multiplication: “The first day we were in there, she gave me 30 multiplication problems. She helped me do it. I got all of them correct my first try. If you didn’t get them all, you had to keep doing them till you got them all correct. So we could do our multiplication problems” (Appendix G, lines 14-17, TI).

CS2 appreciated his 10th grade Algebra II teacher, whom he described as “a real good teacher,” for providing a challenging atmosphere:

> He was hard on me at first, but sometimes you have to be hard on a student to get him to do his work. That is when a teacher cares. He made me study. He didn't solve the problems on the board. He wouldn't tell you how to do it, like the teacher before me…So I took it home, and [my mom and I] worked it out. (Appendix G, lines 23-28, TI)

CS2 seemed to be motivated to succeed because of his teacher's willingness to challenge him and make himself available for after-school tutoring. CS2 also wanted to impress his mother who often tried to help him with his math homework. He understood the importance of good grades for his future success. "Earning good grades is important," he wrote in the survey's margin, "Colleges mainly look at your math scores" (Appendix C, SU).

CS2's math experiences, however, were not all positive. During the interview, he was asked to describe some negative, stressful situations along his math journey. He described his 7th grade math experience as "quite rough because she was never there, and when she came back we always had tests" (Appendix G, lines 6-10, TI).

CS2 thematic analysis: disposition towards his future.

CS2 mentioned his determination to become a businessman on three of his 10 digital metaphors. Digital Metaphor #1 asked him to respond to the prompt, "When I think of math, I am reminded of…." He attached a picture depicting the exterior of a local university's library. He wrote that college classes would help him hone his math skills while working alongside other hardworking students in business class. CS2 chose to take Bridge Math his senior year, yet upon reflection, he stated, "I would rather not take an easy class just to graduate. I would rather take a harder class because I want to be a successful business man" (Appendix G, lines 105-107, TI).

Digital Metaphor #3 had CS2 respond to the prompt, "When I think of my future, I see…" He chose an image of a black man wearing a dress shirt, necktie, and blazer. The man is gazing at his laptop with one hand under his chin. This pensive pose reminded the researcher of the iconic image of Auguste Rodin's bronze sculpture, the Thinker (The Thinker, 2013). "When I think of my future this is what I see," CS2 wrote. "It appears to me that he is a successful, loyal, smart, and skilled in the field of business. This is going to be me one day in my future" (Appendix D, DM). During the interview, he indicated that he and his youth minister often engage in "deep conversations" regarding the colleges he should attend since he wants to be a "successful business major" (Appendix G, lines 126-131, TI).

CS2 thematic analysis: senior math course selection and rationale.

Perhaps the most ambivalent of CS2's responses concerned his senior math course selection and his rationale for choosing. CS2 selected Bridge Math for his senior math course. When asked whether he thought Bridge Math would prepare him for his future, he replied, "That? No, not at all" (Appendix G, lines 102-103, TI). When pressed to explain his decision to take the course, he stated,

> Well, since geometry was so hard this year, but life is hard, so you should just suck it up and live it. I would rather not take an easy class just to graduate. I would rather take a harder class because I want to be a successful business man. (Appendix G, lines 104-107, TI)

When the researcher repeated the question in a more direct manner by asking, So why did you sign up for Bridge? CS2 replied,

> I don't know. I didn't think about it. I talked to [my guidance counselor]. She said based on my ACT scores – I haven't seen my ACT scores. But based on

> those I think I could take a higher math class next year. (Appendix G, lines 108-112, TI)

CS2 may have revealed his true reason for taking Bridge Math when asked whether any other factors influenced his decision. His reply was short, yet revealing: "No, I just heard it was easy" (Appendix G, lines 113-114, TI). This answer seemed to agree with his rationale when asked to explain why he believed African American males avoid advanced math courses: "Some African American males, they want the easy way out" (Appendix G, lines 134-137, TI). CS2's academic history indicated that he barely passed Algebra I, Algebra II, and geometry. That, combined with his math ACT score of 16, suggests that his guidance counselor tracked him into Bridge Math.

CS2 thematic analysis: suggestions for attracting more African American males to advanced math courses.

CS2 did not perceive that more African American males would take advanced math if the classes were taught by African American men. He also rejected the notion that more African American peers in advanced math courses would motivate him to enroll. He mentioned, however, two specific motivators. One suggested the importance of making mathematics relevant and the other suggested the importance of teachers' encouraging African Americans to pursue more advanced courses.

When surveyed, CS2 indicated that discussing careers in math class would encourage him, especially discussions about business. During the interview, when asked what schools could do to encourage more African American males to enroll in advanced math courses, he replied, "Get more teachers to show they care. If they showed they care, people would get more into math" (Appendix G, lines 183-187, TI).

After more reflection, he added, “Stay on top of them. Right there. That will help them out” (Appendix G, lines 194-196, TI).

Descriptive Analysis of CS3

Case Study #3 (CS3) was an African American male during his junior year of high school. This student was not on the school’s free and reduced lunch program. CS3 was also a member of the school’s football team until he suffered a head injury earlier in the year. CS3 was not overly athletic in stature, displaying a slim to average build. In terms of his style of dress, comfort seemed to trump fashion. During the first observation, CS3 was observed wearing a black t-shirt, dark shorts, black socks, and black sandals. During the second observation, CS3 wore a gray and blue striped hoodie, jeans, and black tennis shoes. His appearance was such that he blended in with the other students in the class. CS3 dress conformed to the school’s dress code.

CS3’s academic history revealed that he had struggled significantly in mathematics. During his 9th grade year, he was transferred at mid-term from Algebra I to a remediation elective course called Fresh Start. CS3 passed Algebra I with a D in summer school. His 10th grade year proved to be equally challenging, for he was removed from Algebra II at midterm and placed in Fresh Start. CS3 did not pass Algebra II. He took geometry his junior year, ultimately failing the course with a 64 average. He was scheduled to take Algebra II and Bridge Math his senior year, which was unlikely to occur since he failed geometry. Unless he passed either geometry or

Algebra II in summer school, he would begin his senior year with one math credit. CS3's math ACT score was 14. His mid-term cumulative GPA was 1.78.

CS3's classroom experiences during two observations.

Classroom observations prompted the researcher to characterize CS3's positive peer-to-peer interactions as considerate and pleasant. His personal attributes were identified as introverted, reserved, serious, and shy. During the researcher's first observation, CS3 was involved in a small group activity that had the students solving problems on a worksheet. He was working with an African American female and a Hispanic female. CS3 had very little interaction with his peer group, almost exclusively depending on them to initiate conversations. Even then, CS3 spoke silently and smiled often, yet maintained very little eye contact with his peers. In the margin of the observation protocol, the researcher made a brief comment that described CS3's overall demeanor: "Very quiet" (Appendix E, CO). Prior to the small group activity, CS3 seemed to be working diligently during the teacher's discussion over homework. He took notes, performed calculations on his calculator, and worked independently. As soon as the teacher prompted the class to put their things away and move into their small groups, CS3 responded immediately.

The second observation also found CS3 working in small groups. Before transitioning into groups, CS3 corrected his homework while the teacher worked various homework problems at students' requests. When the class was transitioned into their groups, CS3 made some quiet small talk with a female student, and then added, "I hope ya'll win" (Appendix E, CO). Before sitting down, CS3 smiled and waved at a peer who sat across the room. His small group consisted of a Hispanic male, a Hispanic female, and an African American female. As the teacher gave instructions for the group activity, CS3 maintained constant eye contact and appeared to be listening to instructions. The researcher noted that CS3's legs were "jittery," thus projecting a sense of nervousness or restlessness. The activity included a worksheet that had students finding the area of Hopewell triangles, triangles found in earthwork drawings created by the Hopewell Indians.

Most of CS3's comments during the observations were barely audible to the researcher, who was situated about two feet from CS3. When the teacher approached the group to assist them and monitor their progress, CS3 never asked him any questions. He would, however, make eye contact with his peers as they conversed with the teacher. When the teacher asked the group general questions, CS3 would defer to them unless specifically called on to answer. Overall, CS3 worked independently during small group exercises. He occasionally looked on a neighbor's paper and made quiet comments when prompted by a peer to give feedback.

Throughout both observations, CS3 readily complied with directions and participated in the small group activities, but he was never a major contributor to classroom discussions. Digital Metaphor #6 asked him to respond to the prompt, "When I think about how I fit in in math class, I am reminded of…." He chose to include a picture of a fish resting on land while struggling to breathe. In the caption below the picture he wrote,

> I chose this picture of a fish on dry land because when I am in my math class I feel like I don't belong for the simple fact of I don't understand the material most of the time but then I look around me and I see that most of the people

> around me get it and it makes me feel as if Im the only one in class that doesn't understand. With the fish on dry land he doesn't belong because fish don't belong on dry land they belong in water. (Appendix D, DM)

CS3 thematic analysis: racism, stereotype threat, and "acting White."

CS3 perceived that mathematics was easier for White people, but he stated that African Americans could succeed in advanced math if they were willing to accept the challenges of the more rigorous curriculum. He also indicated that math teachers have lower expectations for African American males. He did not, however, find that his teachers treated him differently because of his race, for he wrote in one of the survey's margins, "My teacher treats me like everybody else" (Appendix C, SU). To CS3, math teachers viewed African Americans as mathematically inferior to Whites, but they did not overtly express this bias. He did not perceive that his math teachers found him intimidating. He wrote in Digital Metaphor #3 that his geometry teacher acknowledged that he was bright. He also admitted that he frequently lost his homework and failed to turn in assignments, an indication that he accepted some personal responsibility for his past math troubles.

During the interview, the researcher told CS3 that some people believed that African American males avoid advanced math class or refused to participate because they did not want to appear as "acting White." "I disagree with that statement," he replied. He continued,

> To me there is no such thing as acting White. I mean, you are acting like you, who you are. If you want to participate in math or be an A student, you are just acting like your parents raised you. It all boils down to how your parents raised you. If you don't come to class, or if you have a poor work ethic, or won't participate, or sit in class sleeping and stuff; some people have been raised where they do work,

> sometimes get lazy and they don't want to do it. If you do do it, you are not acting White, you are acting the way you should act. It is all own your own being. You are not copying anyone at all. Not acting White, just doing this on your own. (Appendix G, lines 181-194, TI)

When CS3 was asked whether he thought that racism played a part in African Americans choosing to avoid advanced math courses, he replied,

> No, I do not because I don't want – African American men don't – It's not a race thing. If it were a race thing, we would probably go to being in advanced math classes with Black teachers all the time. It is not a race thing at all. It is just, some people don't want to be in those advanced math classes because regular math classes come easier to them. They don't want to put forth the effort, you know They just want – they, a lot of African American men do want to be in advanced math class, and that class comes to them easier than other math classes, so they want to be in that math class. I don't think it is a racial thing at all (Appendix G, lines 195-204, TI)

CS3 thematic analysis: adult and peer influence.

When it came to CS3's course-taking decisions, he seemed to lack any influence from his parents and peers. He "fully disagreed" with the following survey statements:

- If my friend chose to take an advanced math class, I would more than likely take it, too;
- My parents help me choose which math courses to take; and
- My friends influence my course taking decisions.

During the interview, when asked from whom he would seek advice regarding important academic decisions, he mentioned his mother and grandmother because they, too, struggled in mathematics and could relate to his experience. He stated that they frequently encourage him to attend college.

CS3 perceived that his guidance counselor and teachers provided little motivation to purse advanced math. It was not surprising that school officials did not encourage CS3 to take advanced math courses since his academic record indicated that mathematics was a subject in which he had a great deal of struggle. It appeared that his math teachers encouraged him in spite of his mathematical deficiencies:

> My math teacher thinks I am [like a] flashlight because [he] thinks I am a bright student, but like everybody else sometimes the light gets dim or cuts off but it always comes back on and shines even brighter than before. (Appendix D, DM)

CS3 thematic analysis: instructional motivators and inhibitors.

CS3 preferred nontraditional teaching methods that provided student- rather than teacher-centered activities. He indicated that he preferred to work on group assignments during math class because he benefitted from talking with his peers. When interviewed, he mentioned his 8th grade teacher's allowing students to work in groups as an integral part of his rebounding from a very challenging 7th grade year. He expressed that math teachers lecture too much, and "the more they talk the more sleepy I get" (Appendix C, SU). During the interview, CS3 cited lectures, PowerPoint notes, and teachers' working problems on the projector as factors that contributed to his sleepiness and lack of motivation. These responses conflicted with his "somewhat disagreeing" with the statement, I have too much energy to sit still for an entire math period.

CS3 found that visual aids and music provided for a more fun, enriched learning experience: "I agree because music helps me think and makes things fun" (Appendix C, SU). His referred to geometry as "a good subject" that can "make you frustrated and irritated" while generating "lots of excitement" and "opportunities to do some projects that get you involved" (Appendix G, lines 176-180, TI). He wrote in one of his digital metaphors that he wished his teacher understood how music stimulated his learning. He stated that music enabled him to be a more efficient reader and writer because it contributed to a more relaxing environment that "helps the brain think more clearer" (Appendix D, DM).

In addition to the group activities, CS3 also perceived that his 8th grade teacher's use of instructional games motivated him to learn. When the researcher asked him to reveal things that made math class exciting, he replied,

> My 8th grade teacher got us involved by doing stuff on the board and playing games. Those are the things that are exciting because it makes you want to come to class and want to be involved in class and want to compete to get that answer, and at the same time she is trying to help you learn what you need to learn to fully understand what the lesson is for that day. That helps you a lot and gets you involved and real excited because you are – we get to play this game for whatever it is for, for this subject. It is a learning experience at the same time. (Appendix G, lines 48-56, TI)

CS3 did not believe that math teachers assign too much busy work. He perceived that the discussing of careers during math class was distracting because "there is no point of discussing that when we are trying to learn" (Appendix C, SU). In spite of his very low grades in mathematics and his continuous need for remediation, CS3 "fully disagreed" with the following statements:

- Math teachers make the class too competitive by focusing on right/wrong answers;
- Math teachers challenge me too much, writing in the surveys margin, "They make class fun sometimes but never competitive;" and
- Math teachers are too impatient for an answer when calling on me in class.

CS3's "fully disagreeing" with those survey statements conflicted with some of his interview responses. When asked to describe some negative or stressful experiences in math classes, he recalled a particular time when he struggled to understand a formula that his peers evidently understood quite well,

> I don't remember what formula or what method it was but during that time it was real stressful because he had explained it and I had asked five questions and other people had asked two or three questions, but I felt I was the only one who couldn't get it cuz I would look around the room and see everyone doing the worksheet and working on it and it came real easy to them. It bothered me because I couldn't understand why I couldn't get that method, that certain method, you know. It was real stressful and I as real stressed because I wanted to get it. I didn't want [my teacher] to think I was asking too many questions about it. Even though teachers say ask all the questions you want about it, I just felt like I didn't want to ask him too many questions, that I just wanted to try and figure it out on my own. (Appendix G, lines 64-75, TI)

In spite of CS3's struggles in mathematics, he said he would give nearly all of his math teachers an "A". He appreciated his 7th grade teacher for teaching him a lot even though he did not like math. He liked his 8th grade teacher's keeping him involved in class. He said his 10th grade teachers could both explain the concepts in ways he could understand. His work ethic, he said, contributed to his lack of success in Algebra II: "It was just bad on my part for not putting forth the effort and trying not to do the work like I should have (Appendix G, lines 89-91, TI). CS3 also mentioned his appreciation for his 11th grade teacher's willingness to help him catch up in class after his being absent due to a football injury. CS3 stated, however, that his 9th grade teacher deserved a "D" for her inability to explain the concepts with clarity and for her impatience when students asked questions.

CS3 thematic analysis: dispositions toward his future.

Even though CS3 had a great deal of struggles in mathematics, he believed that his future outlook was promising. Digital Metaphor #4 asked him to respond to the prompt, “When I think of my future, I see….” He chose a picture of a long, winding path of stairs. He said he chose the picture because the stairs “lead up,” taking him from his past and present “pain and heartaches” (Appendix D, DM). “My future can go nowhere else than up,” he wrote. “I feel that my future is bright and I feel that I’m ready for anything that is thrown at me” (Appendix D, DM).

CS3 said that he did think about his future education. He indicated that he plans to attend a local community college for two years before transferring to a university. He acknowledges that the math courses in college will be more difficult,

> It will come down to work ethic. It will come down to a lot of patience and a lot of studying because I know there is a lot of tests in those math classes, and the teacher is not gonna tell you what you missed if you miss a day. So, I will have to buckle down, do my best, and try my hardest to get working. (Appendix G, lines 128-134, TI)

CS3 thematic analysis: senior math course selection and rationale.

CS3 indicated that he has enrolled in Bridge Math his senior year. He believed the subject would help him in his future since “it is a lot easier” (Appendix G, lines 110-116, TI). When asked which factors helped him choose Bridge Math, he mentioned his previous grades and his work ethic:

> I feel like I just need to get my work ethic better. I think if I go to Bridge Math that will help me out a lot. I will do better in Bridge Math than in my previous math classes. (Appendix G, lines 117-121, TI)

Unfortunately, CS3 failed geometry, leaving him without credits in both Algebra II and geometry going into his senior year.

CS3 thematic analysis: suggestions for attracting more African American males to advanced math courses.

During the interview, when asked what school officials could do to encourage more African American males to enroll in advanced math courses, he said that African Americans should be told to take harder math classes. He believed that school officials' promoting the harder classes as being fun and worthwhile would garner interest among African American males. As before, he also mentioned the importance of the individual's work for success in advanced math.

Descriptive Narrative of CS4

Case Study #4 (CS4) was an African American male during his junior year of high school. This student was on the school's free and reduced lunch program. CS4 was also a member of the school's football team. He was slim with an athletic build, with average height for a high school junior. CS4 dressed in a casual, yet stylish manner. During the first observation, he wore a red and white striped shirt, khaki shorts, and brown loafers. During the second observation, he wore a white dress shirt, blue jeans, and brown loafers. He also wore large, black, plastic framed glasses that were very much in style among teenagers. Many students wore these without a prescription. He also wore his hair in dreadlocks. When interacting with his peers in the school hallway, CS4 always seemed confident and exuberant, suggesting that he was a "people person" who never met a stranger.

During his freshman year, CS4 took both Content Math and Algebra I, passing both courses with an 89 and a 77 average, respectively. His enrollment in Content Math suggests that he left middle school without math skills adequate enough for successful Algebra I experience. During his sophomore year, he passed Algebra II with a 79 average. During his junior year he passed geometry with an 84 average. CS4 chose to take Bridge Math during his senior year rather than take a more progressive, challenging advanced math course. CS4's math ACT score was 18. His mid-term cumulative GPA was 2.48.

CS4's classroom experiences during two observations.

Classroom observations of CS4 prompted the researcher to characterize the participant's positive peer-to-peer interactions as enthusiastic, thoughtful, considerate, and pleasant. His personal attributes were identified as active, ambitious, assertive, and extroverted. Although his geometry class was an inclusion class, CS4 did not receive special education services. During both observations, the students worked individually, yet the classroom environment was relaxed and controlled to allow some verbal dialogue among the students as long as the conversations pertained to the subject matter.

During the first observation, the students reviewed how to find the area of geometric figures. Throughout the instruction, the teacher worked various problems on the overhead projector while calling on students either generally or specifically to provide input. CS4 remained on task, sat upright, and seemed genuinely interested in what the teacher was doing. He took notes the entire time.

At one point during the discussion, the teacher told the students to write down the formula for the area of a rectangle. When the teacher asked, "Who thinks they have an answer," CS4 raised his hand. When discussing the formula for the area of a triangle, the teacher called on CS4 by name, then said, "help me out" (Appendix E, CO). When the teacher asked the class where the one-half comes in, CS4 answered aloud. He frequently responded to the teacher's general questions and provided some inquiry on his own: "Divide by *y*." "Cancel" "We can't divide by *h*, can we?"(Appendix E, CO) Any time CS4 asked a question, the teacher responded to him, at times using CS4's questions to introduce other problems. When CS4 asked, "Can you have 2 *x*'s in equations?" the teacher immediately created a problem showing that equations can have multiple *x*'s. CS4 never hesitated to seek clarification when confused: "So don't worry about miles?" he asked, to determine whether the units of measure were significant to the problem's solution (Appendix E, CO). The teacher explained why the answer had to be in square miles, not miles.

During the second observation, the teacher was reviewing students for the final exam. As before, CS4 was actively involved in classroom discussion: asking questions, volunteering answers, and frequently turning to a neighbor, an African American male, to provide some assistance on how to solve particular problems. On one occasion, CS4 turned to his neighbor and said, "Use b_1 and b_2 times height" (Appendix E, CO). After completing a problem on the overhead, the teacher asked the class, "Does everyone understand?" CS4 replied with an enthusiastic, "Yes, sir!" (Appendix E, CO). CS4 routinely asked questions and provided solutions in a manner suggesting that he understood the material: "You add up all the sides." "Add 'em." "The height is 16." When the teacher asked the class where he should start when calculating the area of a trapezoid, CS4 said, "Is it one-half of b_1 plus b_2 times h?" (Appendix E, CO). The teacher replied in the affirmative.

CS4's geometry teacher was a White male with 18 years' experience teaching mathematics. His teaching method was best described as traditional, with his use of the overhead projector, no grouping of students, and lecturing. Although this particular class was an inclusion class, there was no evidence of differentiated instruction. All students received the same problems and worked at the same pace. The special education assistant did, however, monitor the special education students' progress as she casually walked throughout the room glancing at their written work. The teacher had a friendly, often sarcastic demeanor, which, based on CS4's consistent smiles and laughter in response to the teacher's humor, was well received by the participant. Although the teacher lectured throughout both lessons, his dialoguing with the students creating a relaxed and friendly atmosphere that provided students ample opportunity to casually discuss mathematics among each other or simply ask questions aloud without their having to raise their hands.

CS4 thematic analysis: racism, stereotype threat, and "acting White."

CS4 did not believe that racism, stereotype threat, or the stigma of "acting White" affect his performance in math class, though he did perceive that a select group of teachers may have had lower expectations for African Americans in mathematics. He also perceived that stereotype threat played a role in mathematical experiences of other African American males. CS4 wrote in one of the survey's margins that one's thinking that mathematics is easier for White people "is ignorant" because it is "not true at all" (Appendix C, SU). Also, he "fully disagreed" with the following survey statements,

- Mathematics is easier for White people;
- Math teachers have lower expectations for African American males;
- Math teachers treat me differently because I am African American; and
- As an African American student, I have to work harder in math class than White students in order to be appreciated.

He fully perceived that his math teacher's expectations for him were not different than those he had for White students. "My current math teacher encourages me the same as others (White kids)," he wrote in the survey's margin (Appendix C, SU). Digital Metaphor #2 had CS4 respond to the prompt, "My math teacher thinks I am…." He choose to include a picture of an athletic, African American male doing pushups. In the caption, CS4 wrote,

> Strong minded. Smart. Cool. I choose this picture because it depicts strength and toughness. The man above didn't magically get to where he is. He worked at it. And it gives me motivation, that if I wanna be good at math I got to work at it. My teacher thinks I am awesome and smart. (Appendix D, DM)

During the interview, however, CS4 indicated that he believed that African American males avoid the advanced math classes due to some teachers' lack of faith in their math abilities,

> It isn't that we avoid the math classes. It is just that maybe our teachers don't think we can take harder classes. Coach G---, he encouraged me to take harder math classes, but other teachers tell me to take easier math classes instead of a hard one. So maybe fifty-fifty. Maybe we avoid them, maybe we don't. We don't give it a chance. (Appendix G, lines 130-136, TI).

When the researcher rephrased the question using part of CS4's prior response, he reaffirmed his belief that African American males were just as capable as White males when it comes to mathematics. When the researcher asked why some people believe that African Americans avoid advanced math courses, he responded by saying that people believe "they are stupid," adding,

> But we are not. There are Black professors, Black doctors. I mean, it is just stereotypical to that think. Maybe it is fifty-fifty. They should give us a chance because a Black male is just as smart as a White male if they push theirselves and encourages themselves. A White person may have a better background. Like maybe they have a parent who is a professor in college. Not like a Black student would. But I don't know. (Appendix G, lines 137-147, TI)

CS4's responses suggested that, from his experience, African American males were as mathematically proficient in mathematics as White males. He also perceived that his teachers find him to be a capable math student. He did, however, perceive that some White math teachers had lower expectations for African American males.

CS4 perceived that those who believed that one's math prowess was dictated by skin color were motivated by ignorance. CS4 told the researcher that he did not perceive that racism plays a part in African American males not taking advanced math courses, though in the past it may have been a factor. "Not here at [this school]. I don't think race has anything to do with it. A Black student having a White teacher doesn't make a difference as long as the teacher does their job" (Appendix G, lines 180-185, TI).

CS4 was told by the researcher that some people believe that African Americans refuse to take advanced math courses or refuse to participate in class because they do not wish to be perceived as acting White. After the researcher said, “What do you think that means?” CS4 replied,

> I think that is just stereotypical. I mean, I like to answer questions I class, and I don’t see anything wrong with that. If you want to answer a question, it doesn’t mean you are White. It means you just want to answer a question. It is kinda stupid to say. It is not that we African American males avoid questions; I think they just don’t want to say it. Not because they are acting White, but because they probably think the teacher thinks they are dumb. But maybe they can show it on the test that they can ace it. (Appendix G, lines 167-174, TI)

CS4 thematic analysis: adult and peer influence.

When it came to having input from others regarding his course-taking decisions, CS4 credited his guidance counselor as his primary source of information. He credited his geometry teacher for being an exception to his general perception that teachers did not encourage him to take harder classes. He “fully disagreed” with the survey statements, My parents help me choose which math courses to take, writing in the margin, “No they just want me to make good grades”; and, My friends influence my course-taking decisions in math; writing in the margin, “I lead not follow. I like average math. Friends won’t change that” (Appendix C, SU). He said, however, that his mom served as a motivator who urged him to do his best and that failure was unacceptable. Perhaps he neglected to seek her input on course-taking decisions because, in his words, “My mom is not that smart” (Appendix G, lines 110-115, TI). CS4 did receive academic advice from a cousin who had recently graduated from a local university.

When asked to describe, metaphorically, how his peers were important to him, he chose a picture of three small monkeys because he and his friends like to “monkey around” (Appendix D, DM). According to CS4, he and his friends had fun, got along well, and talked about activities they enjoyed. “My peers and I love each other. We are like a big family” (Appendix D, DM).

CS4 thematic analysis: instructional motivators and inhibitors.

One of CS4’s digital metaphor prompts had him complete the statement, “A perfect math class reminds me of....” He drew the McDonald’s logo, depicting a black and white version of the “golden arches.” Beneath the drawing he wrote, “I’m lovin’ it” (Appendix D, DM). In his caption, he compared his love of math to his love for McDonald’s. When another digital metaphor asked him to respond to how well he fits in in math class, he wrote,

> I fit in. I get math most of the time. My classmates help me get along and pass. I’m almost never alone. My teacher Mr. G--- or Coach G--- is very helpful and considerate. He encourages me to take AP math or advanced. I’m reminded of love and appreciation. (Appendix D, DM).

CS4’s responses regarding instructional motivators and inhibitors suggest that he preferred to work independently on graded assignments, thereby knowing that his grade was solely dependent on his own work ethic and academic abilities. He enjoyed, however, the opportunity to give and receive feedback during instruction. He responded that he “somewhat disagreed” with the survey question, I prefer to work on group assignments during mathematics class, writing in the survey’s margin, “I’d rather work alone” (Appendix C, SU). Then, two questions later, he responded that he “somewhat agreed” with the survey statement, I learn better when I can talk to my classmates during mathematics assignments, writing in the survey’s margin, “They help the situation” (Appendix C, SU). These responses indicate that CS4 was uncomfortable with group activities where one’s grade was often dependent on others’ getting things done correctly and on time. He did, however, enjoy the privilege of interacting with his peers in a more casual, unstructured forum, as was evident during classroom observations.

CS4 perceived that most math classes are boring since they were often all business and lacked fun, yet, upon reflection, he described nearly all of his math teachers for being “fun” and “cool” (Appendix G; line 23, line 27, line 49; TI). On a digital metaphor, he mentioned that his current math teacher, Coach G---, provided a classroom experience that was a combination of hard work and fun. “We joke around, but we get our work done. At times we work the whole class period. Other times we work and discuss the problem or do other fun activity” (Appendix D, DM). The researcher noted that Coach G--- used sarcasm and humor consistently during instruction, and that CS4 frequently responded with silent smiles or audible laughter.

During the interview, CS4 was given the opportunity to reflect back on his math experiences beginning in 7th grade. The motivators he mentioned were, as in the digital metaphors, affective rather than cognitive. He credited his 7th grade math teacher for motivating his affinity toward math. He described her as a “cool” and “fun” teacher who “would always laugh and do fun activities with us” (Appendix G, lines 6-7, TI). CS4 appreciated his 8th grade teacher’s willingness to help him after school. He credited his 9th grade teacher for being patient and helpful to everybody. CS4 liked his 10th grade teacher, a man who, according to CS4, “everybody hated...but he was my favorite” (Appendix G, lines 18-19, TI), yet he never provided any details that supported his 10th grade teacher’s being “his favorite” (Appendix G, lines 18-19, TI). He then reiterated his passion for Coach G---,

> I like him a lot. He encouraged me to take advanced math next year, but I am not sure I can do that. But he is cool. He helps me after school – before or after school. He is real nice, always smiling. I mean, every teacher has bad days, but he is mostly smiling when he comes in. But, I am glad to finish the year out with him because he is going to [another school] next year. I am sad he is leaving because the lower classmen won't have him as a teacher. They won't see how cool and helpful and accepting he was. (Appendix G, lines 25-33, TI).

CS4's favorite learning experiences also had "fun" as their primary motivators. He mentioned doing a project for his algebra teacher that had students creating cities using rulers and crayons. "We used shapes and turns and things, naming cities. That was cool" (Appendix G, lines 46-48, TI). He also enjoyed her playing math BINGO with him. He also enjoyed his 7th grade teacher's "multiplication challenges," where students would see who could work the problem the fastest and put the solution on the board.

When asked to reflect on any negative experiences in math class, CS4 said that nothing came to mind, then he added, "I like math so much I just think of it on the positive side." In fact, when the researcher asked him to assign each teacher a passing or failing grade based on their teaching, he gave all of them passing grades. Coach G--- received a passing grade "because he is so nice and kind to me"; Mrs. C---, his 7th grade math teacher received her passing grade "because it wouldn't always be about math. It was about her family"; his 9th grade teacher passed for being "so nice, so cheerful to everyone" (Appendix G, lines 71-80, TI). When the researcher pressed CS4 to give some constructive criticism to his former math teachers, he mentioned two things: 1) teachers, he said, should shoulder some of the blame for their students' not doing well on tests because "they could have helped me more or explained it in better detail" and 2) teachers should provide more tutoring opportunities outside normal school hours.

CS4 “fully agreed” that earning good grades in math was important. He “fully disagreed” with the statement, I do not like to be called on to participate in mathematics class, writing in the survey’s margin, “I love answering questions” (Appendix C, SU). He perceived that math teachers tended to lecture too much. He also suggested that they assign too much busy work, but “not Mr. G---“ (Appendix C, SU).

CS4 expressed that art and music were irrelevant in math education because “[they] have nothing to do with math” (Appendix C, SU). This statement seemed to contradict his fond memories of a math project that required him to design a city using rulers and crayons. He also suggested that math teachers’ integrating career awareness into the math curriculum was superfluous because “I like math the way it is” (Appendix C, SU). The observations also revealed that CS4 was quite confident and productive in the traditional, lecture-style classroom.

CS4 thematic analysis: disposition towards his future.

CS4 perceived his future to be a blend of both academics and athletics. He hoped to attend Kentucky State but realized he may have to attend a local university since it would be cheaper. Digital Metaphor #3 had CS4 respond to the prompt, “When I think of my future I see....” He chose a picture of an African American male playing basketball. His caption summed up his future goals:

> I see a future of sports, fame, and accomplishment. I choose this photo because I love basketball. But anyone can play basketball, but to go pro, to the NBA you have to make good grades. You have to pass math class. You have to understand 3 pointers, free throws. Math has just about everything to do with basketball. (Appendix D, DM)

CS4 thematic analysis: senior math course selection and rationale.

CS4 chose to take Bridge Math his senior year "because it is easy" (Appendix G, lines 91-92, TI) He admitted that he should have signed up for a harder math class for better college preparation. Even though he stated that Bridge Math was easy, he admitted that he would have to work hard, do his homework, and pay attention. When asked if he thought that Bridge Math would help him in his future, he gave a mixed response,

> I really do because I heard Bridge Math is like Algebra I, Algebra II, and geometry all mixed up together. I don't think you need an AP or honors course to get by in life. I think basic math skills will help you in your future....If I could pass [Bridge Math] with an A, I would try the next semester to get into an advanced class. Bridge Math just sounds easy because trigonometry and other classes just sound hard. And I don't know how the teaching experience is gonna be. (Appendix G, lines 91-106, TI)

During the interview, he seemed to realize that his choosing Bridge Math conflicted with his perception that African American males were equally as capable in mathematics as White males. He seemed to struggle, as indicated by his pensive stare and slowed speech, as he justified his choosing Bridge Math. After telling the researcher about his choice, he immediately admonished himself: "I probably should have signed up for a harder math, just for college purposes" (Appendix G, lines 91-93, TI). He said he would transfer from Bridge Math to an advanced math class at mid-term if he had an A average, an unlikely scenario since students cannot take the second semester of an advanced math course without having taken the first semester. In spite of his being encouraged to take advanced math by both his counselor and his 11th grade math teacher, CS4 opted to take the easier math course, leaving his transcript void of any advanced math courses.

CS4 thematic analysis: suggestions for attracting more African American males to advanced math courses.

At the close of the interview, the researcher asked CS4 what school officials could do to encourage more African American males to take advanced math. His responses suggest that CS4 was better at giving advice rather than taking it. He said that encouragement would be the primary motivating factor. “Just tell them that they can do it. Maybe they think you only help the White students....Just give them hope” (Appendix G, lines 191-196, TI). Coach G---, a teacher for whom CS4 had a great deal of respect, encouraged CS4 to take an advanced math course his senior year. CS4 also had encouragement from his guidance counselor. Their encouragement, however, was not enough to prompt him to take an advanced math course his senior year.

Descriptive Narrative of CS5

Case Study #5 (CS5) was an African American male during his junior year of high school. This participant was not on the school’s free and reduced lunch program. CS5 did not participate in any athletics. He was slim with average height. He dressed casually. During the first observation, he wore a white, V-neck shirt, gray jeans, and black tennis shoes. During the second observation, he was wearing a white Polo-style shirt, gray jeans, and black tennis shoes. CS5’s style of dress and grooming allowed him to blend in with his peers. He conformed to the school’s dress code. CS5 was biracial but was identified on the school’s data base as being African American.

During his freshman year, CS5 passed Algebra I with an 83 average. During his sophomore year, he passed Algebra II with an 84 average. During his junior year, he passed geometry with a 91 average. GS5's ACT math score was 16. His mid-term cumulative GPA was 3.49.

CS5's classroom experiences during two observations.

Classroom observations of CS5 prompted the researcher to characterize the participants' positive peer-to-peer interactions as considerate, pleasant, and thoughtful. His personal attributes were identified as curious, introverted, reserved, serious, and shy. During the first observation, the class worked on a group quiz. When the teacher prompted the class to transition from their regular seating into their groups, CS5 immediately stood to collect his belongings. As he was moving seats, a peer said to him, "Come on, sit there." Once the group began to work the quiz problems, CS5 engaged in some dialogue with his peers, who asked him questions and received feedback from him. At one point, CS5 responded to a peer's inquiry by saying, "Of course. Did you get 5.78?" CS5 entered data into his calculator and replied, "That is what I said. I got 20 squared. I got 14.2". When the teacher checked his response and corrected him for his inaccurate use of pi in the context of the problem, he continued to look at his paper and said, "My bad," then tried to explain to the teacher his rationale. "I know," replied the teacher, "I know what you meant" (Appendix E, CO).

CS5 talked very quietly but did dialogue with his peers throughout the remainder of the activity. He was comfortable asking questions and asking for help from his peers: "What did you get for #2?" "I got a decimal." "Does it matter whether we use a fraction or a decimal?" When the teacher saw one of the group's answers, he said, "Tell me about #4." CS5 replied, "Area of a square?" The teacher grimaced and said, “Looks like you have more to do.” CS5 immediately said to a peer, “Yeah, the area of a rectangle. That is what I got the first time” (Appendix E, CO). As they were finishing the quiz, a peer asked CS5 whether he needed any help. When he answered in the affirmative, she asked him why he was dividing to solve the problem.

During the second observation, CS5 again worked within a small group. He was partnered with two females, one White and the other African American. Prior to the small group activity, the teacher was working homework problems on the overhead projector at students’ requests. When the teacher stated, “$a = b$, who agrees?” CS5 indicated his understanding by raising his hand. Evidently CS5 had been absent for two days, for he spent some of this time copying notes from a female peer. “Which days’ [notes] are you missing? Were you not here?” she asked. He replied, I am missing [notes from days] five and six” (Appendix E, CO). CS5 missed a lot of the homework discussion due to his copying notes. He did not turn in any homework since he was absent the day before.

The group activity was a worksheet over circles and points of tangency. CS5 engaged in light banter, his conversations mostly inaudible due to his quiet voice. After the activity began, his peers were thinking aloud and discussing between each other how to best solve the first problem. “What? No! 7.1. Round up,” he stated. He also provided insight on how to solve the next problem: “Hypotenuse is larger. If this angle is 45, the other has to be 45 degrees,” he said. He then asked the teacher, “Is it sine or cosine?” CS5 laughed when the teacher sarcastically replied, “I don’t know how to do it. Tell me” (Appendix E, CO).

As the group continued to work the problems, CS5 remained an active participant, providing assistance to peers when they asked him for his solutions and methods At one point, CS5 assumed a leadership role. When a peer was confused about whether a triangle was an isosceles right triangle, he said aloud, “No, read it” (Appendix E, CO). He then read the directions aloud to the group. The researcher noted that when the teacher approached his group, CS5 would not make eye contact him, even when he was answering a direct question. Instead, he focused on his worksheet.

CS5’s geometry teacher was a White male with 7 years’ experience teaching mathematics. Although his teacher used group work during both observations, his methods were traditional with constructivist undertones. Until the students separated into their groups, his classroom was arranged in the traditional row-by-row fashion, with his desk and overhead screen facing the students. He began each class period by going over homework problems that students requested. The worksheets were prefabricated with no variations among the problems to account for students’ individual competency levels. The teacher never provided immediate assistance in response to students’ questions. In fact, he seldom provided any hints, leaving them with the impression that they needed to figure the solutions out amongst themselves.

The teacher had a friendly disposition and monitored his students throughout the lessons. The students’ willingness to ask him questions consistently throughout the activities indicated that he was an approachable teacher who encouraged dialoguing as part of the learning process. His sarcastic humor was such that he often played devil’s advocate or appeared not to understand the problems, thus contributing to a relaxed environment where students were free to openly explore their problems without harsh judgment or criticism by the teacher.

CS5 thematic analysis: racism, stereotype threat, and "acting White."

CS5's responses to the survey and interview questions suggest that, although he had never experienced racism or stereotype threat, he perceived that they were salient factors in African Americans' avoiding advanced math classes. He downplayed the phenomenon of "acting White," citing individual choice, education history, and work ethic as factors precluding one's active participation and appropriate behavior in math class.

CS5 "somewhat agreed" with the survey statement, Mathematics is easier for White people. He also "somewhat agreed" and "somewhat disagreed" with the statement, Mathematics teachers have lower expectations for African American males. This question was accidentally mentioned twice on the survey. Next to his first response, he wrote, "Some teachers may have personal opinions," and next to his second response, he wrote, "Some teachers may be biased" (Appendix C, SU). His two very different responses to the same question were difficult to decipher. He disagreed with the following statements:

- My mathematics teacher finds me intimidating,
- Mathematics teachers treat me differently because I am African American,
- My mathematics teacher praises me for doing my best,
- Mathematics teachers have lower expectations for African American males,

- As an African American student, I have to work harder in math class that White student.

When asked whether he perceived that racism plays a part in African American males' choosing not to take advanced math courses, he first sought clarification: "Racism like from the teacher or themselves or...." The researcher replied, "Either." CS5 continued,

> I would say it is more that pattern, that repetition, like if their parents didn't take any, then they won't be pushed to take it. I think they need a push to take it. I mean like if you come to high school as a freshman and you are educated about what to take then they will probably do it. But they will never step up if they don't apply themselves" (Appendix G, lines 160-170, TI).

CS5 hinted that race may play a part in African American males' choosing not to take advanced math courses, for when the researcher asked the question, "I have read that African American males avoid the more difficult math courses, such as precalculus, calculus, and statistics. Do you think that is true?" He replied,

> I would say so because it is not the laziness. I think it is the fear because a lot of them aren't used to it. Some of it is stereotypical because African Americans play sports, play football, whatever, track. That is a lot harder, so sports is their math. That is what they are devoting their time to. So I guess it might be that. (Appendix G, lines 116-122, TI)

One of the digital metaphor prompts had him complete the statement, "I wish my teachers knew this about me...." He chose a picture of a biracial family: a White mother, an African American father, and their three children. The family seemed to be happy as they relaxed on a bed. CS5 wrote,

> I am biracial. I see both sides of the black and white in society. I associate myself with all different types of people. I understand things a little bit better as far as life in general and have a view on what both races feel. I think that being

> biracial is great and it helps me more to understand life and people. (Appendix D, DM)

When asked to explain the phenomenon of "acting White," CS5 replied that he had never been affected by that phenomenon, and then added,

> I don't think it is about acting White. It is about applying yourself. Laziness, like I say. Acting – I have never faced that. I am half White, and I have never seen anyone [say], 'Why are you taking this class?' If you are in that class and you are trying to be successful, that is what they are looking at. They don't care what color your skin is. (Appendix G, lines 148-159, TI).

CS5 thematic analysis: adult and peer influence.

When it came to his course-taking decisions, CS5 depended on school officials to guide him, yet he indicated on the survey that school officials did not always communicate effectively regarding "what benefits me and my future" (Appendix C, SU). He expressed that he would make better decisions selecting math courses if school officials would spend more time talking with him. He credited his teachers and counselors for providing him some encouragement to pursue more challenging math courses. He indicated that if he had to make an important education decision, he would seek input from his guidance counselor because "that is what she is there for," and his business teachers because "that is what I want to do" (Appendix G, lines 107-115, TI).

CS5 did not value his parents' input regarding his course-taking decisions. During the interview he said that he could not discuss educational issues with his parents because they did not complete college. One of the digital metaphor prompts began with, "My parents' understanding of math is like...." He choose a picture of a dark sky spangled with bright stars. He wrote,

> Math is like space to my parents. It is very distant and most of it is unknown.

> I could take a long time before most of it is discovered. Learning math is going to be a challenge to my parents considering that they did not finish college. My parents struggle with math and a lot of it is confusing to them. Even though math is a struggle for my parents, if they work hard they can succeed in it. (Appendix D, DM)

When asked whether the thought about his future, CS5 replied in the affirmative. He then acknowledged his parents' not completing college as an external motivator, for his father consistently reminds him that he will be the first in his immediate family to finish college. He added that his father's expectation was "a lot to deal with" but "it's not really too much pressure" (Appendix G, lines 90-95, TI). He indicated that his White grandfather, who "has been to college and ...is pretty successful," also served as a motivator regarding his future decisions since they can provide monetary assistance (Appendix G, lines 100-106, TI). This grandfather also stressed the importance of CS5's meeting lots of people and making influential connections for advancement.

CS5 indicated that his friends' taking an advanced math course would not motivate him to do likewise. He was more adamant about his not seeking peer input about his course selections. During the series of interview questions about who influenced his important educational decisions, he never mentioned his peers. He did, however, depend on them for moral support and encouragement. One of the digital metaphors had him respond to the prompt, "My peers are important to me because...." He chose a picture of WWII veterans planting the American flag on a battlefield after what appeared to be a hard fought victory. CS5 considered his peers to be an extension of his own family,

They pick me up when I am down. They make me stronger. They stand behind

> me no matter what and raise me to another level as a person. My peers understand me and some of the situations I am in. (Appendix D, DM)

CS5 thematic analysis: instructional motivators and inhibitors.

Although CS5 did not perceive that math teachers lecture too much, all of his other responses indicated that he did not prefer the traditional classroom experience. CS5's survey and interview responses indicated that he would benefit from VAK teaching methods, since they appealed to students' visual, audio, and kinesthetic modalities. He agreed that music and art should be used to make math more fun. When asked to reflect on some of his favorite math experiences, he mentioned his learning about tessellations during his freshman year, adding, "The geometry aspect makes it fun for me" (Appendix G, lines 36-40, TI). He "somewhat agreed" with the following statements:

- I prefer to work on group assignments during mathematics class,
- I learn better when I can talk to my classmates during mathematics assignments,
- I have too much energy to sit still for an entire math period, and

In the survey's margin, CS5 explained his preference for peer interaction in mathematics class: "Learning from someone who is on your level is easier" (Appendix C, SU). He named projects, group activities, and group tests as activities that provided an opportunity to "[learn] from someone who is in your shoes who can explain it more or better..." (Appendix G, lines 39-43, TI). When asked to grade his teachers on their teaching methods, he "gave" his geometry teacher an "A" for using group work. When asked about negative experiences in mathematics, he mentioned the detrimental effect of his having to take laborious notes, and then reiterated his penchant for peer interaction in the learning process,

> Taking notes [is a negative experience] because we have a block period for an hour and a half, and you don't really learn anything. You are so focused on copying the notes, making sure you got it that you don't have time to take it all in. Whereas, as a group, you can think about it; they can explain it. Younger people around your age have more patience with you because they know what you are dealing with. So, that makes it not a teaching, but a helping. (Appendix G, lines 44-52, TI).

Relevance and a challenging math curriculum motivated CS5. After responding that he "somewhat disagreed" with the statement, Mathematics teachers challenge me too much, he wrote in the survey's margin, "African-Americans may not see their full potential if they are not challenged." He also communicated his disdain for so-called busy work. During the interview he characterized busy work as "useless assignments" that teachers seldom go over (Appendix G, lines 30-35, TI). He also complained about math teachers' assigning too much homework that was never graded. CS5 indicated that discussing careers in mathematics class would interest him. He also perceived that earning good grades in mathematics was relevant for his future success because "better grades [equaled a] better job" (Appendix C, SU).

CS5 benefitted from personal motivation and connections with his teachers. One of the digital metaphors prompted him to complete the statement, "My math teacher thinks I am...." He choose a picture of the cartoon icon Garfield relaxing on the floor with his head on a pillow, enjoying a carbonated beverage and a bowl of chips, with a TV remote and a book resting by his side. CS5 wrote about his math teacher's finding him to be both smart and lazy. "I have averaged an A in his class for the whole year and he still thinks I am lazy. He knows that I am a good student he hopefully has high expectations for me" (Appendix D, DM). During his interview, CS5 admitted that his teachers probably know him better than he would like to believe, for he perceived that laziness was a major factor in his struggles in mathematics during his 8th and 9th grade years.

In another digital metaphor, he indicated that he would take more math courses if he had access to "a personal math teacher," one who viewed him as an individual (Appendix D, DM). He stated that a teacher who worked with him individually would have more time to address his individual learning needs, thus resulting in his or her being more patient with him. "I would benefit because my teacher would have a better chance to know me and make learning that much easier," he added (Appendix D, DM). When interviewed, he credited the individualized attention he received from his 7th grade Double Dosing teacher for creating moments of success in his otherwise "up and down year" (Appendix G, lines 6-10, TI).

When describing the ideal classroom, CS5 also focused on affective rather than cognitive experiences. One of the digital metaphor exercises had him complete the statement, "A perfect math class reminds me of...." He chose a picture of the YMCA's logo. The YMCA, said CS5, accepted everyone. He mentioned how the caring staff was always willing to assist those in need, regardless of race and ethnic background. He described the YMCA as a place of enjoyment, where people worked hard and left with a sense of self-accomplishment.

CS5 thematic analysis: disposition towards his future.

Mathematics, according to CS5, was important for future job success. Motivated by his father's insistence that he, unlike his parents, will complete college, CS5 planned to major in business. He acknowledged that he needed a solid math background to achieve success in his accounting classes. "If you do business, or own your own business, do stocks or whatever, you are gonna need math," he said during the interview (Appendix G, lines 84-87, TI).

One of the digital metaphors had him complete the statement, "When I think of my future, I see...." He chose a picture of a smiley face. He wrote a caption that suggests he was confident that his future would be one of happiness and contentment:

> I see happiness when I think of my future. A smile on my face when I wake up and live everyday is what I see. I see myself doing the things that I want to do and being around the people I want to be around. I also see myself doing what I love and helping those who have helped me. I want to be able to make a difference and have purpose in my life instead of just settling for the average. (Appendix D, DM)

CS5 thematic analysis: senior course selection and rationale.

When the researcher asked CS5 which math course he had signed up for, he said that he had signed up for precalculus but was thinking about changing his selection to advanced algebra and trigonometry. "It is kind of a debate," he said, "I am not sure" (Appendix G, line 71, TI). When the researcher informed him that he had signed up for Bridge Math, he replied, "Naw, I didn't sign up for that" (Appendix G, line 73, TI). When asked why he might switch from precalculus to advanced algebra, he said that he did not want to try anything new. He felt that advanced algebra would provide him a solid review of the basics without hurting his GPA. "That is where I was my freshman year," he reflected. "I came into Algebra I honors, and it killed my grade...." (Appendix G, lines 75-79, TI).

CS5 thematic analysis: suggestions for attracting more African American males to advanced math courses.

A strong mentorship program between school officials and African American males would, according to CS5, attract more African American males to advanced math courses. He encouraged schools to reach out to parents to get them more involved in their children's educational roadmap. Home visits, he said, would provide a great opportunity for school officials to discuss the importance of course-selections and earning good grades whether one wished to pursue college or enter the workforce.

He also stated that too many high school athletes were destined for failure because they thought they were going to earn a scholarship to college when, in fact, it might not happen. He perceived that coaches would have a positive impact on African American athletes by encouraging them to achieve both on the field and in the classrooms,

> A lot of African Americans at this school play football. I would say get a coach to talk to them about how grades count, too. It is not just about sports, but about other things. Have the coach tell them about grades. You are not always gonna have – you might get injured or something. You might break a leg and not be able to play football anymore. I'd say the coaches have impact. (Appendix G, lines 175-180, TI)

Descriptive Narrative of CS6

Case Study #6 (CS6) was an African American male during his junior year of high school. He was not on the school's free and reduced lunch program. CS6 did not participate in school athletics. He was tall and thin. During the first observation, he wore a maroon t-shit, blue jeans, and black tennis shoes. During the second observation, he wore a yellow t-shirt, blue jeans, and black tennis shoes. His style of dress and grooming was such that he blended in with his peers.

During his freshman year, CS6 passed Algebra I with a 94 average. During his sophomore year, he passed Algebra II with a 94 average. During his junior year, he passed honors geometry with a 97 average. CS6's ACT math score was 24. His mid-term GPA was 3.97.

CS6's classroom experiences during two observations.

Classroom observations of CS6 prompted the researcher to characterize the participants' positive peer-to-peer interactions as nonexistent. CS6 sat on the front row, direct center of the classroom. Although the teacher's classroom environment allowed students to casually discuss the material amongst them, especially during independent seatwork, CS6 did not speak to any of his peers. His personal attributes during math class were characterized as introverted, passive, reserved, serious, and shy.

During observation number one, the teacher had students volunteer to work homework problems on the board. CS6 volunteered to solve a geometry problem that involved finding the lengths of two tangent lines from a point located outside a circle. After CS6 worked the problem, the teacher said, "This is correct! Anyone else get JK = 19? Good!" (Appendix E, CO). Several students raised their hand, indicating that they had the same solution. CS6 immediately returned to his seat. Throughout the remainder of class, CS6 sat nonchalantly, with his arms and legs crossed, facing the board as his peers worked problems at the board. He would occasionally nod if the teacher asked if anyone agreed with students' solutions.

When the problem set was completed, CS6 passed up his homework. In the caption of Digital Metaphor #2, CS6 indicated that he always completes his class work and homework. After collecting the homework, the teacher asked the class, "Who knows what a chord is?" (Appendix E, CO). Even though CS6 obviously knew the material, he did not raise his hand nor vocalize his understanding. This behavior contradicted his "fully disagreeing" with the survey statement, I do not like to be called on to participate in mathematics class. His silence was more than likely an indication that he was comfortable with the material, for he wrote in the caption beneath Digital Metaphor #2 that he was "not hesitant in asking questions if I don't understand something" (Appendix D, DM).

During the second observation, the teacher worked various problems on the board that involved solving for the areas of circles. As before, CS6 sat quietly, watching the teacher as she explained. He occasionally entered data into his calculator when the teacher prompted the class to find a particular answer, yet he never volunteered an answer. Once, when another student volunteered an answer, the teacher asked, "Everyone agree?" (Appendix E, CO). CS6 sat quietly, watching the teacher.

After the teacher assigned independent seatwork, CS6 worked assiduously, entering data into his calculator and writing his solutions. The teacher circulated throughout the room, occasionally stopping at CS6's desk. He never looked up as he continued working. The teacher would smile to herself and move on to another student.

The teacher's smile seemed to say, *Good, predictable, [CS6], always on task and never in need of my assistance*.

On Digital Metaphor #2, he responded to the prompt, "My math teacher thinks I am...." He chose a picture of ants. He described how they are task oriented and work well together. In the caption he wrote, "I never lose my focus during class, I am always in tune to what is going on" (Appendix D, DM). He metaphorically compared his math teacher to a dictionary, indicating that if he were confused or needed clarification, he could use her as a resource in the same way he would use a dictionary to remove the cloud of confusion regarding a particular word.

CS6's geometry teacher was a White female with 9 years' experience teaching mathematics. This teacher was completing an improvement plan with the assistance of one of her administrators due to her students' low end-of-course testing scores. Her teaching methods were traditional, with no evidence of grouping students during activities, and with no evidence of differentiated instruction. All students received the same instruction, activity assignments, and homework assignments. She did, however, work problems at students' requests. Her classroom was neatly arranged with students' desks situated in neat rows facing the white board. The teacher had a friendly disposition and interacted with her students on a regular basis as they worked. As she monitored the class, she frequently made suggestions and provided feedback on the accuracy of students' responses.

CS6 thematic analysis: racism, stereotype threat, and "acting White."

CS6 did not believe that racism, stereotype threat, and the stigma of "acting White" had affected his mathematical journey. He either "fully disagreed" or "somewhat disagreed" with the following survey statements:

- Mathematics is easier for White people,
- Mathematics teachers have lower expectations for African American males,
- My mathematics teacher finds me intimidating,
- Mathematics teachers treat me differently because I am African American,
- As an African American, I have to work harder in math class than White students in order to be appreciated.

CS6 did not perceive that his math teacher found him intimidating because "she is very nice and says hi to me every day" (Appendix C, SU). When asked whether racism played a part in African American males' choosing to avoid advanced math courses, he replied, "Maybe not too much today. I know it still exists in some derivations. I think it is a personal decision about taking higher classes and stuff" (Appendix G, lines 123-127, TI). During the interview, he indicated that African American males are capable of doing advanced math, but they avoid it because they are "too lazy to do it" (Appendix G, lines 93-97, TI).

CS6 felt that the stigma of "acting White" was based on stereotypical views of Whites and African Americans. Concerning African Americans, CS6 said, "Like Black people, stereotypical, they don't suppose to talk in a proper way or take higher education, just like basketball and stuff like that" (Appendix G, lines 116-119, TI). He suggested, however, that the effects of perceived racism and stereotypes would be lessened if more African American males taught advanced math courses, for he "somewhat agreed" to the survey statement, More African American males would take advanced math if the classes were taught by African American men.

CS6 thematic analysis: adult and peer influence.

CS6 indicated that he receives little, if any, input from counselors, teachers, and parents regarding his course-taking decisions, for he fully disagreed with the following statements:

- My teachers encourage me to take harder math courses,
- My counselors encourage me to take harder math courses,
- My parents help me choose which math courses to take, and
- My friends influence my course-taking decisions.

During the interview, he said he would seek counsel from his parents, counselors, and teachers if faced with a big educational decision. He also said that he had an aunt with whom he had recently discussed his education goals. CS6's responses indicate that his adult input regarding his educational roadmap was not needed.

CS6 depended on his peers for moral- rather than academic support. One of the digital metaphors asked had him explain why his peers were important to him. He chose a picture of his soccer team during one of his middle school games. In the caption, he wrote how teamwork was critical to success in both soccer and real life. His peers, he said, were a source of motivation for both his current and future goals.

Although they do not influence his course-taking decisions, he responded “neutral” to the survey statement, If my friend chose to take an advanced math class, I would more than likely take it, too.

CS6 thematic analysis: instructional motivators and inhibitors.

CS6 seemed to prefer traditional, lecture style teaching methods that allowed for some peer interaction. Even though CS6 did not interact with his peers during instruction, he indicated that he preferred to work on group assignments during mathematics class. He also expressed that conversing with his peers during math assignments helped him learn. He did not perceive that math teachers lectured too much, nor did he perceive that sitting for long periods of time inhibited his learning. CS6 did not perceive that art and music were beneficial for math instruction.

His appreciation for peer interaction was also reflected in one of his digital metaphor prompts: “When I think about how I fit in in math class, I am reminded of....” He chose a picture of a grassy lawn since “every blade of grass on the lawn is similar, yet each one is unique” (Appendix D, DM). He wrote that, although everyone learns differently, “at the end of the day we are all part of the same class and are willing to help each other learn together. My peers and I seem to fit in in math class very well” (Appendix D, DM).

Although he did not perceive that art and music promoted one’s math learning, he did enjoy graphing functions. He stated that crossword puzzles and coloring exercises were “busy work...that don’t really have anything to do with math. They just keep you busy” (Appendix G, lines 24-28, TI). CS6 believed that math teachers routinely assigned busy work that was pedantic rather than constructive. He perceived that discussing the importance of mathematics in careers would benefit students because “it’s important to know why you are learning something as much as what you are learning” (Appendix C, SU).

During the interview, when asked to assign his math teachers a pass/fail grade on their teaching, he gave his 7th grade math teacher a passing grade because he could understand her methods, but he gave her a failing grade for not having good control of the classroom. On one of the digital metaphors he described his middle school math experience as “chaotic” and “out of control because students goofed off and never stopped talking,” thus resulting in the teacher’s assigning homework for punitive reasons (Appendix D, DM). He said that if he could offer any suggestions to his former teachers, he would advise them to keep their classroom quiet to create a better learning environment.

CS6 perceived that effective math teachers used creative methods and maintained discipline. He also perceived that teachers’ influence directly affected students’ success. On one of his digital metaphor prompts, he described himself as a truck and his teacher as its owner. Just as a truck depends on the owner for maintenance to keep it functioning at peak capacity, he depended on his teacher to do her job to enable him to thrive in the classroom. He gave his 8th grade math teacher a failing grade because he had difficulty understanding the material. He gave his 10th and 11th grade teachers passing grades for using analogies, being exciting, and keeping class interesting. He said the most exciting thing about all his high school math classes was his exposure to different teachers’ personalities. He also credited his high school teachers for providing a productive learning environment: “In high school, math class got a whole lot better: great teachers and a controlled class” (Appendix D, DM).

CS6 thematic analysis: disposition towards his future.

CS6’s response to Digital Metaphor #3 suggests that he viewed his future as a work in progress. He chose a picture of a bulldozer on a construction site. In his written narrative, he went into great detail describing the steps necessary before building on land can take place: first, trees must be cleared from the area; next, blasting and rock removal would take place; and finally, bulldozers would flatten the earth for plumbing installation. He described his future the same way. First, any obstacles that infringed on his future success would be removed. Next, he would establish specific outcomes. Then he would negotiate the fundamentals, working gradually, step-by-step until he obtained his goal: becoming an environmental engineer.

CS6 thematic analysis: senior math course selection and rationale.

CS6 stated that his next step in pursuit of his goal of becoming an environmental engineer would involve his completing precalculus. When asked whether he believed precalculus would prepare him for his future, he replied in the affirmative, adding that the course would help him get into college. He also perceived that precalculus would help him complete his engineering major. On the surveys, CS6 “fully agreed” with the statement, I believe mathematics is important for future job success.

CS6 thematic analysis: suggestions for attractive more African American males to advanced math courses.

During the interview, CS6 was asked what school officials could do to attract more African American males to advanced math courses. His response was brief: "Maybe get their counselors to encourage them, to call them down to the office and talk to them about it" (Appendix G, lines 128-133, TI). He "fully agreed," however, with the survey statement, More African American males would take advanced math if the classes were taught by African American men.

Cross-Case Analysis of Participants' Academic Records in Mathematics

All participants began their 9th grade years enrolled in Algebra I, with CS1 and CS4 duel enrolled in Content Math, a subject that enhanced students' requisite skills for success in Algebra I. Five of the six participants passed Algebra I with a C or higher. CS3, however, failed the first semester and was dual enrolled in both Algebra I and Fresh Start during his second semester. Fresh Start required students to repeat first semester coursework during the second semester. Ideally, during this remediation process, the students would master first semester skills while in Fresh Start, thus receiving a full Algebra I credit by the end of the year. CS3 did not, however, master first semester skills. He repeated the first semester of Algebra I during summer school, passing the course with a D average. The cohort's Algebra I average was a C, which is average on a 4.0 scale (see Figure 2).

All participants began their 10th grade years in Algebra II, with CS5 and CS6 enrolled in the honors sections. Four of the six participants passed the course with a C or higher. CS2 passed with a D average. CS3 failed the first semester, and, according to his transcript, he did not take mathematics during the second semester. The cohort's Algebra II average was a D, which is below average, but passing on a 4.0 scale.

During their junior years, all six participants were enrolled in geometry, with CS6 enrolled at the honors level. Four of the six participants passed geometry with a C or higher. CS2 passed with a D average. CS3 failed the course, leaving him without credits in both Algebra II and geometry. The cohort's geometry average was a B, which is above average on a 4.0 scale.

The participating school reported an overall ACT math score average of 19 for its junior class. The school average for African Americans in the class was 16.1. Averages by race and gender were not listed in the school's summary report. Five of the six participants scored lower than the junior class average. CS6 scored a 24. The cohort's ACT average was 17, which was nearly one point higher than the overall score for African American juniors at the site. If one removes CS6's score as an outlier, the remaining five participants have an ACT average of 15.6, which is lower than the African American cohort average (see Figure 3).

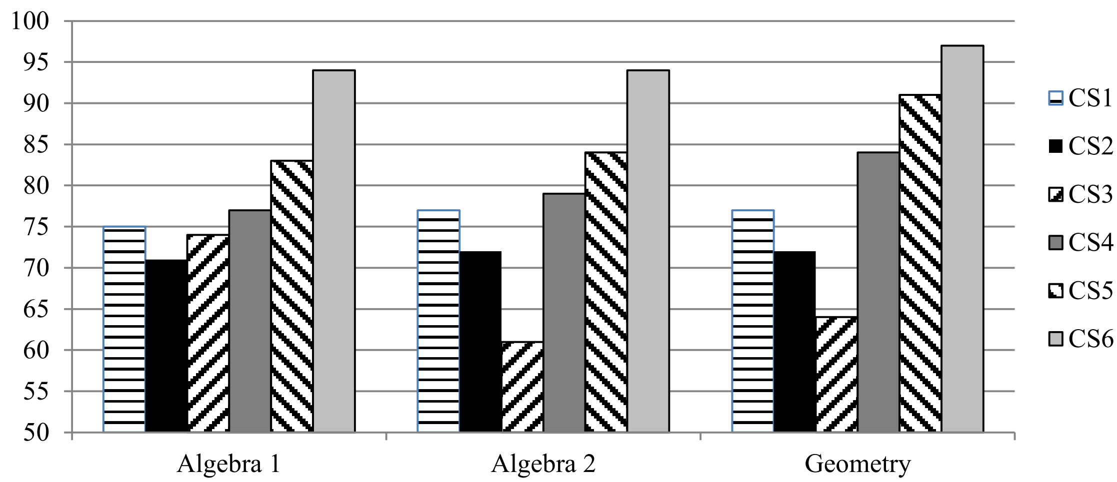

Figure 2. Participants' high school math grades by subject.

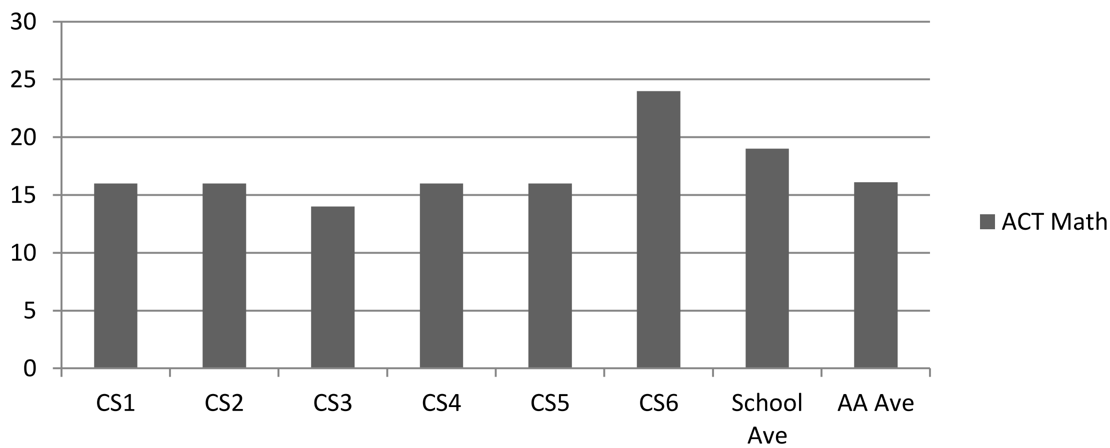

Figure 3. Participants' most recent math ACT scores. Note. "AA Ave" represents the ACT average for all African Americans at the site. "School Ave" represents the junior class average.

All participants indicated that they plan to attend college. Five of the six participants' junior year mid-term GPA's were at or above average (3.0), with CS5 and CS6 having GPA's of 3.49 and 3.99, respectively. CS3's GPA was 1.78. Figure 4 shows each participant's math grades by course, their individual ACT math scores, and their junior year mid-term GPA's (see Figure 4).

The system in which the participating school was located placed all 9th graders in Algebra I (except for some students whose special education needs prohibited such placement). Students who scored below average on standardized math tests given at the middle school level were placed into both Algebra I and content math. The school's placement policy for mathematics eliminated the tracking of African American males out of Algebra, which inhibits their access to higher level mathematics (Kelly 2009; Ladson- Billings, 1997; Stinson, 2006; Williamson, 2012).

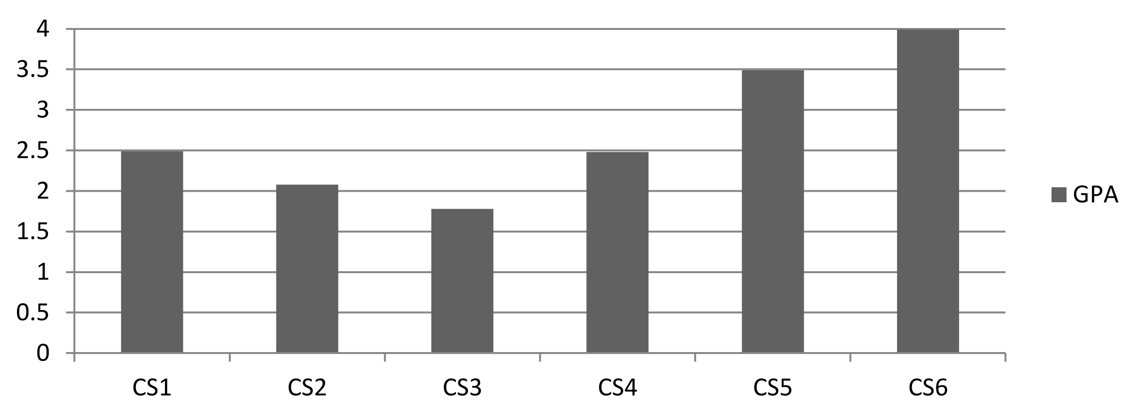

Figure 4. Participants' junior year mid-term grade point averages (GPA's).

Research has shown that African American males often self-track into lower-level courses because they often feel isolated in advanced math classes. Self-tracking into lower-level math courses may provide a more comfortable learning environment for students, but it negatively affects their future academic careers (Kelly, 2009; Tyson, Darity, & Castellino, 2005; Simpson, 2011). The district's placement policy's applying to all students denied students the opportunity to self-track into lower-level classes.

Ladson-Billings (1997) argued that the tracking practices in the United States' public school systems often denied African Americans access to algebra, a "gatekeeper" course that serves as a capstone for advancement to other advanced math courses. Woollery, Strutchens, Gilbert, and Martin (2010) found that African American's math experiences are often capped at the algebra and geometry levels. Fortunately, all participants in this study were placed in Algebra I during their freshman years. This allowed all participants the opportunity to enroll in senior math classes above Algebra II and geometry. At the participating site, seniors with ACT math scores lower than 19 are encouraged to take Bridge Math. They do, however, have the privilege to request enrollment into advanced math courses.

Cross-Case Analysis of Themes

To determine common themes across the cases, synthesis matrixes (Appendix B) and a colored coding scheme were used to catalogue and organize participants' responses (Appendix C). Using a hard copy of the synthesis matrixes, the researcher highlighted protocol responses and interview transcripts using different colors to separate the themes. A separate synthesis matrix was created for the interview protocol. Colored highlighters were used to separate the transcription data by themes for better organization and visual contrast. For example, all responses pertaining to the theme *racism, stereotype threat, and "Acting white* were highlighted in yellow. The matrixes also enabled the researcher to identify consistencies and inconsistencies between the baseline data collected on the surveys and subsequent protocols. Chapter V provides additional analysis along with the researcher's synthesis of findings.

Cross-case analysis of participants' classroom experiences during two observations.

Each participant was observed on two occasions during their geometry classes. Each observation lasted at least 30 minutes. Half of the observations involved students working in small groups. The other observations did not involve grouping. No evidence of non-conformity or off-task behaviors was seen during the observation periods. All participants dressed according to the current fashion, wearing Polo-style shirts and t-shirts, blue jeans or khaki pants, and loafers or tennis shoes. Their displaying no overt sartorial splendor or unique style of dress that manifestly rejected the mainstream culture's fashion contradicts the findings of Corprew & Cunningham (2012) and Harris (1995).

Half of the participants always had their materials: paper, pencil, calculator, homework, and textbooks. During his first observation, CS1 feverishly completed his homework as the teacher discussed it. During one of their observations, both CS2 and CS5 had to borrow paper from a peer. On one occasion, CS5 did not submit his homework because he had been absent the day before. He did, however, ask a peer for the assignment's details, which he wrote down in his notebook.

During the 12 observations, the researcher noted six class periods where the participants were identified as enthusiastic and six class periods where the participants were identified as passive (see Table 5). None of the participants were ever detached from the classroom experience. Behaviors such as sleeping, working on other assignments, or daydreaming were never observed. In fact, no aberrant behaviors were noted by any of the students during the observations. These findings were not surprising since none of the participants had been suspended or expelled during their high school years. The researcher acknowledges that his presence may have precluded incidents of off-task behaviors. He also credits the participants' maturity levels - being juniors in a geometry class - as the primary explanation. As an assistant principal at the site, the researcher acknowledges that upper classmen are generally better behaved than freshmen and sophomores.

Table 5
Participants' Affective Characteristics During Observations

	Positive Peer-to-Peer Interactions			Personal Attributes		
CS1	Caring	Considerate	Pleasant	Introverted	Curious	Reserved
	Thoughtful			Passive	Shy	
CS2	Considerate	Enthusiastic	Pleasant	Ambitious	Assertive	Extroverted
	Thoughtful			Serious		
CS3	Considerate	Pleasant		Reserved	Serious	Shy
CS4	Considerate	Pleasant		Ambitious	Assertive	Serious
CS5	Considerate	Pleasant	Thoughtful	Curious	Reserved	Serious
				Shy		
CS6	None observed			Passive	Serious	Shy

During both of their observations, CS3 and CS6 were passive. CS3 worked in small groups during both observations. Although CS3 was involved in group discussions, the researcher noted that he was "quietly involved," because he answered his teacher and peers only when directly called on, and then his voice was so low that most of his responses were barely audible to the researcher. CS6's classroom experiences did not require peer-to-peer interactions, yet the teacher did not discourage students' sharing answers and providing feedback with one another. CS6 never spoke to anyone during both observations. His primary posture involved his sitting upright, arms crossed, with his face to the board. He did volunteer to work a problem on the board. When he finished the problem, he smiled at the teacher and returned to his seat.

CS1's teacher never used grouping during instruction, yet CS1 frequently laughed and dialogued with one of his peers as they exchanged feedback and asked one another content-related questions during independent classroom activities. CS2, CS4, and CS5 were among the most enthusiastic participants, for they volunteered to answer when their teachers proposed general questions to the entire class, and they provided specific answers when their teachers called on them individually. Likewise, they listened to peers' feedback and sought clarification from peers when they were confused. During CS2's second observation, he assumed the role of advocate for his Hispanic group members. He frequently checked their answers and shared his findings with them as they worked various problems from a worksheet.

No negative peer-to-peer interactions were noted during the twelve observations, perhaps due to the researcher's presence. Five of the six participants were characterized as considerate and pleasant. These students answered their teachers using appropriate tone of voice, using “Yes, sir” or “Yes, ma’am”; interacted with their peers using appropriate tone of voice and eye contact; and laughed and smiled as they sought and provided feedback from their peers; and provided assistance to those peers who seemed to struggle with problems. Three of the participants were characterized as thoughtful, for they displayed the aforementioned behaviors and sought to assist those peers who were struggling with the content. CS6 never interacted with his peers.

All six of the participants were identified as serious students. This characteristic was chosen because all of the students were in class on time, copied notes, participated in all activities, and submitted their work on time. There was no evidence of inappropriate talking out, disengaging from the activities, expressions of apathy, or any other behaviors indicative of the “oppositional culture” described by Palmer, Davis, Moore, and Hilton (2010) and Murrell (1994). Four of the participants were identified as being shy and introverted due to their low tone of voice, limited eye contact when speaking to others, and minimal engagement during group activities.

Because none of the participants perceived that stereotyping influenced their math experiences, the researcher concluded that these students were generally shy rather than suffering from anxiety or fear of being called on as Martin (2011) and White (2009) found in their studies. CS2 and CS4 were described as both ambitious and assertive, for they were most comfortable asking questions for clarity, sharing information with their peers, and asking their teachers probing questions. Their assertiveness challenges research findings that suggest African Americans are often marginalized and uninvolved in the learning process due to their lack of confidence in educational environments (Gutman, 2006; Steele & Aronson, 1995; Taylor & Anthony, 2005).

Cross-case analysis of participants' perceptions on racism, stereotype threat, and "acting White."

Four of the six participants rejected the argument that mathematics is easier for White people, which was a common theme found in research by Riegle-Crumb and Humphries (2012) and Nasir & Shah (2011). CS3 and CS5 agreed, however, with the survey statement, Mathematics is easier for White people. None of the participants perceived that their race contributed to their teachers' treating them differently. None of them believed that their math teachers had lower expectations for them. The cohort, overall, was neutral regarding the survey statement, "White people worry too much about their grades," with CS4 agreeing and CS3 disagreeing with the statement.

Interview Question #11 stated, "Some people have said that African American males opt to take easier math courses or refuse to participate because they don't want to be perceived as "acting White." What do you think that means?" CS2 accurately defined the concept of "acting White": "...African Americans seem that they don't want to look too smart to others. Like they don't want to be looked down on by other Africa American males" (Appendix G, lines 164-165, TI). CS2 and CS6 described the stereotypes often applied to White- and African American students. CS2 characterized the typical White student as one whose pants never sag, who avoids doing drugs, and has a high GPA. CS6 described the stereotypical White student as "proper" and fitting "a certain mold" (Appendix G, lines 121 – 122, TI), while African Americans are perceived, he said, as uneducated sports enthusiasts.

All six participants denied experiencing negative feedback from their peers for making good grades and staying out of trouble Since the school placed all of its regular education students on the Algebra I, Algebra II, and geometry track their first three years, then it should be expected that their less motivated peers would not perceive the cohort's course-taking patterns as elitist. CS1 stated that those who label successful African American students as acting White are vocalizing their jealousy because they do not want to see African Americans succeed. CS3 regarded "acting White" as an abstract term that downplayed the reality that many African Americans do have a strong work ethic that is influenced by their upbringing. Similarly, CS5 stated that one's taking easier classes was a testimony to his or her laziness.

CS4 was the most vocal regarding the notion that an African American participating in class as expected was "selling out" his race: "It is a stupid thing to say." He did indicate that many smart African Americans may not answer questions because their teachers may think they are dumb. Similarly, CS2 mentioned that some African Americans "skip math and act dumb and hang out with other African American males" to avoid being looked down on by their peers, a reality that was discovered by McGee and Martin (2011) and Ogbu (1997).

Interview Question #12 asked, "Do you think racism plays a part in African American males choosing not to take advanced math courses such as trigonometry, precalculus, and calculus?" Five of the six participants adamantly dismissed the notion that racism played a part in African American's being underrepresented in advanced math courses. CS6 responded as follows: "Maybe not much today. I know it still exists in some derivations. I think it is a personal decision about taking higher classes" (Appendix G, lines 125-127, TI).

The participants credited individual work ethic, laziness, and a lack of motivation from school officials as primary reasons for African Americans avoiding advanced math courses. CS5 believed that students in general tend to mimic their parents course-taking histories, and that school officials need to intervene for at-risk African Americans because "they need to be pushed to take [harder classes]....They will never step up if they don't apply themselves" (Appendix G, lines 165-169, TI). Similarly, Snipes and Water's (2005) encouraged educators to "hold [African American males'] "feet to the fire," especially those from broken homes that often lack nurture, and mandate that they pursue a more rigorous curriculum (p. 114). CS4 response seemed to establish the cohorts tone regarding the influence of racism on course-taking decisions: "I don't think race has anything to do with it" (Appendix G, line 183, TI).

Cross-case analysis of participants' perceptions of adult- and peer influence.

The participants, overall, indicated that their teachers and parents did not encourage them to take harder classes. Guidance counselors were the most influential in encouraging them to take harder classes, but the overall response rating to the survey statement, My counselors encouraged me to take harder classes, was neutral. The participants generally agreed that they would make better course-taking decisions if school officials would spend more time talking with them. Their responses parallel the results of Noguera's (2003) study, which found that many schools reversed negative trends in the African American population with intense interventions that took place only after a change in mindset. Traditional tracking methods have resulted in African Americans being channeled into easier classes that serve as “glass ceilings” (Alliman-Brissett & Turner, 2010). Once students embark on a less rigorous math track, their ability to overcome this deficit if they decide to purse mathematics and science majors in college would be extremely difficult.

Many prior studies also concluded that African American students lack encouragement from their parents and teachers. Kelly (2009) found that, in general, African American parents feel marginalized and excluded from their children’s schooling experiences. Research indicates that these feelings of exclusion are motivated by two key factors: 1) parents’ feelings of inferiority as they interact with predominantly White school officials (Graham & Erwin, 2011) and 2) the Eurocentric school model that is predicated on the belief that White educators know what is best for children (Bridglall & Gordon, 2004).

The participants never indicated that their parents felt detached from the school environment due to feelings of inferiority. They reported, however, that their parents had negative feelings toward mathematics. Digital Metaphor #5 had the participants describe their parents’ understanding of math. Half explained their parents understanding using negative visuals and captions. One participant used the metaphor of a bomb exploding, indicating that his parents perceived math as something chaotic and unpredictable. Another used the metaphor of unexplored space, indicating that their parents’ understanding of math was very limited in light of its limitless possibilities. CS4 used the word “pointless,” adding, “They think they are smart but in reality there not” (Appendix D, DM). Notwithstanding the reasons for their parents’ lack of input on their course-taking decisions, the result is their pursuing easier courses. Five of the six participants signed up for Bridge Math their senior year because they perceived that it was easier.

Although parents and teachers do not seem to directly encourage the cohort regarding their course-taking decisions, all of the participants had significant others with whom they could turn to for advice regarding important education decisions, such as choosing which college to attend. CS1 would seek counsel from his mother because she attended college. He also indicated he would seek advisement from his teachers and principal “since they have master’s and stuff” (Appendix G, lines 77-78, TI). CS4 would talk to his cousin since he recently graduated from a local university. Similarly, CS5 valued input from those with college experience: his counselor, business teacher, and grandfather. He said he would not seek his parents’ counsel because they did not finish college. CS3 would approach his mother, grandmother, and uncle because they had similar experiences and had been a source of encouragement to him during life’s struggles. CS2’s youth minister is one he looked to for important education decisions because their lives have a lot of similarities.

Fortunately, all of the participants had an advocate to whom they could seek counsel regarding important decisions. Students need influential others in their lives to offer guidance and encouragement as they plan for their futures (Berry, 2005; White, 2009). Their influence was primarily motivated by their advocates’ life experiences rather than skin color. Only two participants, CS5 and CS6, perceived that more African American males would take advanced math if the classes were taught by African American men.

CS2 was the only participant who said that his friends influenced his course-taking decisions, leaving five of the six participants disagreeing with the survey statement, My friends influence my course-taking decisions. No participant agreed with the survey statement, If my friend chose to take an advanced math class, I would more than likely take it, too. Digital Metaphor #8 had the participants complete the statement, “My peers are important to me because...” All participants’ responses suggested that they viewed their friends as necessary sources of motivation, encouragement, and camaraderie outside of school. Those who mentioned their friends in the context of education referred to their casually discussing future college plans and dreams, not specific course-taking decisions.

Cross-case analysis of participants’ instructional motivators and inhibitors.

A series of survey questions, metaphor prompts, and interview questions had each participant share good- and bad-classroom experiences from 7^{th} through the 11^{th} grades. The purpose for asking such questions was to ascertain which teaching strategies African Americans perceive to be productive and counterproductive aspects of their math journeys. The majority of information in this section will pertain to participants’ likes rather than dislikes, for most of them found their math experiences to be generally positive. The few criticisms they expressed during the interviews were the result of the researcher’s persistence that there had to be something on which their former teachers could improve.

The researcher fully expected to find some of the participants frustrated and unmotivated when it came to mathematics (Lattimore, 2005; Murrell, 1994; Nasir &

Niral, 2011). Many researchers have found African American males to be emotionally- and cognitively disconnected from their math classes, especially when instruction is based on drill, repetition, exact answers, memorization of seemingly unrelated facts, and abstract concepts that have little connection with real-life experiences (Herzig, 2004; Ladson-Billings, 1997; Sheppard, 2009). Several participants, instead, expressed that math was their favorite subject. In fact, CS4 compared his love of math to the McDonald's slogan, "I'm lovin' it!" (Appendix D, DM). CS4's expressing his affinity toward mathematics coincided with his classroom conduct and level of involvement. Otherwise, the researcher would have viewed such extreme optimism toward mathematics as an attempt to pander to his authority position or challenge the stereotypical view of African American males' being disconnected from the math environment. During both observations, CS4 regularly volunteered responses, explained concepts to his peers, and dialogued with the teacher to better understand concepts.

Prior research also found that many math teachers' depend on lecture and memorization as their primary modes of instruction and retention (Ladson-Billings, 1997). These methods run counter to African American's desire for learning experiences that encourage dialogue, movement, visual representations, and hands-on learning -- experiences that are engrained in the African American culture (Berry, Thunder, & McClain, 2011; Gordon, Gordon, & Nenbhard, 1994; Ladson-Billings, 1997). Lecture requires the students to sit passively for long periods of time as they, it is hoped, absorb the content. The participants were equally divided on whether math teachers lecture too much, with three agreeing and three disagreeing with the survey statement, Math teachers lecture too much. The participants as a whole disagreed with the survey statement, I have too much energy to sit still an entire math period. CS5 was the only participant who agreed with that statement, thus challenging Loscoco's (1994) belief that African American males' abundance of testosterone renders them incapable of sitting in class for extended periods of time.

CS2, when prompted to describe how he fit in in math class, described himself as a 'sponge" because it can "soak up all the soapy wetness and hold it in" (Appendix D, DM). Not all participants, however, found memorization to be a meaningless mode of learning. CS3 understood that memorizing facts is often a critical part of the learning process. He compared math teachers to coaches who require their athletes to memorize key plays. Once a student commits important details to memory, he wrote, whether they are X's and O's in football scenarios or equations needed for the big test, he is confident and ready for success because he already knows the proper response to the situation or problem.

Most of the participants had a penchant for instructional activities that allowed them to utilize visual, audio, and kinesthetic (VAK) modalities. Their preference for VAK modalities agrees with the findings of Dunn and Dunn (1987), Hurley, Boykin, and Allen (2005), and Tomes (2008). The participants mostly agreed with the survey statement, Teachers should use music and art to make math more fun. CS4 and CS6 were the only one who disagreed. CS2 and CS5 revealed that they enjoyed working with tessellations, which provide mosaic representations of geometric shapes. CS4 recalled that one of his favorite math activities involved his having to design a city using geometric shapes, rulers, and crayons. In one of his digital metaphors, CS3 expressed how music helped him learn by allowing him to relax and keep his mind clear. At least half the participants expressed how interactive games and activities that required them to work problems on the board often motivated their learning.

There were two unexpected findings from this study: 1) The participants did not find their math experiences challenging enough, and 2) They were motivated by competition and grades. All participants agreed that earning good grades in math was important. No participant agreed with the following survey statements, Math teachers challenge me too much, and, Math teachers make class too competitive by focusing on right/wrong answers. CS1 wrote in response to Digital Metaphor #9 that math was his favorite subject in spite of its being a challenging course.

Prior research (Gutman, 2006) found that classroom goals and activities that separate winners from losers often heightened African Americans' feelings of inferiority. As a whole, the participants viewed competition as a motivator, with most of them reporting that they were not averse to being called on in class to answer questions aloud. CS2 compared to his having to answer a math question with one's decision to jump from a plane while skydiving: "I have a throbbing pinch in my stomach"..."and a silent moment when answering a question," then "when I answer the question right that's like reaching the ground from diving" (Appendix D, DM). This indicates that he may have suffered some trepidation during the experience, but the reward made the effort seem worthwhile.

Half of the participants, when asked to share their favorite learning experiences, mentioned competitive games and activities as being highly motivational. Participants' racing their classmates to the board to write the correct answers, working individually against others to see who completed math puzzles first, and playing math BINGO were favorite activities mentioned during the interview process. CS3 perceived that his doing problems at the board and competing with his peers kept him involved in the lesson.

The participants as a whole expressed a desire for learning opportunities that allowed them to interact with their peers. Boykin & Toms (1985) and Ladson-Billings (1997) also found that African American males thrive in communal learning situations. No participant disagreed with the survey statement, I learn better when I can talk to my classmates during instruction. Only one participant, CS5, disagreed with the survey statement, I prefer to work on group assignments during math class. CS3 wrote that the perfect math class reminded him of a championship ring because everyone worked hard as a team. He indicated that everyone's having a strong work ethic and a desire for excellence made the reward worth the effort.

CS3, whose struggle in math was the most obvious among the participants, longed for peer assistance in math class. His response to Digital Metaphor #6 indicates that he often felt like a "fish on dry land," especially when his peers seemed to understand a concept and he did not. CS6 perceived his individuality as an essential part of the class. He compared himself to a "unique" blade of grass. "We all learn different and act different...but we are part of the same class and we are willing to help each other learn..." (Appendix D, DM). Similarly, CS5 compared the perfect math class to the YMCA, where everyone is "friendly" and willing to "help a person in need" (Appendix D, DM). He acknowledged that each person is a unique individual whose contributions to the whole group allow for different, yet meaning expressions:

> In a library there are many books on a shelf, and many are different. If all the books were the same, then there would be no variety for thereader. The reader would not know of all the other wonderful books he or she is missing. At the end of the day, all of the books fit into place nicely." (Appendix D, DM)

Perhaps the most profound determiner of African American males' being motivated in math class is whether they are having fun during the learning process. CS1's caption on Digital Metaphor #1 said the perfect math class involved "being happy" (Appendix D, DM). Happiness, he wrote, goes hand-in-hand with one's maintaining a positive disposition. He expressed that one's having a can-do attitude can allow one to conquer the seemingly impossible. His response to Digital Metaphor #6 suggested that fun classrooms increase the likelihood of one's being more at ease with themselves and less likely to present themselves as being different than they really are. CS2 and CS3 described their teachers' use of games as fun and exciting. CS5 enjoyed group activities and projects. CS4 lamented that most math classes are "boring," since they often send the message that math is "all work not fun" (Appendix D, DM).

Two of the participants underscored the importance of order and discipline in the math classroom. CS2 described the perfect math class as "smooth, round, and has no dents," where students "would have no problem learning and understanding "because there would be "no distractions inside of the classroom" (Appendix D, DM). CS6 lamented that most of his middle school math classes reminded him of "clutter" and "chaos" because "students goofed off and never stopped talking," thus causing the class to be more difficult because the teacher responded to negative behavior by assigning "a lot of homework" (Appendix D, DM). He appreciated his high school teachers for being "great" and having "a controlled class" (Appendix D, DM).

Cross-case analysis of the teachers' connections within the classroom.

As in Sheppard's (2009) study, teachers' personal connections had a profound influence on all of the participants. CS5 wrote that he would take more mathematics if teachers would see him more as an individual rather than just another part of the group. "I would benefit," he wrote, "because my teacher would have a better chance to get to know me and make learning that much easier" (Appendix D, DM). CS4 recalled his 7th grade teacher as one who laughed often and shared her life's stories. He frequently mentioned his geometry teacher's sense of humor as making class more fun. CS6 stated that teachers' different personalities made classes exciting.

The participants overwhelmingly agreed that math teachers assign work that is perceived as busy work rather than instructional motivators. CS2 was the only participant who disagreed with the statement, Teachers assign too much busy work in math class. CS6 appreciated teachers who used activities for instructional- rather than entertainment purposes. He perceived crossword puzzles and coloring exercises to be busy work. CS5 also expressed his disdain for busy work. Too often, according to him, teachers assigned homework and never checked it, making it seem to be more of an exercise in futility rather than an instructional- or assessment benefit.

When pressed to explain negative aspects of their math journeys, teachers' lack of patience and inability to fully explain the details were mentioned by a couple of participants during interviews. On the baseline surveys, only one participant, CS2, indicated that math teachers are too impatient for an answer when calling on them in class. CS1's survey response was "neutral," yet he gave one teacher a failing grade for not allowing students enough time to copy information from the board. CS3 believed most math teachers were patient, yet he did give one of his past teachers a D for not explaining well.

CS4 was "neutral" regarding math teachers' being patient, but disliked being blamed for his low test scores when, he said, the teachers could have explained the content more thoroughly. Ineffective teachers, they sensed, were more interested in covering content rather than ensuring that their students understood the material. Danielson (2002), Ladson-Billings (1997), and Chapman and Gregory (2002) would argue that these teacher would better serve their students by scaffolding and cubing, methods that allows the students to discover the answer as a result of their teachers' questioning and probing them in the right direction.

Cross-case analysis of participants' dispositions toward their futures.

All six participants plan to attend college. CS1 and CS2 described their futures as successful. CS1's childhood dream was to be a professional football player. If that goal was not realized, he indicated that he wanted a well-paying job. He hoped to position himself in such a manner that allowed him the opportunity to repay his parents "for the support and love that they showed me my entire life" (Appendix D, DM). CS2 was more expressive when describing his future, for he described his future self as a "successful Black businessman" who is "successful, loyal, smart, and skilled in the field of business" (Appendix D, DM).

CS3 viewed his future as an opportunity to improve himself. His responses throughout the study indicated that his past was filled with strife and divisiveness: "I have had a lot of pain and heartaches and I feel that I have been through a lot of issues and drama," he stated in Digital Metaphor #3. He then described why he chose an ascending flight of stairs to encapsulate his feelings: "I feel that my future can go nowhere else than up. I feel that my future is bright and I feel that I'm ready for anything that is thrown at me" (Appendix D, DM). He saw his future as transcending his current life situations.

CS4 envisioned himself living as a successful, famous athlete: "I see a future of sports, fame, and accomplishment" (Appendix D, DM). He understood, however, that reward is not without sacrifice: "But anyone can play basketball, but to go pro, to the NBA you have to make good grades. You have to pass math class" (Appendix D, DM). CS6 planned to become an engineer.

CS5 was not specific regarding his future plans. He envisioned his future as his having his loved ones around and doing the things that he wants to do. His future goals were not just centered around his own happiness: "I also see myself...helping those who have helped me. I want to make a difference and have purpose...instead of just settling for average" (Appendix D, DM).

CS6 viewed his future as an extension of the present. He said he wanted to be an environmental engineer. He planned to take precalculus and AP Environmental Science to help prepare him for college. Building one's dreams, he indicated, starts with the present. In Digital Metaphor #3, he included a picture of a bulldozer at a construction site. He compared his reaching his goal to a construction company wanting to build an apartment complex. When the unchartered land is first viewed, there are numerous opportunities and obstacles that must be negotiated: blasting, clearing the rubble, and flattening the earth. "I think of my future in the same way. First, I have to clear out any obstacles and stay away from anything that will keep me from my goals" (Appendix D, DM). Once he established his goals, he said he would then negotiate the fundamentals and gradually build upon them, eventually reaching his goal.

Of the six participants in the study, only CS6 was willing to delay gratification to achieve his goals. Many seniors view their final year of high school as an opportunity to begin winding down, to take some easier elective classes, and just do whatever is required to graduate. CS6 chose to make his senior year a challenging one, taking both an advanced placement science course and precalculus. He reminded the researcher of the traveler in Robert Frost's (1874-1963) "The Road Not Taken." In the poem, the traveler makes a decision whether to travel the easier, well routed trail, one that many other travelers had traversed. He chose the road "less traveled by, And that made all the difference" (Academy of American Poets). CS6's choosing to take precalculus his senior year rendered him different from the other case studies, for all of the remaining participants chose a senior math course not designed for college-bound students.

Cross-case analysis of participants' senior math course selections and rationale.

Five of the six participants choose to take Bridge Math their senior years. CS1 perceived that there were no other choices to take. He said he hoped it would help his future endeavors. CS2 said that realized he should have signed up for a harder course since he planned to attend college, but his struggles in geometry forced him to choose an easier course. CS3, although signed up for both Algebra II and Bridge Math, would first have to earn his geometry credit since he failed the course. His rationale for choosing Bridge Math was based on the realization that his basic math skills were not up to par for more rigorous mathematics. CS3's prior math grades, his low ACT score, and his history of failing every math subject in high school suggested that he would certainly not succeed in an advanced math course.

CS4 elected to take Bridge Math because "it is easy," then acknowledged that he should have taken a harder math class for better college preparation (Appendix G, lines 92-93, TI). He reiterated that he heard that Bridge Math was an overview of Algebra I, Algebra II, and geometry. CS4 believed that one's having a solid understanding of basic math skills was more important that his or her taking an advanced course. CS5 said during his interview that he had elected to take precalculus. His records indicated that he signed up for Bridge Math. When made aware of that inconsistency, he remarked, "I wanna stay on that basis where I can get a reflection on the past and kinda know where I am at. I don't wanna take something new and get a bad grade" (Appendix G, lines 75-78, TI). When asked whether he thought Bridge Math would be helpful, he said he believed that math is always helpful for one's future. CS6's choosing precalculus for his senior math class rendered him the only participant to graduate high school with an advanced math course on his transcript. He chose that course to prepare him for college and its engineering curriculum.

Cross-case analysis of participants' suggestions for attracting more African American males to advanced math courses.

All participants mentioned motivation and encouragement from parents and school officials as the primary means of attracting more African American males to advanced math courses. CS1 advised school officials to offer more remediation services after school. He also recommended that schools provide after-school socialization events that focus on mathematics and how it relates to sports would spark African American males' interests, especially if the school provided food as an incentive. CS2 encouraged teachers to show that they care about their students. He recommended that school officials identify those students from broken homes or who have deceased parents since those students are less likely to have motivation and encouragement from an at-home adult.

CS3 said that direct communication with African American males is crucial. He said that African American males need to be told to take harder classes. He indicated that school officials would demystify the shroud of mystery surrounding the advanced math classes if they would tell the students about the content covered, teachers' expectations, and how the course will benefit their futures. CS4 said that African Americans need motivation and courage, yet he struggled to find an avenue through which school officials could effectively communicate with them. At first, he recommended a meeting with all African American students, then stated that such measures may seem to single out African Americans.

CS5 believed that coaches should have an integral role in encouraging players to do their best in academic pursuits and by telling them they will need a backup plan in case their athletic goals are not realized. He also stressed the importance of getting parents more involved in their children's educational decisions, even if it means having school officials visit their students' homes. CS6 believed that guidance counselors meeting with African American males to encourage them to take harder math classes would be productive.

The participants' responses agreed with prior research on the power of educators' levels of motivation and encouragement. Davis (2003), Palmer (2010), and Jackson and Moore (2006) found that teachers' and guidance counselors' negative expectations toward African American males greatly inhibit their success in high school. Similarly, this study revealed that African American males desire reassurance from schools. When asked about their course taking patterns, nearly every participant who chose Bridge Math as their senior math course admitted to taking in because they heard it was easy. Encouragement from school officials, however, may not be enough. CS4 admitted several times that his geometry teacher, a teacher whom he greatly admired and respected, encouraged him to take an advanced course his senior year. He chose Bridge Math instead.

Prior research (Kelly, 2009) found that African American parents are marginalized by school officials, especially regarding their children's course-taking decisions. Several participants in the study excluded their parents when it came to seeking input on important educational issues, primarily because their parents had no college experience or were not academically inclined, especially in mathematics. It seems that school officials and African American males have succeeded in created a double-insulated buffer that sends the message to African American parents that their input regarding their children's schooling is undesired if not unnecessary. Several studies have focused on successful African American male achievement and found that parent involvement was critical to their success (McGhee & Martin, 2011; Berry, 2005; Noguera, 2003).

Themes that Emerged from the Study

During the data analysis process, several themes emerged that were not found in the review of literature: Four overarching themes emerged from this case study: 1) The participants did not exhibit the inferior attitudes towards mathematics that researchers found in prior studies; 2) They were willing to shoulder the blame for their not taking advanced math courses, often citing their desire for a stress-free rather than challenging math curriculum; 3) They were also motivated by math games and challenging activities; and 4) They tended to characterize their middle school math experiences as negative. Documentation supporting emergence of these themes is located in Table 6. In Chapter V, these emergent themes will serve as platforms for further research regarding the underrepresentation of African American males in advanced math courses.

Table 6
Data Supporting Emergent Themes from the Study

Descriptor Title	Emergent Themes	Data Sources (See Appendices)
Attitude Adjustment!	Unlike participants in other studies, these participants did not have prevailing inferior attitudes toward mathematics.	Survey 1: Questions 1, 2, 4, 5, 7, 9 CS1 DM #1, DM #6, DM #9 CS1 TI, lines 79-83 CS2 DM #1, DM #3 CS3 DM #2 CS4 DM #1, DM #2, DM #4, DM #6 CS5 DM #6, DM #9 CS5 TI, lines 74-81 CS6 DM #1, DM #6

Table 6 (continued)
Data Supporting Emergent Themes from the Study

Descriptor Title	Emergent Themes	Data Sources (See Appendices)
"Manning up!"	The participants were willing to shoulder the blame for their not taking advanced math courses	Survey 3: Questions 1, 3, 5, 9, 10 CS1 TI, lines 103-118 CS2: TI, lines 137-140 CS3: TI, lines 20-42 CS3: TI, lines 152-168 CS5: TI, lines 154-159 CS6: DM #3 CS6: TI, lines 93-97
"Let the games begin!"	Several participants were motivated by math games and challenging classroom activities.	Survey 2: Questions 1, 2 CS2 TI, lines 6-10 CS2 TI, lines 36-47, 51-53 CS3 TI, lines 49-56 CS4 TI, lines 6-10, 48
"Middle school syndrome"	Many participants indicated that their middle school math experiences were negative	CS1 TI, lines 6-7 CS2 TI, lines 6-10, 63-69, 89-92 CS5 TI, lines 6-16, 32-35 CS6 DM #9 CS6 TI, lines 6-9, 37-39

*For survey, digital metaphor (DM), and interview (TI) responses, see Appendices C, D, G, respectively.

CHAPTER V

CONCLUSION

This qualitative study sought to determine why African American males are underrepresented in advanced high school math courses. Six African American male juniors from a large Southeastern (U.S.) high school served as individual case studies. The researcher's use of within- and cross-case analysis allowed for interpretation of each participant's math experiences and a synthesizing of their collective math experiences. This methodology allowed the researcher to identify trends and differences among the cases and identify themes not found in the review of literature. Triangulation was achieved by the researcher's use of multiple data-gathering instruments: direct observation, field journals, observation protocols, digital metaphor scrapbooks, personal interviews, surveys, and academic transcript information.

The surveys, digital metaphor scrapbooks, and personal interview questions were motivated by themes found within the review of literature, such as racism, stereotype threat, and adults' as well as peers' academic influence. The researcher was surprised to find that the participants, overwhelmingly, did not perceive that racism was an impeding factor in their math journeys. In fact, all participants characterized their geometry teachers, all of whom were White, as fair-minded and dedicated. Also, the majority discounted the notion that having more African American male math teachers would have motivated them to pursue advanced mathematics. They perceived that most African American males chose to avoid advanced math courses because they (a) desired an easy senior year experience, (b) did not possess the necessary work ethic, (c) mirrored their parents' high school course selections, or (d) sensed a lack of encouragement from significant adults, such as their parents, teachers, and school counselors.

Although the participants did not consider racism to be a salient inhibitor of African American males' success in mathematics, they did identify several pedagogical strategies that advanced or stifled their math learning. They also made recommendations for strategies that school officials could implement to invite and retain more African American males in advanced mathematics. The researcher's analysis and synthesis of these findings will be discussed.

Research Question #1: What do African American males identify as psychosocial factors contributing to their underrepresentation in advanced math courses?

Schools' traditions hindered educators' and parents' influence on these African American males' course-taking decisions.

The participants' indicated that their peers had little input regarding their course-taking decisions. Their parents, extended family members, and school officials, however, were regularly perceived as *potential* influencers regarding course selections. The researcher uses the word "potential" because the participants generally refrained from asking their parents for input on which courses they should take. Likewise, they revealed that neither their counselors nor their teachers provided significant motivation to pursue advanced courses.

Many of the participants in the study compartmentalized their peer-adult relationships. They generally perceived their peers and adult family members as support systems for life events outside of school, while school officials were perceived as academic advisors, albeit marginally. This low level of academic support from school officials is a byproduct of the European school model. The model is replete with bureaucracy, and its gears are greased by tradition steeped in middle class values and learning styles. It also suggests that educators, alone, know what is best for students' academic preparations. Thus, parents are often marginalized if not unwelcomed in their children's schools. What this model fails to recognize is that all students, regardless of race, have unique goals and individual histories that preclude their being forced into standardized routines that cling to tradition at the cost of innovation.

The researcher's administrative role at the site involves his being in charge of student scheduling. This experience has allowed him to observe communication barriers that negatively affect students' course-taking decisions. For example, many students perceive that the school's math placement policies are "set in stone," with standardized test scores determining placement and with no deviation allowed from the already established Algebra I to Algebra II to geometry track. As a result, students seldom if ever question their being placed in standard math courses throughout the years. In fact, many students at the site were unaware that Algebra II and geometry may be taken during the same year. It is interesting to note that the only students at the site who were dual enrolled in both Algebra II and geometry over the last two years were White. This dual enrollment occurred during those students' sophomore year to allow them the opportunity to take calculus in their senior year.

The researcher's experience has also lead him to surmise that White students and their parents are far more likely to advocate for their being removed from a standard math course to an advanced math course. African American parents and grandparents have accepted that, in general, all things academic are best handled by school officials. After all, public schools, especially in the South, were among the last institutions to accept non-Whites, and often that acceptance was the result of court decrees and federal influence. As such, African Americans were indoctrinated within a well-established bureaucracy motivated by years of European traditions and White, middle-class values. The school culture, therefore, communicated to outsiders that White educators were best equipped to educate young minds.

Even though most of the participants claimed that encouragement from school officials would bolster their cohort's enrollment in mathematics, it is evident that encouragement alone may not be enough, especially when students take advantage of their parents' being disconnected from the school environment. CS4's geometry teacher, for example, regularly encouraged him to enroll in an advanced math course his senior year, yet he chose to enroll in Bridge Math. He specifically discounted his mother's input because "she is not that smart" (Appendix G, lines 111-112, TI). It is likely that CS4's mother had no idea regarding the senior math courses available to her son, much less the ones needed for his college preparation. Similarly, CS5 stated that he confided in his White grandfather for educational advice because his parents' dropping out of college rendered them to be, in his mind, incapable of providing meaningful educational advice. Nevertheless, nearly all of the participants agreed that schools must reach out to African American parents and directly involve them in their children's course-taking decisions. Before that can happen, however, parents must perceive that their input is valued, and that it is in their child's best interest for them to push their children to take harder math courses, especially if their children plan to attend college.

Research Question #2: What pedagogical strategies are identified by African American males as more conducive to their learning mathematics?

Participants' preference for VAK instruction.

The participants generally agreed that art, music, and kinesthetic activities contributed to enriched math education experiences. This preference for visual, audio, and kinesthetic modalities perhaps is due to their brains' being developed in the digital age, where desktop computers, laptops, iPods, and cellphones, all of which are highly visual and interactive, have trained them to expect instant gratification with the mere touch of their fingers.

In Small and Vorgan's (2008) article "Your iBrain: How Technology Changes the Way we Think," the authors argued that today's students, known as digital natives, have grown up under the prevalent influence of brain-stimulating software that has remapped the human brain's cognitive networking patterns. Additionally, the availability of electronic resources, such as Google's search engines, has resulted in students' externalizing rather than internalizing information (Sparrow, Liu, and Wegner, 2011). Rather than memorizing facts or pondering higher-level thinking problems, students simply retrieve information from computer databases via the Internet or other information databases.

The digital natives' emphasis on their ability to acquire needed information from external sources often conflicts with their teachers' emphasis on memorizing facts and learning algorithms. For example, today's students perceive the Gaussian elimination method and other algorithms for solving systems of equations as antiquated and highly ritualized procedures. After all, such handwritten methods that require several minutes of detailed and often burdensome computations are now easily bypassed with a few entries on a graphing calculator (Sparrow, Liu, & Wegner, 2011).

Motivation through socialization.

Five of the participants in this case study agreed that socialization with their peers motivated their math learning. This finding concurs with prior research that purports the significance of community in African Americans' learning experiences (Boykin & Toms, 1985; Hurley, Boykin, and Allen, 2005; Ladson-Billings, 1987). CS3, however, did not perceive that socializing was beneficial to his learning mathematics. His history of struggles in mathematics may have negatively affected his self-efficacy, which would explain his minimal interactions with peers during cooperative learning. He likely perceived that his flawed math background rendered him incapable of providing any type of meaningful math discourse.

Although CS4 believed that socializing with his peers assisted his learning, he indicated that he preferred to work alone on math assignments. He did not want his peers to provide input that might negatively impact his grades. The researcher found CS4 to be the most confident of all the participants. During observations, he frequently vocalized with the teacher and shared his findings with his peers. His perception that grades were important, coupled with his confidence in his math ability, rendered him to be more comfortable with his own skill set. Other participants, however, revealed that completing assignments with others who are on their level provided a sense of comfort, especially when students perceived that their math teachers were impatient.

Cooperative activities provide a strength-in-numbers approach to learning as the collective whole functions in a manner that allows one's deficits to be compensated by another peer's strengths, thus providing a sense of security. Students' working with others who are striving to understand the same material relieves students' anxieties and fears of failure because everyone reaps the rewards of success or tastes the bitter fruit of failure collectively rather than individually. Also, working with peers who can relate to their concerns creates a less judgmental atmosphere than performing alone under the scrutiny of the seemingly all-knowing teacher. Thus, students are more likely to ask questions and seek clarity during cooperative experiences, thus providing them the benefit of understanding a concept that would otherwise remain unexplored out of fear of criticism by the teacher. These perceptions are supported by the results of Kocak's (2008) study on the effects of cooperative learning on undergraduate students. The study revealed that cooperative learning experiences decreased students' anxieties and feelings of loneliness. Surely, these benefits would be more advantageous for high school students because of their increased desire for peer connections and acceptance.

Opportunities to work with their peers may also serve to cognitively prime students for success. In their study on the effects of math anxiety on math learning, Ashkraft and Krause (2007) found that one's performing math computations above the basic levels requires a great deal of the brain's working memory resources. Additionally, they found that math anxiety also creates demands on one's working memory, thus serving as a "resource-demanding secondary task" for students who suffer from math anxiety while working math problems (p. 243). Such conditions are even more burdensome for many African American males when math anxiety and stereotype threat influence with the brain's being occupied with performing complex algorithms. In a manner similar to the theory of "fight or flight," the brain's being cognitively loaded with anxiety and stereotype threat while solving algorithms creates a trifecta of cognitive stimulation that overloads the brain and compromises math learning. In sum, the human brain's ability to perform highly cognitive tasks is hindered by anxiety and other affective influences. Under such conditions, math students simply shut down. Therefore, it stands to reason that cooperative learning and any other instructional strategies that diminish anxiety would enhance learning.

The importance of meaningful context in math instruction.

As in prior research studies (Ladson-Billings, 1997; Gregory & Chapman, 2002), the participants in this study desired relevant and meaningful learning experiences. The participants generally perceived that math teachers assign too much busy work. Specifically, CS6 mentioned how crossword puzzles and coloring exercises were, in his opinion, more for entertaining students rather than instructing them. CS5 mentioned that homework was often assigned as drill-and-repetition exercises. Teachers, he complained, never checked homework. CS6, the most math savvy of all the participants, expressed his disdain for lengthy homework assignments. Thus, these participants appreciated math assignments that were meaningful and enhanced instruction over those that were redundant and assigned as "busy work."

Our society has conditioned students to expect some type of reward for their efforts, whether in the form of immediate gratification, such as grades on homework assignments, or in the form of delayed gratification, such as learning something that may result in a better paying job or college acceptance. Learning for learning's sake, however, is not highly motivational in a society where all players receive a trophy just for making the team. Students are conditioned to believe that the end result is more important than the process.

Often, students have difficulty relating to new learning, which causes them to view the material as irrelevant. Students' ability to relate to new information is affected by their prior experiences. As such, their exposure to new ideas results in their accepting, rejecting, or assimilating the information according to how it fits into their existing thought processes, or schema. LaTellier (2007) describes *schema* as one's "intellectual capital" comprised of prior knowledge (p. 38). He argues that the human brain simultaneously scans and categorizes new information by comparing it to images and ideas stored into one's long-term memory. If past schema is accurate, the new information is incorporated effectively and learning takes place. Unfortunately, if past schema is inaccurate or nonexistent, information is either incorrectly encoded into memory or altogether dismissed by the learner. It is imperative, therefore, for math teachers to have an understanding of students' prior learning and experiences, as well as cultural differences.

Learning is best achieved using an incremental approach.

One portion of the participants' interviews gave them an opportunity to assign their math teachers grades based on their teaching ability. Teachers who were unable to effectively explain the content were given poor grades. Three participants disagreed with the survey statement, Math teachers are too impatient for an answer when calling on me. One participant complained that his laborious note-taking was aggravated by his teacher's not allowing enough time for him to copy them down. Another participant reported that his teacher yelled at students for asking questions. In contrast, the participants who were enrolled in Fresh Start for remediation believed their placement in the course gave them opportunities to work with teachers who could communicate on their level and adjust instructional pacing to accommodate their needs.

Thorndike (1903) described learning as an incremental process encouraged by intermittent rewards. African American males, not unlike other students, learn best in environments where intermittent successes set the stage for continued learning. As Chapman and Gregory (2002) and Ladson-Billings (1997) found in their research, teachers who demand immediate answers and value only correct responses are less effective than those who finesse students toward solutions through effective cuing and questioning. Murrell (1994), too, found that teachers who had the best rapport with African American males were those who gave them opportunities to engage in meaningful classroom discourse by posing thought-provoking questions, asking for in-depth inquiries, providing extended explanations on topics of interest, and by establishing classroom protocols that reward perseverance and discourage feigning ignorance.

Competition and learning games as motivators.

Half the participants in the study credited teachers' use of games and challenging activities as highly motivational. Math BINGO, a puzzle-piece game, and team members' racing to the board to write down correct solutions were specifically mentioned as creative, fun ways that increased student involvement. The puzzle piece game required each student to get the correct answer before adding his piece to a huge puzzle located in the center of the room. This activity fostered both individual accountability and communal interests as students realized the importance of their singular contribution, the puzzle piece, to the meaningful whole, the completed puzzle.

Two of the three participants who never mentioned the importance of games and competition in their math experiences did not play a school sanctioned sport. In contrast, all of those who specifically mentioned their enjoyment of games and competition in math classes were members of the school's football team. School athletes are more likely to be motivated by classroom activities and games that give them opportunities to compete against their peers. After all, students with athletic experience, especially at the high school level, have been routinely exposed to numerous on-the-field learning opportunities that require teamwork, emphasize dependence on others, and unite individuals in pursuit of common goals. It is also interesting to note that the two males who did not play school-sanctioned sports had the highest math grades. This study suggested that nontraditional classroom strategies, such as providing games and fostering competition among students, were most beneficial for students who struggle academically.

The concept of "motivational flow" to enhance instruction.

Evidence from this study suggests that traditional classroom instruction for these African American males lacked *motivational flow*, a phrase the researcher has created to describe mathematics instruction where motivation is consistently high throughout the entire lesson (see Figure 5 and Figure 6). Traditional teaching methodologies were observed in half the observations (two different teachers). These teachers followed a linear, assembly-line approach as they began each class by going over the previous night's homework, then taking questions on the homework, followed by their introducing new material and working examples from the textbook, and then assigning homework on the new material. The ultimate goal for such instruction, as communicated by the teachers, was passing the upcoming unit or end of course tests.

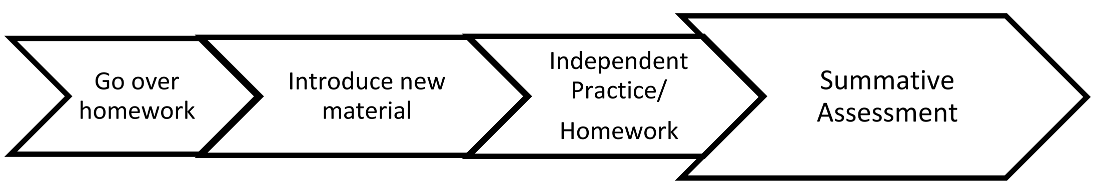

Figure 5. The traditional teaching routinel, which shows routine classroom procedures that are directed towards summative assessments.

The other half of the observations (all with the same teacher) were categorized as traditional with constructivist undertones. This teacher allowed the students to work in small groups while he facilitated and provided prompts to direct them toward success, yet the instruction was neither varied nor based on students' different academic abilities and learning styles. Also, the teacher communicated that the answers were more important than their thought process, thus devaluing students' conceptualizing skills.

A synthesis of the participants' responses suggested that their math teachers would establish motivational flow by utilizing instructional games, allowing competition among students, making the content meaningful, providing encouragement, implementing VAK activities, and using varied assessments that drive instruction (see Figure 6). Unlike the traditional teaching format, where all teaching is geared toward summative assessments, instructional strategies that utilize motivational flow provide a nuanced blending of affective and cognitive teaching strategies that focus on student learning. Assessments, in such classrooms, would be both formative and summative to support students' learning and evaluate their mastery of objectives. As such, motivation remains high throughout the learning process.

Research Question #3: What are African American males' perceptions on how both psychosocial factors and teaching strategies affect their motivation to enroll in advanced math courses?

Encouragement as a recruitment tool.

When it comes to schools attracting more African American males to advanced math courses, encouragement, according to the participants in this study, is the primary motivator. Most participants expressed a lack of effective communication between them and their guidance counselors. One participant signed up for Bridge Math because

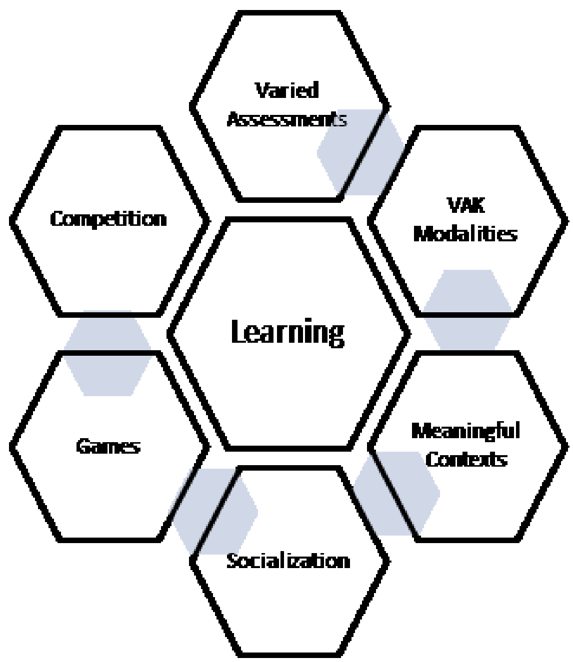

Figure 6. Motivational flow model, where learning, the instructional focus, is enhanced by both cognitive and affective teaching strategies.

he thought it was the only course available to seniors. Another participant was unclear about how his counselor factored in his ACT math score to determine his course selection. He thought his score was high enough to allow his being tracked into an advanced math course, even though he had not discussed his score with his counselor. If his score was high enough, then why was he placed in Bridge Math? If his score was too low, why was that not communicated to him?

When students' ACT scores were lower than 19, the counselors did not advocate their taking a more rigorous course, even if their prior math grades indicated their ability to succeed. No teacher input was sought in determining placement, which is unfortunate for students who do not test well but possess the organizational skills and work ethic to pass an advanced math course. Parents, too, had no input in their children's math course selection, thus denying them an opportunity to be an influential voice that could motivate their children to attempt an advanced math course.

When the researcher taught at the participating site, he encouraged many so-called average geometry students to take calculus even if it meant their retaking it in college. Many students accepted the challenge, taking both calculus and precalculus their senior years. Later, when these students took calculus in college, they had been exposed to most of the material, which surely resulted in grades that likely would have been lower without the prior experience. In fact, several former students returned to visit and claimed that the year of preparation in high school calculus gave them a superior advantage over their college math peers. While taking calculus in high school, if students learn only the procedural steps for finding derivatives and integrals, they are at least somewhat comfortable with the mechanics of calculus, which is an anxiety reducer.

Students' ACT math scores should not serve as millstones tied to their necks for the remainder of their lives, especially because too many variables influence a single test score, such as illness, personal issues, not taking the test seriously, testing conditions, and anxiety. Student placement in high school mathematics sets the stage for their academic futures, especially for those who plan to attend college and pursue STEM fields. Such an important decision should not be determined on how well a student performed on a standardized test. More comprehensive factors such as the student's work ethic, future goals, academic history, and parent and teacher input should be considered (see Figures 7a and 7b).

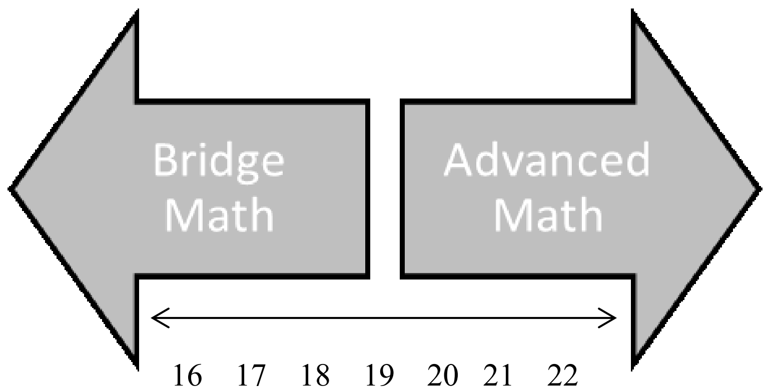

Figure 7a. Diagram showing sites' current decision continuum for seniors' placement in math courses. The line depicts a continuum of ACT MATH scores, with 19 serving as the "gatekeeper" for senior year math course selections.

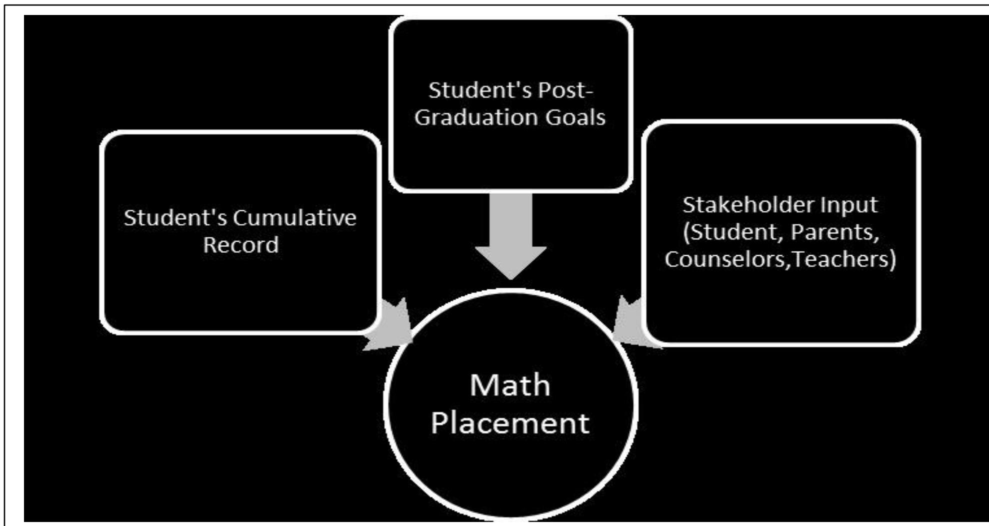

Figure 7b. Model depicting a comprehensive decision-making process for students' senior year math placement.

A change in mindset precedes a change in culture.

As Noguera's (2003) research revealed, schools must make a concerted effort if Such efforts, Noguera (2003) argued, must be spearheaded by a change in mindset; for as long as school officials accept that a particular group is bound by their past performance and cultural identities, there will not be critical advancements that improve their academic performance and marketability. When guidance counselors predicate a student's future academic experiences on his negative history, the student's maximum potential will never be achieved. Too often, students' academic mistakes and low test scores are used as the basis for providing them mediocre academic experiences. Instead, students' deficits must be seen as areas in need of improvement that can be strengthened by intensive instructional interventions. A football coach who realizes that his quarterback's speed is lacking would provide training that increased his player's speed and endurance. To accept that the quarterback's future was predicated on his past performance without providing him with interventions to bolster his success would be ludicrous. Unfortunately, such mentality has been accepted in our nation's schools, and African American males have been the victims of such rationale far too long.

Implications for Further Research

Themes not found in the review of literature serve as platforms for additional research. Most suggestions for further research focus on our schools' dependence on the inflexible European school model that places more value on following time-honored policies and procedures than meeting individual students' academic needs (see Table

7). Many of its flaws are bureaucratic in nature, such as tracking students into math classes based on standardized test scores, scheduling students without input from their parents and teachers, and allowing middle school teachers with general education degrees to teach mathematics, especially with the current emphasis on teaching for conceptual understanding. Other flaws are pedagogical in nature since traditional,

Table 7
A Comparison between the Traditional, European School Model and a Progressive, Student-Centered Model

Traditional, European Model	Progressive, Student-Centered Model
Emphasis on policies, procedures, and traditions.	Emphasis on students' growth and potential.
Course-placement based on standardized test results.	Course-placement based on standardized assessments, parents' and teachers' input, and students' postsecondary goals.
Students' *past* schooling experiences determine present schooling experiences.	Students' *future* goals determine present schooling experiences.
History of failure prepares students for a future of failure.	History of failure results in individualized, intensified instruction to address students' deficits.
Assessments are summative, consisting primarily of tests and quizzes	Assessments are varied to identify students' strengths and weaknesses and perpetuate individualized instruction.
Parents are marginalized. School is not friendly to non-educators.	Parents are advised on course availability and options that best meet their children's postsecondary goals.
Classroom instruction is predominately traditional (teacher centered/lecture).	Classroom instructional strategies appeal to students' visual, auditory, and kinesthetic modalities, and allow for socialization.

teacher-centered classrooms allow teachers to monopolize dialogue, interaction, and movement while students are relegated to the role of passive learners. Perhaps the model's most devastating flaw is that it serves the purpose for which it was created: to teach middle class, White males.

Rethinking the certification requirements for middle level math teachers.

Five of the six participants perceived that their middle school years were a struggle along their math journeys. CS1 suggested that middle school teachers lacked the focus and rigor provided by his high school teachers. CS2's 7th grade teacher was frequently absent. Upon her returns, she would give tests over content she did not personally teach. CS2 was still baffled by that experience. CS3's reflection on his middle school math experience prompted him to say, "I really didn't understand that much in 7th grade math" (Appendix G, line 8, TI). CS5 described his 7th grade experience as chaotic as he struggled to review former content in Double Dosing Math class while trying to learn new material in his regular math class. CS6 said middle school math class was "kinda hectic" because the teacher assigned a lot of homework to punish the class for misbehavior. CS4 never expressed any discontent regarding his middle school math experiences, and this difference is not contributed to any particular variable.

The state in which the participating school is located does not require middle level math teachers to have a degree in mathematics or mathematics education. The researcher served as an assistant principal at one of the participating site's feeder schools. During his ten year tenure at that middle school, all 6th, 7th, and 8th grade math teachers had general education degrees. A teacher with a math degree did teach one or two classes each year for middle school students earning high school credit in either geometry or Algebra II. She was considered part-time faculty because her services required her to rotate among two to three other middle schools each year.

Is it time for states to mandate that all middle level math teachers have at least a bachelor's degree in mathematics or mathematics education, especially considering the current emphasis on conceptual rather than procedural understanding? Do some states have a mandate requiring middle level math teachers to be as educated in mathematics as their high school teachers? If so, do these states demonstrate greater gains in standardized math scores for African American males? These are questions worth investigating because middle school seems to be a period of much angst for African American males.

Increased teacher accountability for all students' achievement decreases inequitable classroom experiences.

Initially, the psychosocial factors were comprised of four themes: 1) "Acting White" and peer influence, 2) racism and stereotype threat, 3) teachers' lower expectations for African Americans, and 4) teachers' and role models' effects. The protocols' structures and participants' responses allowed the researcher to condense the psychosocial factors into two central themes: 1) racism, stereotype threat, and the stigma of "acting White," and 2) adult and peer influences regarding African American males' educational decisions generally, and their course-taking decisions for mathematics specifically.

As previously mentioned, none of the participants perceived racism, stereotype threat, or the stigma of "acting White" as inhibitors to their math learning. Most of the participants rejected the claim that racism, actual or perceived, was a prevalent force in their math classrooms. One participant, CS5, acknowledged that racism in the math classroom may generally exist at some level, but he had neither experienced it nor heard of anyone he knew experiencing it in his math classes.

Another participant suggested that racism was relegated to the past, and that all of his teachers treated their students equally. None of the participants indicated that any anxiety or feelings of inferiority they had in math class were based on racism, stereotype threat, or fear of their being perceived as acting White. As a whole, the participants acknowledged that any negative feelings they had were a direct result of their not participating in class as expected, or were due to their own lack of motivation.

The researcher believes that government initiatives at the local, state, and national levels have created more equal opportunities in our nation's classrooms (see Table 8). Prior to the release of 1983's *A Nation at Risk: The Imperative for Educational Reform*, educators were not held accountable for student achievement. Following the report, government officials implemented policies to reverse the negative trends in public education. Many states, for example, immediately required all high school graduates to take Algebra I. Within a year of the report's release, according to Raizen, McLead, and Rowe (1997), enrollment in Algebra I in those states increased from 65% to 89%. They also found a marked increase in Algebra II and calculus enrollments that year, with Algebra II's enrollment increasing from 35% to 62% and enrollment in calculus increasing from 5% to 11%.

Nationwide, by 1990, overall enrollment percentages in algebra and geometry greatly increased, yet minority enrollment in those courses remained low. In response to this inequity, civil rights leader Bob Moses launched a campaign of awareness by declaring access to algebra as the new civil right (Jetter, 1993). This campaign, according to Berry, Pinter, and McClain (2013), resulted in more African Americans enrolling in advanced math courses, yet still at rates far below Whites.

Table 8
Comparison of educators' accountability for students' learning pre- and post-No Child Left Behind.

Pre-No Child Left Behind Influence	Post-No Child Left Behind Influence
No mandated interventions for students not performing at acceptable levels.	Interventions for struggling students: Fresh Start classes, inclusion for special education students, graduation coaches, Response to Intervention strategies
Curriculum was taught according to individual teacher's discetion.	Implementation of SPI's (student performance indicators) at state and local levels and Core Curriculum standards at the national level.
Special education teachers taught math courses without certification in mathematics.	Special education teachers may teach math if they have a bachelor's degree in math or they pass the Praxis exam for mathematics.
Schools were not accountable for at-risk students (minorities, poor, special education, English limited)	Schools are now expected to show measurable gains in math scores for at-risk populations.
No state-mandated graduation requirements.	Schools must show an annual increase in graduation percentages for all student cohorts (minorities, poor, special education, English limited)
Teacher evaluations focused on the teachers' performance and class routines.	Teacher evaluations focus on students' standardized tests, instructional quality, and professional development.

In early 1990, school officials were issued a national decree by President George Bush and our nation's governors: to make our nation's students the global leaders in mathematics and science by the year 2000 (Berry III, Pinter, & McClain, 2012). This declaration followed extensive bipartisan research on our nation's lackluster math performance on standardized tests. Before President Bush's declaration was made public, NCTM had already begun the revision of mathematics standards for K-12 students. In 1989, NCTM issued its *Curriculum and Evaluation Standards for School Mathematics*, which decried past educational inequities and declared mathematics to be the great economic- and quality-of- life equalizer (National Council of Teachers of Mathematics, 1989). Later, the federal government's No Child Left Behind Act of 2001 required increased academic rigor and teacher accountability for all students. The legislation's requirement of identifying student achivement by subgroups (race, gender, income levels, language, etc) forced teachers to diminish any apathy they had towards students who underachieved in mathematics.

Currently, many states are evaluating school systems and teachers based on their ability to elevate subgroups' achievement levels. More than ever, educators who turn a blind eye towards underachievers find themselves with subpar evaluation scores that could, over time, result in their being dismissed from employment. As such, teachers are now providing more remedial and enrichment opportunities to elevate students' math achievement. African American males, the most at-risk subgroup, are now receiving more intense exposure to both procedureal and conceptual math concepts.

Are these outcomes isolated to this particular set of case studies? Or are the prevailing attitudes of today's African American male students more positive than those attitudes found in past research? If African American males' overall dispositions toward mathematics and the academic environment have improved, then government initiatives that forced educators to be accountable to all students regardless of their level of academic proficiency and motivation could be the contributing variable. These initiatives have placed teachers in the roles of motivator, coach, and facilitator because students' end-of-course scores are now directly related to teachers' evaluation ratings. Schools' increased efforts benefit everyone, including African American males who seem to realize that their underachievement despite numerous interventions leaves them with few excuses.

Effects of government initiatives at the participating site.

All schools in the state where this study took place have targeted goals regarding graduation rates, dropout rates, and services available to struggling students. As a result, half of the participants in this study benefitted from remediation math classes such as Fresh Start and Content Math. The participating school places students in these courses to better prepare them for end-of-course tests. All students in the school, in response to state mandates, must graduate with specific, detailed plans that prepare them for either college or specific vocational domains, such as auto mechanics, criminal justice, child care, banking and finance, and graphic arts.

State guidelines require the participating school to evaluate all of its teachers according to a detailed rubric that addresses areas such as planning, classroom environment, teacher's grouping- and questioning strategies, differentiated instruction provided, and remediation and enrichment opportunities for all students. In the past, there was little accountability to those students who were not served state's public school system. Government mandates that hold school officials accountable for all students no longer allow teachers to espouse a sink-or-swim attitude toward students' learning. The teachers' attitudes seem to have shifted from "if you don't get it, too bad," to "we are all in this together." This sense of shared responsibility has urged teachers to identify all students who are not proficient in mathematics and provide essential services and remediation to increase students' chances for success.

The participating school, in response to local and state mandates, now requires all students to complete four years of mathematics, with Algebra I required for all freshmen in the general education population. This initiative decreases the likelihood of African American males' being tracked out of algebra, a trend identified in prior research (Ladson-Billings, 1997). The participating school also offers inclusion Algebra I, Algebra II, and geometry classes, thus giving more special education students access to a more rigorous math curriculum. Special education students and minorities have been identified by municipalities as groups that must show yearly gains on state mandated tests.

A local initiative within the participating school's system involved the hiring of graduation coaches for all high schools. Their job requires them to identify juniors who are at-risk of not graduating with their senior class. Once identified, they counsel these students and their parents regarding courses that must be taken and the remediation services available, such as on-line courses, after school tutoring, and summer school opportunities. The coaches regularly coordinate with each student's teachers, parents or guardians, and coaches, if applicable. Next year, the school is piloting a Response to Intervention (RTI) program, a local and state initiative that incorporates additional math instruction for all students regardless of their math proficiency. It is possible that numerous interventions such as these could have been the variable that contributed to the participants' willingness to accept the blame for any deficits in their math learning. The provision of so many support services renders students to be less likely to blame external factors for their lack of achievement. Research is needed to determine whether African American males' attitudes toward mathematics correlate with the level of support services available within their schools.

The need for research on the impact of government initiatives on African American males' math experiences.

Government initiatives such as the *Nation at Risk* report and No Child Left Behind have forced math educators to reflect upon their curricular decisions and teaching practices to better serve all students, especially those students identified as being "at risk" in terms of academic preparation. As a result, schools across the nation are currently in transition as teachers strive to abandon traditional, teacher-centered instruction and embrace constructivist, student-centered instruction. The participants' responses, particularly those that reflect their having a positive disposition towards mathematics and their downplaying of racism as an inhibiting factor, suggest that government influence is having a positive effect in our math classrooms, at least during its formative years. More research must be done, however, to determine the long-term effects of government influence in education. The most prevailing question for further study is, Are students more academically prepared for higher-education and work-force demands as a result of government-mandated change? Post-No-Child-Left-Behind students merely feeling better about their math experiences does not necessarily mean that they are learning more than their Pre-No-Child-Left-Behind counterparts.

Comparative research on African American males' math performance before and after 2001 would determine the effects of government influence on their quality of education. Do increased graduate rates parallel increased math ACT score for African American males? Also, the participating school is located in a state where Race to the Top funds are being invested in teacher training that discourages traditional methods and embraces student-centered approaches. Are new training initiatives inspiring today's teachers to provide a more enriched classroom experience for African American males?

Summary

Over a decade has passed since the implementation of No Child Left Behind legislation. Millions of dollars have been invested in standardized testing, teacher training, and curriculum changes. Yet African American males are still underrepresented in advanced math courses. If this trend continues, African American males will find themselves marginalized in STEM fields such as engineering, research, computer technology, and medicine. Although research on the plight of African American males in our nation's schools exists, most of it focuses on the negative aspects of their contributions, which stimulate more negative stereotyping for the already disenfranchised population (Ladson-Billings, 2006; Lubienski & Bowen, 2000).

Many researchers (Herzig, 2004; McGee and Martin, 2011; Nasir and Niral, 2011; O'Conner, Lewis, and Mueller, 2007) have suggested that more studies should be conduct that deemphasize race blaming and focus, instead, on "racialized nature of students' mathematical experiences that most profoundly influences [negative outcomes]" (McGee & Martin, 2011, p. 49).

This qualitative study delved into the lived experiences of six African American males to learn how they interpreted the highs and lows of their math journeys. The researcher did not find six victims who viewed their skin color as barriers for their future success. They did not display attitudes suggesting their succumbing to a "discourse of deficiency" or a "discourse of rejection" that is often accepted as the norm for African American males often portrayed as morally and economically bankrupt and having no positive ties to the education experience. Instead, the researcher found six African Americans who seemed to enjoy their schooling experiences, both academic and social. No participant expressed any antipathy towards mathematics. CS3, the most unsuccessful in mathematics of all participants suggested that his work ethic and home circumstances were more to blame than classroom circumstances. In fact, mathematics was generally favored among the participants.

The participants in this study revealed several important themes that school officials will find beneficial in their pursuit of increased academic gains among their African American male populations:

- parents need to be more directly involved in their children's course-taking decisions by having school officials educate them on course availability and subjects most likely to satisfy their children's future academic and career goals;
- guidance counselors should not continue to track African Americans into lower level math courses based solely on standardized test scores, but should provide a more comprehensive criteria that includes teacher and parent input, the students' future goals and aspirations, and the students' work ethic;
- school officials should encourage all math teachers to incorporate content-related games and activities that inspire competition and provide opportunities for students to socialize with their peers;
- research is needed to determine why African American males' middle school math experiences are so negative; and
- research is needed to determine whether African American males' math learning has increased since the implementation of No Child Left Behind and Race to the Top initiatives.

Critical theory research seeks to determine how power and influence serve as mediating factors in society, especially to determine how those factors seem to benefit the majority to the detriment of the minority. The participants in this study, refreshingly, communicated that their success is not predicated on race. They did not perceive that they were victims because of their skin color. It seems that government initiatives for improving the educational outcomes for all students have minimized the influence of race in our nation's schools because teachers and principals are now more accountable to all students.

These participants' experiences, however, differed greatly from their parents' and grandparents' schooling experiences, where race was often a deciding factor regarding educational outcomes and privilege within a system predicated on European values. A famous syndicated talk show host once suggested that African Americans' being disenfranchised for so long has given them a great deal of acumen regarding White people's motives. If that is true, it is certainly reasonable to assume that the older generations of African Americans remain circumspect when the majority strives to become more inclusive. The burden, therefore, is on the schools to provide better communication with minority parents by sending the message that their input is valued necessary to better their children's futures.

In addition to including African American parents in educational discourse, school officials should investigate best teaching practices and more effective teacher training initiatives. The use of lecture, memorization, and laborious note taking is still pervasive in math classrooms. Perhaps this is the result of teachers' feeling burdened to cover the content rather than pursue meaningful in-depth inquiry because standardized tests focus on the accuracy of students' responses rather than their thinking strategies. School officials should also strive to identify and recruit quality teachers whose math understanding includes both conceptual and procedural knowledge, especially in middle schools where students' attitudes toward mathematics may be forged for better or worse. In sum, further research on school initiatives and programs that focus less on nature (race) and more on nurture (meaningful experiences) would benefit today’s African American males.

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APPENDICES

APPENDIX A

DATA GATHERING PROTOCOLS

Student Snapshot Data

1. Name:
2. Grade:
3. Parents' education levels.
4. Free or reduced lunch?
5. Math courses taken since high school:
6. ACT score in math:
7. Student's current GPA
8. What do you plan to do after high school?

Individual Interview Protocol

Interviewer's Introduction: *"Thank you for agreeing to conduct this interview. The interview should not last longer than one hour. Feel free to respond honestly to all questions. Be advised that this your participation is voluntary, your identity will be kept confidential, and you may withdraw your participation at any time without any negative consequences. To facilitate note-taking, this is being audio recorded. You and your parents signed the release forms pertaining to interviews and other aspects of the study prior to this meeting. Do you have any questions?"*

Student's Name: _______________________________ Grade Level: ______________

1. You are about to begin your senior year! Think back on some of your math classes for a moment. Describe your mathematical journey from 7th grade until now. Feel free to mention the classes you took, how well you did, your willingness to participate, how the teachers made class exciting or boring, and whatever else comes to mind.

2. Now that you have reflected on your math experiences over the past few years, tell me about your favorite learning experiences in math classes.

3. What about negative learning experiences in math classes? Do any particular incidents stand out that you remember as being difficult, stressful, or just simply bad experiences?

4. You just described some good and bad experiences from past math classes. You are used to your math teacher giving you grades and feedback, so what if you had to give math teachers a grade on their teaching. To make it easy, let's think about a pass/fail grade for your former teachers. Which teaching methods would you give a passing grade? Which teaching methods would you assign a failing grade? In other words, if you could tell them what they do right or wrong, what would you say? Let's begin with what they do right in order to teach mathematics.

5. Now that we have visited the past, let's think about now. Which math class did you sign up for next year? Do you believe that course will prepare you for the future? If so, how? If not, then why did you take this course?

6. Which factors helped you to decide to take that class?

7. Let's shift our focus to the future. Do you often think about your future in education?
   a.) If yes: When you think about your future in education, with whom do you discuss your future? Whose advice matters most to you about your education?

b.) If no: Would you please explain why you choose not to think about your future education?

8. Suppose who had to make a big decision about an educational issue, maybe which class you should take or which college you should apply to. Are there any particular people you might turn to for advice? If so, who?

9. I have read that African American males avoid the more difficult math courses, such as precalculus, calculus, and statistics. Do you think that is true? If so, why? If not, then why do some people believe that?

10. We have talked about math as it relates to your past, present, and future, and how others influence your course-taking decisions. Let's talk about how you may help others choose their math journeys. Do you have any younger brothers or sisters, or another young person in your life who looks up to you?

    a.) If yes: What would you tell them about math courses? Which ones to take? How they can be good math students?

b.) If no: Then, suppose you could go back in time. What if you could go back and change some things about your math journey, what would some of those things be? Why?

11. Let's turn to the issue of race, and how that may affect one's math journey. Some people have said that American males opt to take easier math courses or refuse to participate because they don't want to be seen as "acting White." What do you think that means?

12. Do you believe that racism plays a part in African American males choosing not to take advanced math courses, such as trigonometry, precalculus, and calculus? Explain.

13. You are about to finish your final year of high school. Suppose a teacher, principal, or guidance counselor asked you for your advice on how they can encourage more African American males to take harder math classes. What are some things that you believe would help?

14. I do not have any other questions for you. But I do want to give you the opportunity to ask some questions about the study, make some comments about your experience participating in the study, or anything else you would like to say.

Survey 1 (Psychosocial)

Please circle the number that best represents your beliefs and experiences

Scale: 1=Fully Disagree 2= Somewhat Disagree 3= Neutral (no opinion) 4= Somewhat Agree 5=Fully Agree

	Question(s)	1	2	3	4	5	Comments
1	Mathematics is easier for White people.	1	2	3	4	5	
2	Math teachers have lower expectations for African American males.	1	2	3	4	5	
3	My mathematics teacher finds me intimidating	1	2	3	4	5	
4	Math teachers treat me differently because I am African American.	1	2	3	4	5	
5	Math teachers have lower expectations for African American male students.	1	2	3	4	5	
6	I do not like to be called on to participate in mathematics class.	1	2	3	4	5	
7	My mathematics teacher praises me for doing my best.	1	2	3	4	5	
8	Earning good grades in math is important.	1	2	3	4	5	
9	As an African American student, I have to work harder in math class than White students in order to be appreciated.	1	2	3	4	5	
10	White people worry too much about their math grades.	1	2	3	4	5	

Survey 2 (Pedagogy)

Please circle the number that best represents your beliefs and experience

Scale: 1=Fully Disagree 2= Somewhat Disagree 3= Neutral (no opinion) 4= Somewhat Agree 5=Fully Agree

	Question(s)	1	2	3	4	5	Comments
1	Math teachers make the class too competitive by focusing on right/wrong answers.	1	2	3	4	5	
2	Math teachers challenge me too much.	1	2	3	4	5	
3	Math teachers are too impatient for an answer when calling on me in class.	1	2	3	4	5	
4	I prefer to work on group assignments during mathematics class.	1	2	3	4	5	
5	Math teachers lecture too much.	1	2	3	4	5	
6	I learn better when I can talk to my classmates during mathematics assignments.	1	2	3	4	5	
7	I have too much energy to sit still for an entire math period.	1	2	3	4	5	
8	Teachers should use music and art to make math more fun.	1	2	3	4	5	
9	Teachers assign too much busy work in math class.	1	2	3	4	5	
10	Discussing careers that use mathematics would interest me during math class.	1	2	3	4	5	

Survey 3 (Psychosocial and Pedagogical Motivators)

Please circle the number that best represents your beliefs and experience

Scale: 1=Fully Disagree 2= Somewhat Disagree 3= Neutral (no opinion) 4= Somewhat Agree 5=Fully Agree

	Question(s)	1	2	3	4	5	Comments
1	Schools should do more to encourage African American males to take advanced math classes.	1	2	3	4	5	
2	I believe mathematics is important for future job success.	1	2	3	4	5	
3	More African American males would take advanced math if the classes were taught by African American men.	1	2	3	4	5	
4	I believe that a good mathematics background will lead to a better paying job.	1	2	3	4	5	
5	If my friend chose to take an advanced math class, I would more than likely take it, too.	1	2	3	4	5	
6	I would make better decisions selecting math courses if schools would spend more time talking with me.	1	2	3	4	5	
7	My teachers encourage me to take harder math classes.	1	2	3	4	5	
8	My counselors encouraged me to take harder math classes.	1	2	3	4	5	
9	My parents help me choose which math courses to take.	1	2	3	4	5	
10	My friends influence my course-taking decisions in math.	1	2	3	4	5	

Observation Protocol

Student's Name: ________________________________ Date: ________ Time:

____

Subject: ______________________________________ Teacher's Name:

____

1. **Diagram of Classroom Layout**. Use an asterisk with time to denote student's location in room at various times: Example: (* 1:22, * 1:45, etc.)

2. Classroom Population (Number of Students by Race and Gender)

	White	African American	Hispanic	Other	Total
Males					
Female					
Total					

3. Describe the grouping structure throughout the lesson (small group, working with a partner, no grouping), noting transition times, activities, etc.

4. Cite any evidence of differentiated instruction/evidence of VAK teaching methods (visual, auditory, tactile, kinesthetic).

5. Tally the number of times the teacher calls on each category of student:

	White	African American	Hispanic	Other	Total
Males					
Female					
Total					

6. Describe the student's level of participation (passive, eager, etc.) with notes describing his participation (asking questions, volunteering, interacting with peers, etc.).

7. How does the student contribute to group activities/discussions?

8. Is there evidence of nonconformity or disruptive behaviors? Be specific.

9. Does the student seem to have his expected materials and assignments? Explain.

10. Do the student's peers interact with him? If so, describe the interactions.

11. Were any unexpected events, positive or negative, observed during the lesson?

12. Other Information

    a. How many students? Provide a description by race/ethnicity and gender.

    b. Notes:

Digital Metaphor Protocol

Researcher reads narrative and describes the example: *"It has often been said that a picture is worth a thousand words. This exercise will enable you to use your *cellphone or a digital camera to take various photographs relating to your experience in learning mathematics. For each photo you take, please write a paragraph describing how that photo relates to each question. After you write the paragraph, underline all words that you think are most important. You have one week to complete this assignment. It is due on _<u>May 31, 2013</u>_."*

Example: How do you view today's high school athlete?

[Bulldog]. Retrieved April 12, 2013: www.images.google.com

"I chose to photograph a <u>bulldog</u> to describe today's high school athlete because most of our athletes are <u>strong</u> and in <u>great shape</u>. For example, our wrestling coach requires our players to <u>train on weights for an hour every day after school</u>. Even during the off season, our athletes are required to keep up with their <u>training exercises</u>. All of our athletes are weighed every week to make sure that they are <u>not gaining too much weight</u>. This bulldog is <u>White</u> because most of our wrestlers are white students. Only one wrestler is African American. Bulldogs are known for their <u>loyalty and bravery</u>. Every Friday our athletes dress in the same attire and eat lunch together. This shows our loyalty to one another. Wrestling is a tough sport, so all of us have a lot of bravery."

For each question, take a picture, print it, and write your paragraph. Refer to the example if you have any questions. Staple your work to the back of this page to create your Digital Metaphor Notebook.

Take a picture and write a paragraph that relates to each of the following questions or statements:

1. When I think of mathematics, I am reminded of….
2. My math teacher thinks I am…
3. When I think of my future, I see…
4. A perfect math class reminds me of…
5. My parents' understanding of math is like…
6. When I think about how I fit in in math class, I am reminded of…
7. I wish my teachers knew this about me…
8. My peers are important to me because…
9. Most math classes remind me of…
10. I would take more math if I had access to…

*If you do not have access to a camera, you may use photographs from newspapers, magazines, calendars, etc. Bring your scrapbook to the interview on __

APPENDIX B

TRIANGULATION MATRIXES FOR CROSS-CASE ANALYSIS

Triangulation Matrix of Multiple Data Sources

Table 1

Triangulation Matrix

Research Question	Baseline data For Cross-Case Interdependence	Data Source 2 Taped Interviews	Data Source 3 Direct Observations	Data Source 4 Student Products	Secondary Sources
(1) What do African American males identify as psychosocial factors contributing to their underrepresentation in advanced math courses?	Survey 1, questions 1-10	Individual Taped Interview (Protocol and Transcribed)	Classroom Observations Field Notes	Digital Metaphors	Peer Reviewed Journals Books Textbooks Websites
(2) What pedagogical strategies are identified by African American males as more conducive to their learning mathematics?	Survey 2, questions 1-10	Individual Taped Interview (Protocol and Transcribed)	Classroom Observations Field Notes	Digital Metaphors	Peer Reviewed Journals Books Textbooks Websites
(3) What are African American males' beliefs on how both psychosocial factors and pedagogical strategies affect their motivation to enroll in advanced math courses?	Survey 3, questions 1-10	Individual Taped Interview (Protocol and Transcribed)	Classroom Observations Field Notes	Digital Metaphors	Peer Reviewed Journals Books Textbooks Websites

Participant Snapshot Matrix for Cross-Case Analysis

Item						
Name	**Case 3.1**	**Case 3.2**	**Case 3.3**	**Case 3.4**	**Case 3.5**	**Case 3.6**
Grade	11	11	11	11	11	11
Free / Reduced Lunch (Y/N)	Reduced	Free	No	Free	No	No
High School Math Courses Taken	**Course/Grade**	**Course/Grade**	**Course/Grade**	**Course/Grade**	**Course/Grade**	**Course/Grade**
9th Grade	Content Math 91 B and Alg I 80 C	Alg I 77	Alg I (S1) 50 Fresh Start (S2) 73 Summer School Alg I (S1) 74. Final Alg I grade: 73	Content Math 89 Alg I 77	Alg I 83	Alg I 94
10th Grade	Alg II 77 C	Alg II 72	Alg II (S1) 61	Alg II 79	Alg II H 84	Alg II H 94
11th Grade	Geometry C	Geometry D	Geometry F	Geometry C	Geometry B	Geometry A

12th Grade	Bridge	Bridge	Alg II & Bridge	Bridge	Bridge	Precalculus H
Math ACT Score	16	16	14	16	16	24
Current GPA (MidTerm Jr. Year)	2.44	2.08	1.78	2.48	3.49	3.99
Plans after High School W C M DK*	C	C	C	C	C	C

* LHS = Less than high school HS= High School SC = Some College B=Bachelor's M=Master's P=Doctorate

W=Work C=College M=Military DK=Don't Know

Survey 1 (Psychosocial) Matrix for Cross-Case Analysis

Question and Rating (1-5) Overall	Case 3.1	Case 3.2	Case 3.3	Case 3.4	Case 3.5	Case 3.6
1. Mathematics is easier for White people. (D)	D	D	A	D	A	D
2. Math teachers have lower expectations for African American males. (D)	D	D	N	D	D	D
3. My math teachers find me intimidating. (D)	D	No Answer	D	N	D	D
4. Math teachers treat me differently because I am African American. (d)	D	D	D	D	D	D
5. Math teachers have lower expectations for African American males. (D)	D	D	D	D	D	D
6. I do not like to be called on to participate in mathematics class. (D)	N	N	D	D	D	D
7. My mathematics teacher praises me for doing my best. (A)	N	N	A	A	D	A
8. Earning good grades in math is important. (a)	A	A	A	A	A	A
9. As an African American student, I have to work harder than White students in order to be accepted. (D)	N	D	D	D	D	D
10. White people worry too much about their math grades. (N)	N	N	D	A	N	N

* For coding purposes, 1 or 2 will be labeled as “disagree,” 3 will be labeled “neutral,” and 4 or 5 will be labeled “agree.”

Survey 2 (Pedagogy) Matrix for Cross-Case Analysis

Question and Rating (1-5)	Case 3.1	Case 3.2	Case 3.3	Case 3.4	Case 3.5	Case 3.6
1. Math teachers make class too competitive by focusing on right/wrong answers. (D)	D	No Answer	D	D	N	D
2. Math teachers challenge me too much. (D)	N	N	D	D	D	D
3. Math teachers are too impatient for an answer when calling on me in class. (D)	N	A	D	N	D	D
4. I prefer to work on group assignments during mathematics class. (A)	A	N	A	D	A	A
5. Math teachers lecture too much. (N)	A	D	A	A	D	D
6. I learn better when I can talk to my classmates during mathematics assignments. (A)	A	N	A	A	A	A
7. I have too much energy to sit still an entire math period. (D)	N	D	D	D	A	D
8. Teachers should use music and art to make math more fun. (A)	A	D	A	A	A	D
9. Teachers assign too much busy work in math class. (A)	A	A	D	N	A	A
10. Discussing careers that use mathematics would interest me during math class (N)	N	A	D	D	A	A

* For coding purposes, 1 or 2 will be labeled as “disagree,” 3 will be labeled “neutral,” and 4 or 5 will be labeled “agree.”

Survey 3 (Recruitment) Matrix for Cross-Case Analysis

Question and Rating (1-5)	Case 3.1	Case 3.2	Case 3.3	Case 3.4	Case 3.5	Case 3.6
1. Schools should do more to encourage African American males to take advanced math courses (N)	N	N	N	D	A	A
2. I believe mathematics is important for future job success. (A)	A	A	A	A	A	A
3. More African American males would take advanced math if the classes were taught by African American men. (D)	N	D	D	D	A	A
4. I believe that a good math background will lead to a better paying job. (A)	A	A	A	N	A	A
5. If my friend chose to take an advanced math class, I would more than likely take it, too. (D)	N	D	D	D	N	N
6. I would make better decisions on course selection if schools would spend more time talking with me. (A)	D	A	N	A	A	A
7. My teachers encourage me to take harder classes. (D)	N	D	D	N	A	D
8. My counselors encouraged me to take harder math classes. (N)	N	N	D	A	A	D
9. My parents help me choose which math courses to take. (D)	A	D	D	D	D	D
10. My friends influence my course-taking decisions in math. (D)	D	A	D	D	D	D

* For coding purposes, 1 or 2 will be labeled as “disagree,” 3 will be labeled “neutral,” and 4 or 5 will be labeled “agree.”

Observation Protocol Matrix for Cross-Case Analysis

Item	Case 3.1	Case 3.2	Case 3.3	Case 3.4	Case 3.5	Case 3.6
1. Grouping Structure SG PA NG*	NG/NG	SG/SG	SG	NG	SG	NG
2. Participant's level of participation. P E D*	P/E	E/E	P/P	E/E	P/E	P
3. How does participant contribute to class activity/discussion? VQ VA NVA QI P D*	NONE/ VQ QI L ASK	AQ	P D	P NVA VA QI	QI IWD VQ NVA	VA NVA P
4. Non-comformity/Off-task behaviors.	NO	NO	NO	NO	NO	No
5. All required materials (paper, pencil, textbook, calculator, etc.) Yes/No.	YES	NO Paper	YES	YES	NO (Paper/ HW)	YES
6. Do peers interact with participant in meaningful ways IWD ASK FEED LIST*	L ASK FEED LIST	L IWD ASK FEED LIST	QI IWD	LIST ASK FEED IWD	LIST ASK FEED IWD	None

* SG=Small Group PA=Partner NG=No Grouping V=Visual A=Auditory K=Kinesthetic P=Passive E=Eager D=Detached VQ=Volunteers Questions VA=Volunteers Answers NVA=Non-volunteer Answers QI=Quietly Involved T=Talking Out S=Sleeping O= Out of Seat AR=Argumentative L=Laughing IWD=Involved in Discussion ASK=Asking Questions FEED=Providing Feedback LIST=Listening

Observation Protocol Wordlist Matrix

Case ______ Observation 1 or 2 Date: ________________________

Circle behaviors/dispositions observed, and then write comments to explain the word choice. Others may be added as needed.

Words to Describe *Positive* Peer-to-Peer Interactions:

Caring 1	Enthusiastic **2**	Funny	Thoughtful **1 2 5**
Considerate **1 2 3 4 5**	Excitable	Pleasant **1 2 3 4 5**	Other: None **6**

Words to Describe *Negative* Peer-to-Peer Interactions:

Aggressive	Domineering	Manic	Thoughtless
Argumentative	Inconsiderate	Manipulative	Other:
Bossy	Irritating	Rude	

Words to Describe *Personal* Attributes:

Active	Conceited	Introverted **1 3 5 6**	Perfectionist	Volatile
Ambitious **2 4**	Creative	Inventive	Pragmatic	
Assertive **2 4**	Curious **1 2 5**	Nervous	Reserved **1 3 5 6**	
Careless	Extroverted **2**	Nervous	Serious **1 2 3 4 5 6**	
Cautious	Impulsive	Passive **1 6**	Shy **1 3 5 6**	

Digital Metaphor Matrix for Cross-Case Analysis (Key Words/Phrases)

Response Statement/Photo Description	Case 3.1	Case 3.2	Case 3.3	Case 3.4	Case 3.5	Case 3.6
1. When I think of math, I am reminded of…	College	College	iPhone	Bicycle	Chicago Bulls	Orange
2. My math teacher thinks I am…	Distracted	Distracted	Flashlight	Smart	Smart but Lazy	Ant
3. When I think of my future, I see…	Successful	Successful	Improving	Sports & Fame	Happiness	Engineer
4. A perfect math class reminds me of…	Happiness	Perfect Circle	Championship Ring	McD's Food	YMCA "all accepted"	Dictionary
5. My parents understanding of math is like…	Being Happy	Exploding Bomb	Guitar	Pointless	Unexplored Space	Money, useful
6. When I think about how I fit in in math class, I am reminded of…	Being Me	Wet Sponge	Fish on Land	Belonging	Book in a Library	Grass
7. I wish my teachers knew this about me…	Understood Me	I Do Try	Music Helps Me Learn	I'm Smart	Biracial	Can Do If They Do
8. My peers are important to me because…	Friends	Caring Friends	Help & Support	Friends	Like Family	Helpful Connections
9. Most math classes are like this…	Food	Skydiving	Football	Boring	Life	Clutter
10. I would take more math if I had access to…	Money	Business Documents	Laptop	Extra Credit	A Personal Teacher	More Time

Transcript Matrix for Question #1

Case	"Describe your math journey from 7th grade until now." (Middle School Focus)
CS1	Middle school was harder than high school because teachers weren't teaching as hard as they do now.
CS2	Negative experience in 7th because teacher was frequently absent. She would return and give tests – "I never got that." 8th was better b/c teacher used games.
CS3	"I really didn't understand that much in 7th grade math" (line 8). He participated, took lots of notes, but was bad test taker.
CS4	Cool teacher. Made it fun. Challenges and competitions.
CS5	7th grade was an "Up and down year" (9-10). Double Dosing . 8th "still struggling" Admits he was lazy and didn't apply himself.
CS6	Middle school was "kinda hectic" (line 7). T had poor classroom management. Assigned too much homework.

Transcript Matrix for Question #2

Case	Now that you have reflected on your math experiences over the past years, tell me about your favorite learning experiences in math class.
CS1	"Just coming to class and her showing me how to do it more, just more experience"
CS2	Puzzle piece game with hard problems on the board. Race to get the answer correct to complete the puzzle. Right solution resulted in one's getting the correct puzzle piece. Group worked both individually and collectively to complete the puzzle. Tessellation game. You had to get right shape to keep pattern going.
CS3	Doing stuff on the board and playing games because you have to compete to get the answer. Helps a lot and gets you involved.
CS4	7th teacher laughed, shared life stories, and fun activities. Challenges. Competitions. Teachers having a sense of humor. Project with rulers and crayons to design a city. Math BINGO.
CS5	Tessellations, projects, and group activities, group tests.
CS6	Teachers' different personalities make classes exciting.

Transcript Matrix for Question #3

Cases	What about negative learning experiences in math classes? Do any particular incidents stand out that your remember as being difficult, stressful, or just simply bad experiences?
CS1	Just having to figure out information on his own when returns from absences.
CS2	None except the teachers not writing stuff out on the board.
CS3	Not understanding a concept when everyone else seems to get it. Afraid to ask to many questions when lost because it draws negative attention to him.
CS4	Nothing comes to mind. I like math so much...
CS5	Individually taking notes for long periods of time. In a group, people on your level can explain it to you and they have more patience.
CS6	Busy work, like crosswords, coloring, and stuff like that. Class out of control in 7^{th} grade.

Transcript Matrix for Question #4

Cases	If you had to give math teachers a grade on their teaching...which methods would you give a passing grade or failing grade?
CS1	Passing for making them write notes out. F for not giving us time to write it down (Patience).
CS2	Failing grade for being out too much. A for at least trying to help. A for puzzle piece game. Passing grade for showing all steps. A for not just giving the answers, but making them work for it. A for staying on them all the time.
CS3	A for teaching me a lot and getting me involved. D for not explaining well. (Scaffolding needed). A for explaining well. A for working with me after I returned from injury.
CS4	Pass for nice and kind. Pass for staying positive. Sharing family stories. Fail for blaming me for failing a test when they could have explained better.
CS5	A for group work. Failing for busy work and not checking hw.
CS6	7^{th} grade a fail for not keeping class under control. 8^{th} fail because he had trouble grasping material. 10^{th} pass for using analogies, being exciting, and keeping it interesting.

Transcript Matrix for Questions #5 and #6

Case	"What math class did you sign up for next year? Do you believe it will help prepare you future? If so, how?" "Which factors helped you decide to take that class?"
CS1	Bridge Math. Hopes it will prepare him for his future. Said there were not any other subjects to take.
CS2	Bridge Math. Help prepare for future? "No." Realizes he should take a harder class because he wants to be a successful business man. Found geometry quite difficult.
CS3	Bridge Math. Will prepare him for the future because it is easier than the advanced math courses and he realizes his basics are not up to par.
CS4	Bridge Math because "it is easy." "I probably should have signed up for a harder math, just for college purposes" (lines 92-93). Heard it was a repeat of Algebra I, Algebra II, and geometry. Says basic skills are what is important for future success, not an AP class.
CS5	Said he signed up for precalculus. Records show Bridge Math. "Wanna stay on that basis where I can get a reflection on the past and kinda know where I am at. I don't wanna take something new and get a bad grade" (lines 75-78) Help future goals? Yes. Math is always helpful.
CS6	Precalculus. Prepare him for college and engineering curriculum.

Transcript Matrix for Question #7

Case	"Do you often think about your future education? If yes, with whom do you discuss your future? Whose advice matters?" No one answered "no."
CS1	His parents, especially his mother, because she went to college.
CS2	Football coach and mom, because she wants what's best for him.
CS3	Mom because we have been through a lot together. They have experienced the same situations.
CS4	Counselor and mother, although she isn't that smart. She encourages him.
CS5	Paternal grandparents (who are White). Grandfather went to college. Study needed here?
CS6	Yes, pretty often. Parents and aunt.

Transcript Matrix for Question #8

Case	Suppose you had to make a big decision about an educational issue, maybe which class you should take or which college you should apply to. Are there any particular people you might turn to for advice? If so, who?
CS1	Mom, because she went to college. Teacher or principal because they have master's and stuff.
CS2	My youth minister because their lives have many similarities. "We have been through the exact same things."
CS3	Mom, grandmother, and uncle because they have been in that situation before. They help give input regarding college.
CS4	Cousin who graduated from [local university]
CS5	Counselor, because that is what she is there for. Business teacher since he wants to be a business major. Grandpa. Not parents because they didn't finish college.
CS6	Parents, counselor, teachers.

Transcript Matrix for Question #9

Case	"I have read that AA males avoid the more difficult math courses. Do you think that is true? If so, why? If not, then why do some people believe that?"
CS1	No. Everyone is smart in their own way. "Some people just want to take the easy route" (lines 82-83). Those that believe it are just making decisions based on things they have heard.
CS2	No and yes. "Some AA males, they want the easy way out" (line 137). Those who believe it are judging AA males by their clothing (sagging pants = drug dealer).
CS3	No. Some of his friends are in advanced math, like precalculus, and they love it. Others "just don't wanna put for the effort and time" that advanced math courses require. Also "work ethic"
CS4	50/50. "Maybe our math teachers don't think we can take harder math classes" (lines 132-136). Often "we don't give it a chance" (line 136).
CS5	Yes, not due to their laziness, but fear. Also, their focus is on sports.
CS6	Yes, in some respects because "it isn't they are not smart, but too lazy to do it" (lines 96-97).

Transcript Matrix for Question #10

Case	"Do you have any younger brothers or sisters, or another young person in your life who look up to you? If yes, what math courses would you tell them to take? How can they be a good math student? If no, what are some things you would change about your math journey?
CS1	Study more and bring their hw home. Ask questions. Take algebra. "Don't miss school."
CS2	Little brother. "Never give up in math class." "Do your work." "Start of easy and go hard." Start with standard courses and move on to advanced later.
CS3	Take geometry because it is a "good subject."
CS4	Go with the harder math classes. Push yourself. Take honors math classes. "I am lazy."
CS5	Two sisters who struggle with school. They should take courses in which they are comfortable. Start small and work your way up. A good math student pays attention, takes notes, and helps those who are struggling in class.
CS6	Only child. He would fix his problem with procrastinating.

Transcript Matrix for Question 11

Case	“Some people have said that African American males opt take easier math courses or refuse to participate because they don’t want to be perceived as “acting White.” What do you think that means.
CS1	Those who say that are “jealous”...”not trying.” “They just don’t want to see AAs succeed.” “We are just as smart as them.”
CS2	“...that AAs seem that they don’t want to look too smart to others. Like they don’t want to be looked down on by other AA males.” Whites typically not perceived as sagging, doing drugs, making bad grades, and having low GPAs.
CS3	“I disagree with that statement. To me there is no such thing as “acting White.” You do what you want to do, whether it is taking harder classes, making good grades, etc. Individual work ethic; not race, but the way you were raised.
CS4	“I think that is just stereotypical. “ Sees nothing wrong with answering questions in class. “It is a stupid thing to say.” “There are smart AA males who know the answer; they just don’t want to say it...because they think the teacher thinks they’re dumb.” White people thought of as smart and passing tests.
CS5	“I have never experienced or seen that before.” It is not about “acting White,” it is about applying yourself. Laziness, like I say.” Peers never comment on his course-taking: “They don’t care what color your skin is.”
CS6	Blacks perceived as using improper grammar, uneducated, sports enthusiasts. Whites perceived as “proper,” fitting “a certain mold” lines 121-122

Transcript Matrix for Question 12

Case	"Do you think racism plays a part in African American males choosing not to take advanced math courses such as trigonometry, precalculus, and calculus?"
CS1	"No sir. I think they don't want to do it. They just want to take the easy way out."
CS2	"Not really. I think it is up to them." "I don't think it is a race thing."
CS3	"No, I do not...." It is not a race thing at all. It is just, some people don't want to be in those advanced math classes because regular math comes easier..." "They don't want to put forth the effort..."
CS4	"In today's view, I don't think so. Maybe in the past. Not here at [this school]. I don't think race has anything to do with it."
CS5	No, more of a pattern based on what your parents took in school. "They need pushed to take it." "They will never step up if they don't apply themselves."
CS6	"Maybe not much today. I know it still exists in some derivations. I think it is a personal decision about taking higher classes..."

Transcript Matrix for Question #13

Case	Suppose a teacher, principal, or guidance counselor asked you for your advice on how they can encourage more AA males to take harder math classes. What are some things you believe would help?
CS1	More tutoring. Have after-school activities that relate sports to math. Eating and socializing.
CS2	Get more teachers to show they care, especially those who come from broken homes or whose parents are deceased. They need a motivational push.
CS3	Tell them to take harder class. Tell them what the classes are about (Shroud of mystery?) Tell them why it is beneficial to them.
CS4	Encourage them a little more. Have a meeting – no, don't want all Black students in one place. Encourage and motivate.
CS5	Get a coach to talk to them about grades and a backup plan. Get parents involved. Go to their houses and talk to them.
CS6	Get their counselors to encourage them, to call them down to the office and talk to them about it.

APPENDIX C

PARTICIPANTS' RESPONSES TO SURVEYS

CS1's Responses to Baseline Surveys

Survey 1 (Psychosocial)

Please circle the number that best represents your beliefs and experiences

Scale: 1=Fully Disagree 2= Somewhat Disagree 3= Neutral (no opinion) 4= Somewhat Agree 5=Fully Agree

	Question(s)	1	2	3	4	5	Comments
1	Mathematics is easier for White people.	1	2	3	4	5	Because math is most black favorite Subje
2	Mathematics teachers have lower expectations for African American males.	1	2	3	4	5	Teachers have faith in all the students
3	My mathematics teacher finds me intimidating	1	2	3	4	5	My teacher finds me interesting
4	Mathematics teachers treat me differently because I am African American.	1	2	3	4	5	We all are treated equally.
5	Mathematics teachers have lower expectations for African American male students.	1	2	3	4	5	I highly disagree
6	I do not like to be called on to participate in mathematics class.	1	2	3	4	5	Sometimes I don't depends on my mood
7	My mathematics teacher praises me for doing my best.	1	2	3	4	5	Rarely she does depends on the question.
8	Earning good grades in math is important.	1	2	3	4	5	I love making good grades
9	As an African American student, I have to work harder in math class than White students in order to be appreciated.	1	2	3	4	5	I believe we all have equal chances.
10	White people worry too much about their math grades.	1	2	3	4	5	Some do, but others are slackers

CS1's Response to Survey 2

Please circle the number that best represents your beliefs and experience

Scale: 1=Fully Disagree 2= Somewhat Disagree 3= Neutral (no opinion) 4= Somewhat Agree 5=Fully Agree

	Question(s)	1	2	3	4	5	Comments
1	Mathematics teachers make the class too competitive by focusing on right/wrong answers.	1	2	3	4	5	They do when everyone wants to answer.
2	Mathematics teachers challenge me too much.	1	2	3	4	5	I somewhat agree but also do not
3	Mathematics teachers are too impatient for an answer when calling on me in class.	1	2	3	4	5	They need more patients
4	I prefer to work on group assignments during mathematics class.	1	2	3	4	5	It helps more to work with a class mate.
5	Mathematics teachers lecture too much.	1	2	3	4	5	All the time and be way to boring.
6	I learn better when I can talk to my classmates during mathematics assignments.	1	2	3	4	5	Talking to them just seems more simple.
7	I have too much energy to sit still for an entire math period.	1	2	3	4	5	Sometimes then again I'm tired.
8	Teachers should use music and art to make math more fun.	1	2	3	4	5	music is always a good way to focus.
9	Teachers assign too much busy work in math class.	1	2	3	4	5	They give unnecessary work and way too much.
10	Discussing careers that use mathematics would interest me during math class.	1	2	3	4	5	Possibly could cause I am good at it.

Survey 3 (Psychosocial and Pedagogical Motivators)

Please circle the number that best represents your beliefs and experience

Scale: 1=Fully Disagree 2= Somewhat Disagree 3= Neutral (no opinion) 4= Somewhat Agree 5=Fully Agree

	Question(s)	1	2	3	4	5	Comments
1	Schools should do more to encourage African American males to take advanced math classes.	1	2	3	4	5	They could bot it is our decision.
2	I believe mathematics is important for future job success.	1	2	3	4	5	Cause your gonna use some type of math.
3	More African American males would take advanced math if the classes were taught by African American men.	1	2	3	4	5	I don't agree with that
4	I believe that a good mathematics background will lead to a better paying job.	1	2	3	4	5	Yes, it could would lead to future success.
5	If my friend chose to take an advanced math class, I would more than likely take it, too.	1	2	3	4	5	Maybe but I'm going do what is best for me
6	I would make better decisions selecting math courses if schools would spend more time talking with me.	1	2	3	4	5	I am a smart guy and can make smart choices myself.
7	My teachers encourage me to take harder math classes.	1	2	3	4	5	They did so I could be prepare for college
8	My counselors encouraged me to take harder math classes.	1	2	3	4	5	Sometimes when I talk about it.
9	My parents help me choose which math courses to take.	1	2	3	4	5	Yes, because they know what can challenge me.
10	My friends influence my course-taking decisions in math.	1	2	3	4	5	No, they have never influence my math courses idea.

CS2's Responses to Baseline Surveys

Please circle the number that best represents your beliefs and experiences

Scale: 1=Fully Disagree 2= Somewhat Disagree 3= Neutral (no opinion) 4= Somewhat Agree 5=Fully Agree

	Question(s)	1	2	3	4	5	Comments
1	Mathematics is easier for White people.	1	2	3	4	5	It is easy for anyone its just the way you lo
2	Mathematics teachers have lower expectations for African American males.	1	2	3	4	5	
3	My mathematics teacher finds me intimidating	1	2	3	4	5	
4	Mathematics teachers treat me differently because I am African American.	1	2	3	4	5	
5	Mathematics teachers have lower expectations for African American male students.	1	2	3	4	5	They seem to not care a little
6	I do not like to be called on to participate in mathematics class.	1	2	3	4	5	It depends on if I know it or not
7	My mathematics teacher praises me for doing my best.	1	2	3	4	5	
8	Earning good grades in math is important.	1	2	3	4	5	Colleges mainly look at your Math scores
9	As an African American student, I have to work harder in math class than White students in order to be appreciated.	1	2	3	4	5	
10	White people worry too much about their math grades.	1	2	3	4	5	Some do some don't

CS2's Response to Survey 2

2

Survey 2 (Pedagogy)

Please circle the number that best represents your beliefs and experience

Scale: 1=Fully Disagree 2= Somewhat Disagree 3= Neutral (no opinion) 4= Somewhat Agree 5=Fully Agree

	Question(s)	1	2	3	4	5	Comments
1	**Mathematics teachers make the class too competitive by focusing on right/wrong answers.**	1	2	3	4	5	
2	**Mathematics teachers challenge me too much.**	1	2	3	4	5	
3	**Mathematics teachers are too impatient for an answer when calling on me in class.**	1	2	3	4	5	I would be thinking in class but h… would call on…
4	**I prefer to work on group assignments during mathematics class.**	1	2	3	4	5	
5	**Mathematics teachers lecture too much.**	1	2	3	4	5	
6	**I learn better when I can talk to my classmates during mathematics assignments.**	1	2	3	4	5	I seem to understand a little more w… students h…
7	**I have too much energy to sit still for an entire math period.**	1	2	3	4	5	
8	**Teachers should use music and art to make math more fun.**	1	2	3	4	5	Depends on th… learning styl…
9	**Teachers assign too much busy work in math class.**	1	2	3	4	5	
10	**Discussing careers that use mathematics would interest me during math class.**	1	2	3	4	5	Im Planning on going to College for bu… and that uses Math

Survey 3 (Psychosocial and Pedagogical Motivators)

Please circle the number that best represents your beliefs and experience

Scale: 1=Fully Disagree 2= Somewhat Disagree 3= Neutral (no opinion) 4= Somewhat Agree 5=Fully Agree

	Question(s)	1	2	3	4	5	Comments
1	Schools should do more to encourage African American males to take advanced math classes.	1	2	3	4	5	
2	I believe mathematics is important for future job success.	1	2	3	4	5	Business
3	More African American males would take advanced math if the classes were taught by African American men.	1	2	3	4	5	
4	I believe that a good mathematics background will lead to a better paying job.	1	2	3	4	5	
5	If my friend chose to take an advanced math class, I would more than likely take it, too.	1	2	3	4	5	
6	I would make better decisions selecting math courses if schools would spend more time talking with me.	1	2	3	4	5	
7	My teachers encourage me to take harder math classes.	1	2	3	4	5	He dosent care
8	My counselors encouraged me to take harder math classes.	1	2	3	4	5	
9	My parents help me choose which math courses to take.	1	2	3	4	5	
10	My friends influence my course-taking decisions in math.	1	2	3	4	5	we talk abot College goals

CS3's Responses to Baseline Surveys

Please circle the number that best represents your beliefs and experiences

Scale: 1=Fully Disagree 2= Somewhat Disagree 3= Neutral (no opinion) 4= Somewhat Agree 5=Fully Agree

	Question(s)	1	2	3	4	5	Comments
1	**Mathematics is easier for White people.**	1	2	3	4	5	
2	**Mathematics teachers have lower expectations for African American males.**	1	2	3	4	5	
3	**My mathematics teacher finds me intimidating**	1	2	3	4	5	Im not intimidating
4	**Mathematics teachers treat me differently because I am African American.**	1	2	3	4	5	My teacher treats me like everybody else
5	**Mathematics teachers have lower expectations for African American male students.**	1	2	3	4	5	
6	**I do not like to be called on to participate in mathematics class.**	1	2	3	4	5	
7	**My mathematics teacher praises me for doing my best.**	1	2	3	4	5	It is true because whenever I do good I get a good Job.
8	**Earning good grades in math is important.**	1	2	3	4	5	This is true because you need to pass.
9	**As an African American student, I have to work harder in math class than White students in order to be appreciated.**	1	2	3	4	5	I disagree because I work at the same pace as Caucasian People
10	**White people worry too much about their math grades.**	1	2	3	4	5	I disagree because I know a lot of Caucasian People that could care less about their grad

Please circle the number that best represents your beliefs and experience

Scale: 1=Fully Disagree 2= Somewhat Disagree 3= Neutral (no opinion) 4= Somewhat Agree 5=Fully Agree

	Question(s)	1	2	3	4	5	Comments
1	**Mathematics teachers make the class too competitive by focusing on right/wrong answers.**	1	2	3	4	5	They make class fun sometimes but never competitive
2	**Mathematics teachers challenge me too much.**	1	2	3	4	5	They challenge me the right amount
3	**Mathematics teachers are too impatient for an answer when calling on me in class.**	1	2	3	4	5	They are patient.
4	**I prefer to work on group assignments during mathematics class.**	1	2	3	4	5	
5	**Mathematics teachers lecture too much.**	1	2	3	4	5	I agree because the more they talk the more sleepy I get.
6	**I learn better when I can talk to my classmates during mathematics assignments.**	1	2	3	4	5	
7	**I have too much energy to sit still for an entire math period.**	1	2	3	4	5	
8	**Teachers should use music and art to make math more fun.**	1	2	3	4	5	I agree because music helps me think and art makes things fun
9	**Teachers assign too much busy work in math class.**	1	2	3	4	5	
10	**Discussing careers that use mathematics would interest me during math class.**	1	2	3	4	5	I disagree because theres no point of discussing that when we are trying to learn

Survey 3 (Psychosocial and Pedagogical Motivators)

Please circle the number that best represents your beliefs and experience

Scale: 1=Fully Disagree 2= Somewhat Disagree 3= Neutral (no opinion) 4= Somewhat Agree 5=Fully Agree

	Question(s)	1	2	3	4	5	Comments
1	Schools should do more to encourage African American males to take advanced math classes.	1	2	3	4	5	
2	I believe mathematics is important for future job success.	1	2	3	4	5	
3	More African American males would take advanced math if the classes were taught by African American men.	1	2	3	4	5	I disagree because it do matter what color the teacher is.
4	I believe that a good mathematics background will lead to a better paying job.	1	2	3	4	5	
5	If my friend chose to take an advanced math class, I would more than likely take it, too.	1	2	3	4	5	I disagree because I don't like AP Math.
6	I would make better decisions selecting math courses if schools would spend more time talking with me.	1	2	3	4	5	
7	My teachers encourage me to take harder math classes.	1	2	3	4	5	I disagree because I haven't been told that.
8	My counselors encouraged me to take harder math classes.	1	2	3	4	5	haven't been told tha
9	My parents help me choose which math courses to take.	1	2	3	4	5	She doesn't really help chouse my math course.
10	My friends influence my course-taking decisions in math.	1	2	3	4	5	I disagree because if it was I would be in every math classes my friends have had.

CS4's Responses to Baseline Surveys

CS4's Response to Survey 1

's and experiences

Scale: 1=Fully Disagree 2= Somewhat Disagree 3= Neutral (no opinion) 4= Somewhat Agree 5=Fully Ag

	Question(s)	1	2	3	4	5	Comme
1	Mathematics is easier for White people.	1	2	3	4	5	thats rig Not true
2	Mathematics teachers have lower expectations for African American males.	1	2	3	4	5	My curren encourages Same as o
3	My mathematics teacher finds me intimidating	1	2	3	4	5	I'm n
4	Mathematics teachers treat me differently because I am African American.	1	2	3	4	5	non sense
5	Mathematics teachers have lower expectations for African American male students.	1	2	3	4	5	not now are things
6	I do not like to be called on to participate in mathematics class.	1	2	3	4	5	I love a questions.
7	My mathematics teacher praises me for doing my best.	1	2	3	4	5	he's very enthusiastic
8	Earning good grades in math is important.	1	2	3	4	5	yes. cause my favorite
9	As an African American student, I have to work harder in math class than White students in order to be appreciated.	1	2	3	4	5	I work ju hard. equal will.
10	White people worry too much about their math grades.	1	2	3	4	5	thats kinda not always.

CS4's Response to Survey 2

Scale: 1=Fully Disagree 2= Somewhat Disagree 3= Neutral (no opinion) 4= Somewhat Agree 5=Fully Agree

	Question(s)	1	2	3	4	5	Comments
1	Mathematics teachers make the class too competitive by focusing on right/wrong answers.	1	2	3	4	5	disagree. my teacher doesnt.
2	Mathematics teachers challenge me too much.	1	2	3	4	5	im treated equally.
3	Mathematics teachers are too impatient for an answer when calling on me in class.	1	2	3	4	5	depends on their mood.
4	I prefer to work on group assignments during mathematics class.	1	2	3	4	5	id rather work alone.
5	Mathematics teachers lecture too much.	1	2	3	4	5	Kinda lol
6	I learn better when I can talk to my classmates during mathematics assignments.	1	2	3	4	5	they help the situation
7	I have too much energy to sit still for an entire math period.	1	2	3	4	5	no its just really cold.
8	Teachers should use music and art to make math more fun.	1	2	3	4	5	music and art have nothing to do with math
9	Teachers assign too much busy work in math class.	1	2	3	4	5	Some not mr. gonye
10	Discussing careers that use mathematics would interest me during math class.	1	2	3	4	5	no i like math the way it is

CS4's Response to Survey 3

Please circle the number that best represents your beliefs and experience

Scale: 1=Fully Disagree 2= Somewhat Disagree 3= Neutral (no opinion) 4= Somewhat Agree 5=Fully Agree

	Question(s)	1	2	3	4	5	Comments
1	Schools should do more to encourage African American males to take advanced math classes.	1	2	3	4	5	that would degrad us.
2	I believe mathematics is important for future job success.	1	2	3	4	5	Numbers and formulas may be useful later on in life.
3	More African American males would take advanced math if the classes were taught by African American men.	1	2	3	4	5	the teacher dont matter, its the student
4	I believe that a good mathematics background will lead to a better paying job.	1	2	3	4	5	depends on the job
5	If my friend chose to take an advanced math class, I would more than likely take it, too.	1	2	3	4	5	no I like as much math as I can handle
6	I would make better decisions selecting math courses if schools would spend more time talking with me.	1	2	3	4	5	possibly
7	My teachers encourage me to take harder math classes.	1	2	3	4	5	nope they've never said that
8	My counselors encouraged me to take harder math classes.	1	2	3	4	5	Yes. I dont know if I can handle it.
9	My parents help me choose which math courses to take.	1	2	3	4	5	no they just want me to make good grades.
10	My friends influence my course-taking decisions in math.	1	2	3	4	5	I lead not follow. I like average math. friends wont change that.

CS5's Responses to Baseline Surveys

Please circle the number that best represents your beliefs and experiences

Scale: 1=Fully Disagree 2= Somewhat Disagree 3= Neutral (no opinion) 4= Somewhat Agree 5=Fully Agree

	Question(s)	1	2	3	4	5	Comments
1	Mathematics is easier for White people.	1	2	3	4	5	
2	Mathematics teachers have lower expectations for African American males.	1	2	3	4	5	Some teachers may have person
3	My mathematics teacher finds me intimidating	1	2	3	4	5	
4	Mathematics teachers treat me differently because I am African American.	1	2	3	4	5	
5	Mathematics teachers have lower expectations for African American male students.	1	2	3	4	5	Some teachers may be biased
6	I do not like to be called on to participate in mathematics class.	1	2	3	4	5	
7	My mathematics teacher praises me for doing my best.	1	2	3	4	5	
8	Earning good grades in math is important.	1	2	3	4	5	better grades = better job
9	As an African American student, I have to work harder in math class than White students in order to be appreciated.	1	2	3	4	5	
10	White people worry too much about their math grades.	1	2	3	4	5	

Please circle the number that best represents your beliefs and experience

Scale: 1=Fully Disagree 2= Somewhat Disagree 3= Neutral (no opinion) 4= Somewhat Agree 5=Fully Agree

	Question(s)	1	2	3	4	5	Comments
1	Mathematics teachers make the class too competitive by focusing on right/wrong answers.	1	2	3	4	5	
2	Mathematics teachers challenge me too much.	1	2	3	4	5	African - Americ may not see full potential i
3	Mathematics teachers are too impatient for an answer when calling on me in class.	1	2	3	4	5	
4	I prefer to work on group assignments during mathematics class.	1	2	3	4	5	
5	Mathematics teachers lecture too much.	1	2	3	4	5	
6	I learn better when I can talk to my classmates during mathematics assignments.	1	2	3	4	5	Learning from someone who is on your level
7	I have too much energy to sit still for an entire math period.	1	2	3	4	5	
8	Teachers should use music and art to make math more fun.	1	2	3	4	5	Real - world subject would make more sense and be ea
9	Teachers assign too much busy work in math class.	1	2	3	4	5	
10	Discussing careers that use mathematics would interest me during math class.	1	2	3	4	5	

Survey 3 (Psychosocial and Pedagogical Motivators)

Please circle the number that best represents your beliefs and experience

Scale: 1=Fully Disagree 2= Somewhat Disagree 3= Neutral (no opinion) 4= Somewhat Agree 5=Fully Agree

	Question(s)	1	2	3	4	5	Comments
1	Schools should do more to encourage African American males to take advanced math classes.	1	2	3	4	5	The classes would benefit their fut
2	I believe mathematics is important for future job success.	1	2	3	4	5	
3	More African American males would take advanced math if the classes were taught by African American men.	1	2	3	4	5	
4	I believe that a good mathematics background will lead to a better paying job.	1	2	3	4	5	Math falls into almost every job-wise in the
5	If my friend chose to take an advanced math class, I would more than likely take it, too.	1	2	3	4	5	
6	I would make better decisions selecting math courses if schools would spend more time talking with me.	1	2	3	4	5	I need to know what benefits me and
7	My teachers encourage me to take harder math classes.	1	2	3	4	5	
8	My counselors encouraged me to take harder math classes.	1	2	3	4	5	
9	My parents help me choose which math courses to take.	1	2	3	4	5	
10	My friends influence my course-taking decisions in math.	1	2	3	4	5	

CS6's Responses to Baseline Surveys

Please circle the number that best represents your beliefs and experiences

Scale: 1=Fully Disagree 2= Somewhat Disagree 3= Neutral (no opinion) 4= Somewhat Agree 5=Fully Agree

	Question(s)	1	2	3	4	5	Comments
1	Mathematics is easier for White people.	1	2	3	4	5	
2	Mathematics teachers have lower expectations for African American males.	1	2	3	4	5	
3	My mathematics teacher finds me intimidating	1	2	3	4	5	She is very nice + says hi to me every day.
4	Mathematics teachers treat me differently because I am African American.	1	2	3	4	5	
5	Mathematics teachers have lower expectations for African American male students.	1	2	3	4	5	
6	I do not like to be called on to participate in mathematics class.	1	2	3	4	5	
7	My mathematics teacher praises me for doing my best.	1	2	3	4	5	
8	Earning good grades in math is important.	1	2	3	4	5	
9	As an African American student, I have to work harder in math class than White students in order to be appreciated.	1	2	3	4	5	
10	White people worry too much about their math grades.	1	2	3	4	5	

Please circle the number that best represents your beliefs and experience

Scale: 1=Fully Disagree 2= Somewhat Disagree 3= Neutral (no opinion) 4= Somewhat Agree 5=Fully Agree

	Question(s)	1	2	3	4	5	Comments
1	Mathematics teachers make the class too competitive by focusing on right/wrong answers.	1	2	3	4	5	
2	Mathematics teachers challenge me too much.	1	2	3	4	5	
3	Mathematics teachers are too impatient for an answer when calling on me in class.	1	2	3	4	5	
4	I prefer to work on group assignments during mathematics class.	1	2	3	4	5	
5	Mathematics teachers lecture too much.	1	2	3	4	5	
6	I learn better when I can talk to my classmates during mathematics assignments.	1	2	3	4	5	
7	I have too much energy to sit still for an entire math period.	1	2	3	4	5	
8	Teachers should use music and art to make math more fun.	1	2	3	4	5	
9	Teachers assign too much busy work in math class.	1	2	3	4	5	
10	Discussing careers that use mathematics would interest me during math class.	1	2	3	4	5	It's important to know why you are learning something as much as what you are learning.

Survey 3 (Psychosocial and Pedagogical Motivators)

Please circle the number that best represents your beliefs and experience

Scale: 1=Fully Disagree 2= Somewhat Disagree 3= Neutral (no opinion) 4= Somewhat Agree 5=Fully Agree

	Question(s)	1	2	3	4	5	Comments
1	Schools should do more to encourage African American males to take advanced math classes.	1	2	3	4	5	
2	I believe mathematics is important for future job success.	1	2	3	4	5	
3	More African American males would take advanced math if the classes were taught by African American men.	1	2	3	4	5	
4	I believe that a good mathematics background will lead to a better paying job.	1	2	3	4	5	
5	If my friend chose to take an advanced math class, I would more than likely take it, too.	1	2	3	4	5	
6	I would make better decisions selecting math courses if schools would spend more time talking with me.	1	2	3	4	5	
7	My teachers encourage me to take harder math classes.	1	2	3	4	5	
8	My counselors encouraged me to take harder math classes.	1	2	3	4	5	
9	My parents help me choose which math courses to take.	1	2	3	4	5	
10	My friends influence my course-taking decisions in math.	1	2	3	4	5	

APPENDIX D

PARTICIPANTS' DIGITAL METAPHORS SCRAPBOOKS

Scrapbook of Digital Metaphors for Case Study #1

1. "When I think of mathematics, I am reminded of...."

[College]. "I chose to do this picture of a college to represent what I am reminded of when I think about mathematics. Mathematics is an very important part of our education and we are gotta use it everyday. Such as, our math teachers here try their best to help us strive for excellence and not fail any classes. In order to stay focus and not get distracted you must get a good healthy sleep and eat a very nutritionist breakfast every morning. Basically to make it into college you gotta pass the first stages and that is high school, so what you do here is gonna reflect what is gonna happen on the next level."

2."My math teacher thinks I am...."

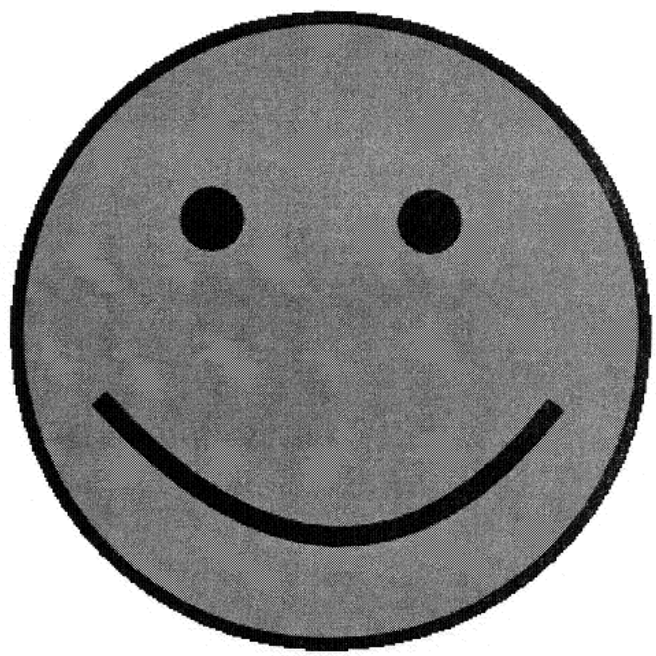
[Distracted]. " Teachers have a way of thinking am not paying any attention to them when I do not look up all the time. But really I am focused and listening to what's being taught to me. They sometimes have the nerve to tell me what I'm doing, which is not true because clearly I could answer their questions correctly. I can doze off a couple times but I am still going to pass your classes. Although I could be wrong at times I will ask other classmate just in case if I didn't understand the lessen at all.

3."When I think of my future, I see..."

[Being Successful]. " I am a positive guy and never try to be cocky in any way shape or form. My future is going to be great I hope to achieve many of my childhood goals, that I been striving for since I was a little kid. Being a professional football athlete was one of my goals, because me and my brother always played together, then if I don't do that I want a well paying job. Mainly I want to give back to my parents for the support and love that they showed me my entire life.

4."A perfect math class reminds me of..."

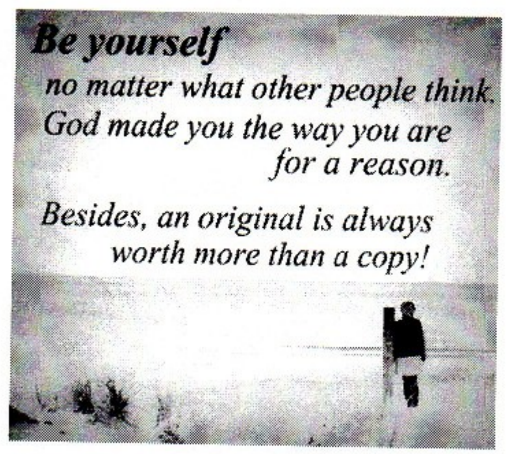
[Being Happy]. " The key to a fun math class is happiness and being positive. A perfect math class is rarely impossible the whole year, but being a class clown and being positive will change everything. At Smyrna High many people can change your mood instantly. Math is not a fun subject but it is easy if your dedicated to it like its something you love. So, try to go to class with a smile on your face and see how long that is gonna last throughout the day if you do not positive."



5."My parents understanding of math is like..."

[Being Happy]. "My parents think it is easy to maintain an A average all year. I try my best at every subject and just have to realize that I give everything my best no matter what it is. Education is the key to my parents and me because I am going to be the first child of theirs to graduate and I'm blessed to say I wont let them down. Although I feel like I'm not the brightest child I am though. My parents brought me here to pass school, do right, never do drugs, and live a successful life. "

6."When I think about how I fit in math class, I am reminded of." [just being myself]. "I don't try to fit into math classes cause I am already close with everyone. Trying to fit in is not for me. Everything I've done had a purpose to myself not from anyone help. Fake people really bug me and they stay trying to be like other people. Just be yourself and not a follower that's why you were brought into this world. Like today people need to look into the mirror and realize who they are. My math class is fun so no need to be a fake person around them."

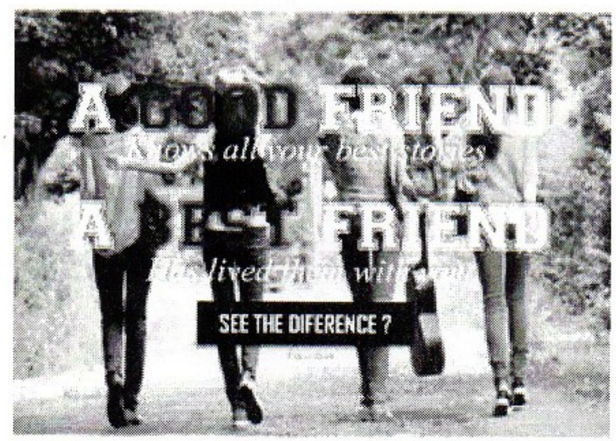


7."I wish my teachers knew this about me."

[Understanding me]. "I just wish my teachers understand my struggles and stress that I've been through when I'm upset and not focusing on their work. The fact that all teachers think their class is just about them and not us is ridiculous and is a pet peeve I hate. Some teachers can be layback and calm but others just don't get it and especially sub teachers who try to be rude to you for no reason just cause you forgot something. I'm really not catching on to them and their weird ideas but I try to stay calm and not let the anger out and just snap on them. In a nutshell I have no time for all the rude teachers and I'm just gonna go on with my day and stay smiling. "

8."My peers are important to be because."

[Fiends]. "My peers they are always gonna be honest and be here for me as long as we stay together. Going through high school you must have close friends who you can really trust and believe especially when something bad happens, just to know they are on your side. Entering high school I only had my brother and his friends now they graduate I have a ton on friends and cousins who go here now. I hope to graduate with my close friends and to be able to trust them without any problems. After high school is over I hope we all stay close and possibly can get a well paying job together. "



9. "Most math classes remind me of."

[Food]. " Every time I get into math class for awhile I just get hungry from working. Which is not to bad because I could be putting too much on the brain then my stomach goes empty. I love math and its my favorite subject although it can be challenging at many times but I strive to pass it. Everything is easy if you actually try it and nothing is impossible. I believe in a lot and that god has a plan for me and he will not let me struggle through anything. So if you believe in yourself than you can just fly through it with no problem."

•

10. "I would take more math if I had access to"

[Money]. " I would take more math courses if I got paid for it. Getting paid for something is another way to boost some ones train of thought and has more passion for it. I don't know if I would even want to that because I rather find a more simple job then just math everyday. I love math a lot and know how to do it pretty well without too much trouble. My mom helped me all the time growing up because I could not find my best subject at all, but later she realizes math is mine and history is hers. School is a challenge I think to see if you will actually do what your taught or to just give up and drop out. I came to far in life to give up now, so I am going to finish what I started to make myself and family proud of me."

•

Scrapbook of Digital Metaphors for Case Study #2

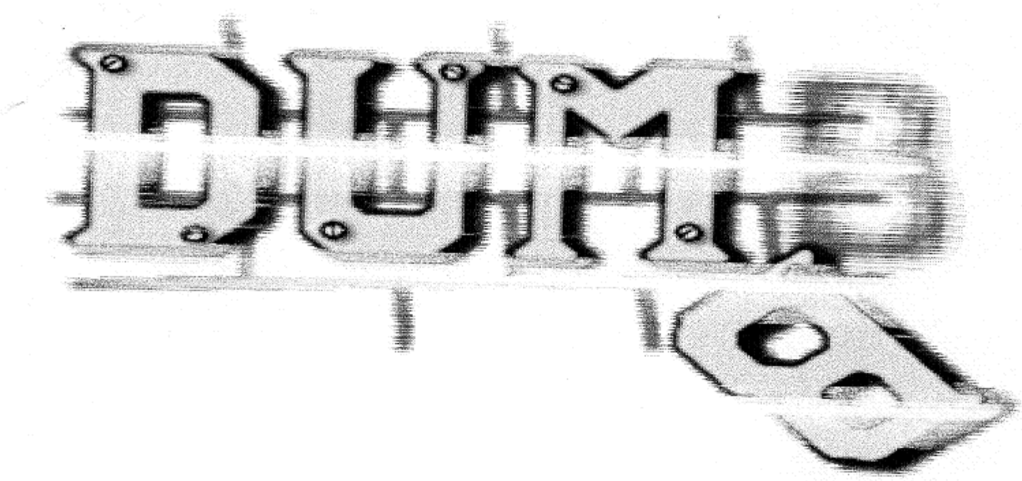
1.

"When I think of math, I am reminded of…."

"I chose <u>MTSU</u> because I am reminded of what a <u>hardworking</u> program it has. The reason I think of MTSU in the field of mathematics is because of the <u>other experiences you can have in other fields at this school.</u> For example I can take a math class with <u>hardworking</u> students and I can take a business class while learning to be <u>skilled</u> at math. In the picture it is during the day the photo was taken that's because students are <u>bright</u> and <u>ready to learn.</u> This is what comes in mind when I think of mathematics."

2.

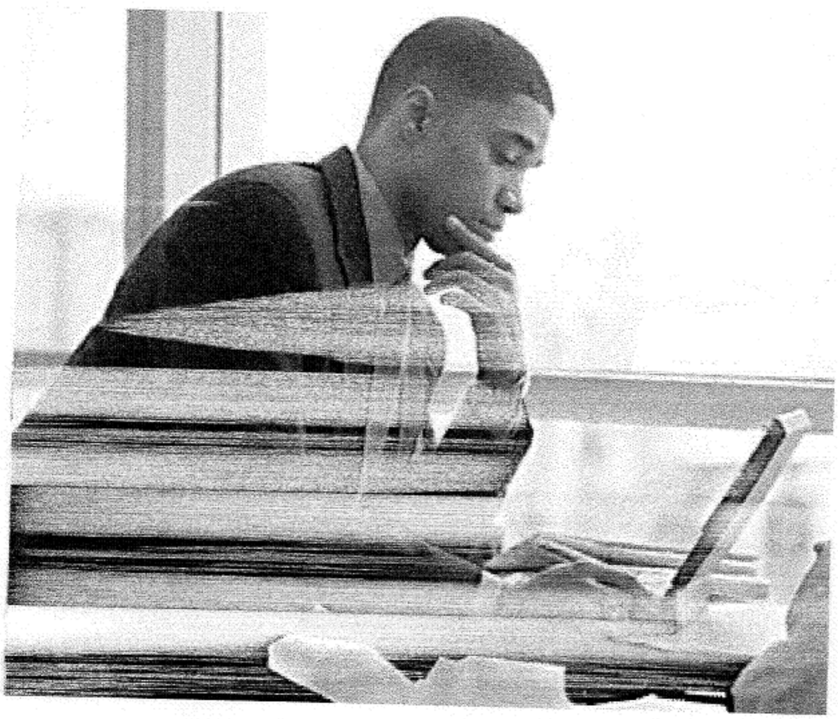
"My math teacher thinks I am …."



"It's multiple reasons why I chose this picture. I can play dumb but this year I am trying my best at geometry. The subject can be hard and challenging. The teacher I have he is a brilliant teacher but it seems to me that he thinks I don't put all my effort into my work. I can never seem to get things correct in his class. That's why I believe he thinks im dumb."

3

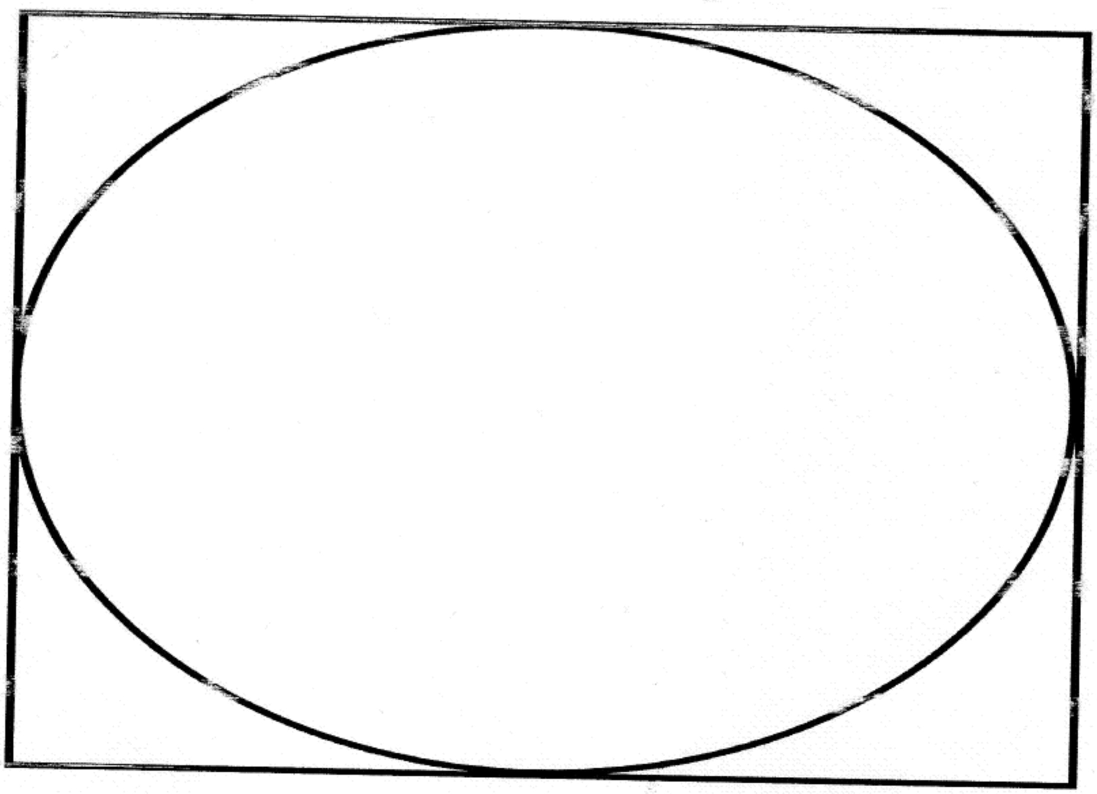
"When I think of my future, I see…."



"The picture above is a picture of a successful black businessman. When I think of my future this is what exactly what I see. In this picture it appears to me that he is a successful, loyal, smart, and skilled in the field of business. This is going to be me one day in my future. That's what I see in my future."

4

"A perfect math class reminds me of …"



"A perfect math class reminds me of a perfect circle. A perfect circle is smooth, round, and has no dents. A perfect classroom would have no problem learning and understanding. Classrooms in today's time are hard to learn because of the distraction inside of the classroom. This is what a perfect classroom reminds me of."

“My mom thinks of math as a bomb explosion. She says that today’s math is way harder than back then. She also said the school is trying to make us brilliant and excellent students. To us math today is hard but easy at times. To parents math is a headache.”

6

"When I think about how I fit in in math class, I am reminded of…."

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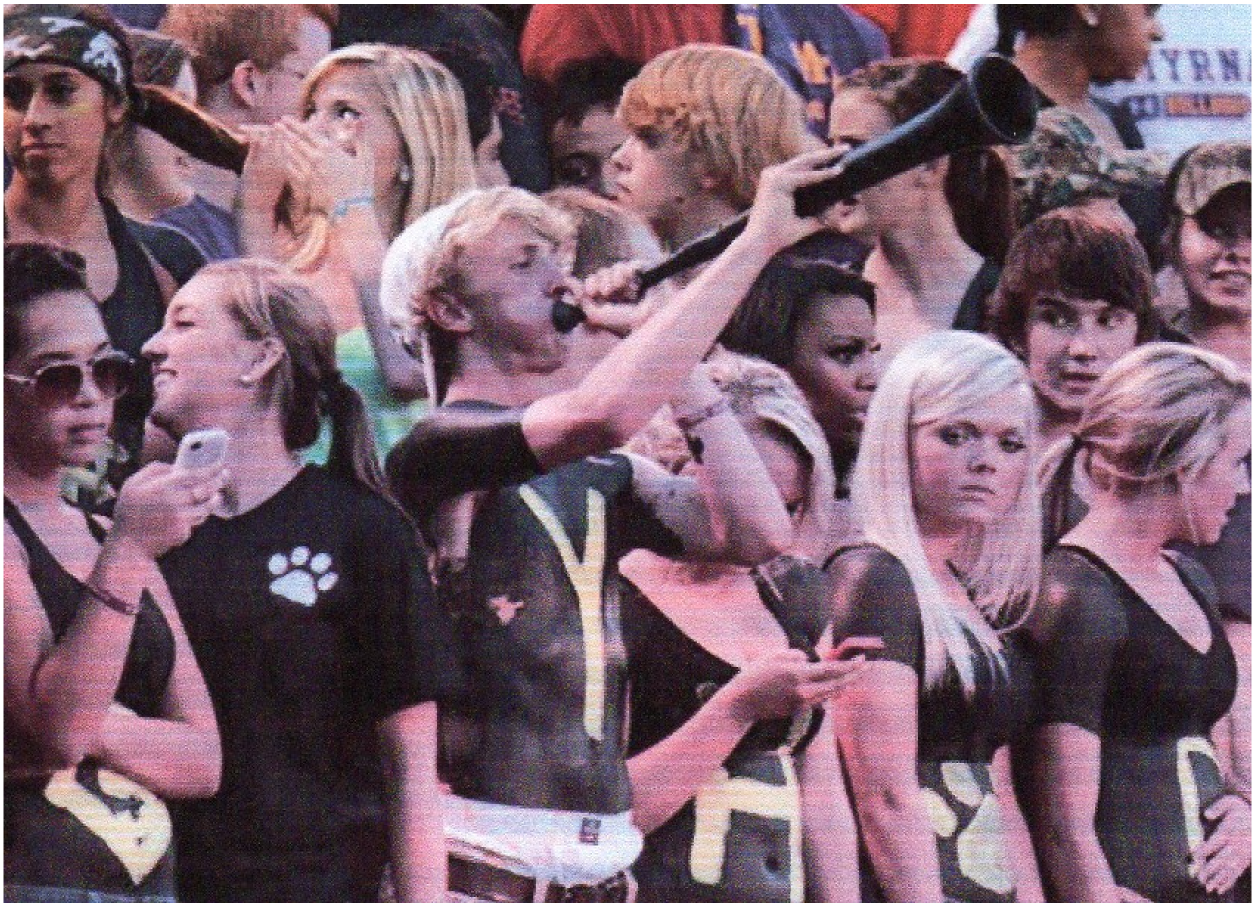
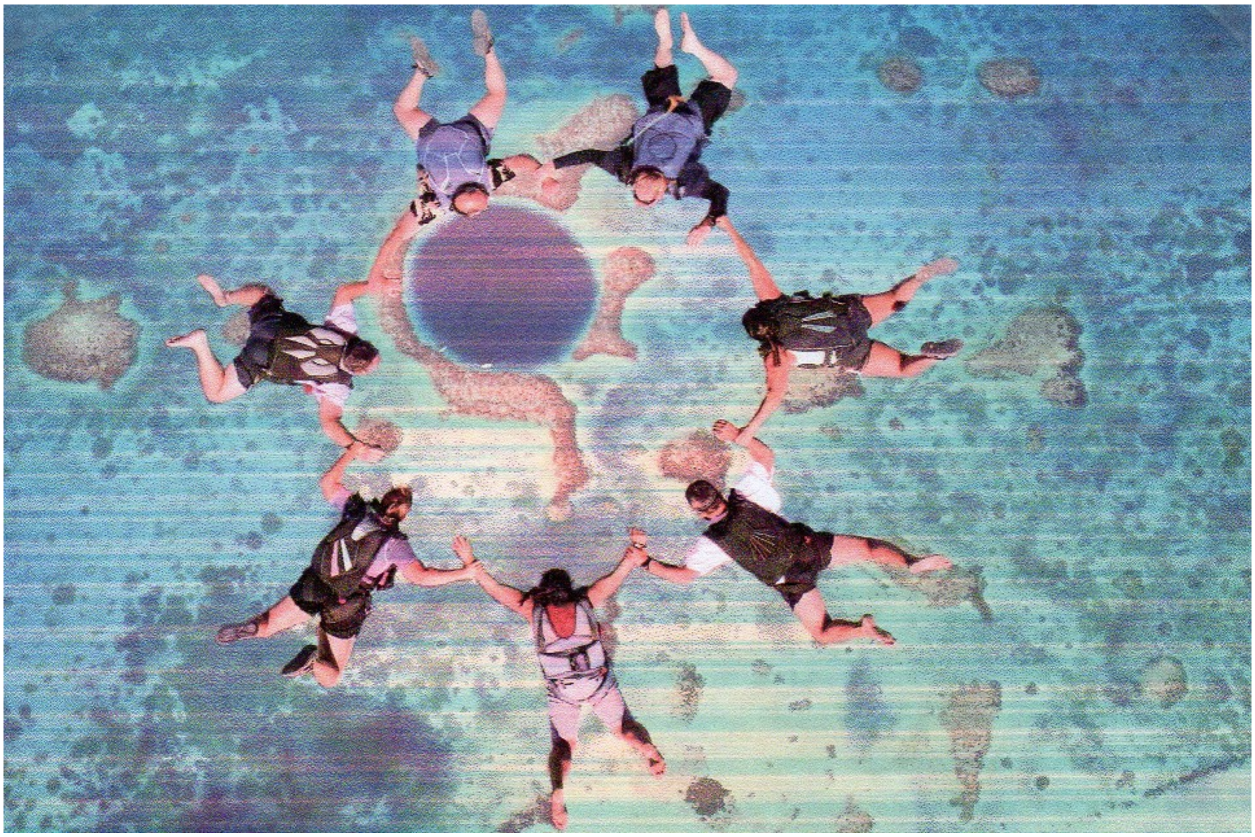
"I chose the wet sponge because of its features. The sponge is wet and soapy and it can get a little bit nasty at times. That's not all though the sponge can soak up all the soapy wetness and hold it in. That's how I feel when I think about my role in my math class. That's why I chose the sponge."

"It always comes to the point where a teacher tells me that im not working hard enough. They say that to get to me at times but they don't realize the effect it has on me. I try my best at everything I do but it is never good enough. I believe I am a <u>bold, hardworking, and loyal</u> student. I wish teachers knew.



"This is a picture of students at [my school]. These students are very important to me because of the care we show to one another. We are a bright, talented, well minded group of kids. Sometimes student are the ones who keep other students coming to school. We are always winners in my book."



"The reason why math class reminds me of skydiving is because of the levels of skydiving. IN class I have a throbbing pinch in my stomach that's the same feeling you have lifting off of the ground. I also have a silent moment when answering a question. Relating that to skydiving is like the decision on whether or not to dive. Finally when I answer the question right that's like reaching the ground from diving.

10.

"I would take more math if I had access to…."

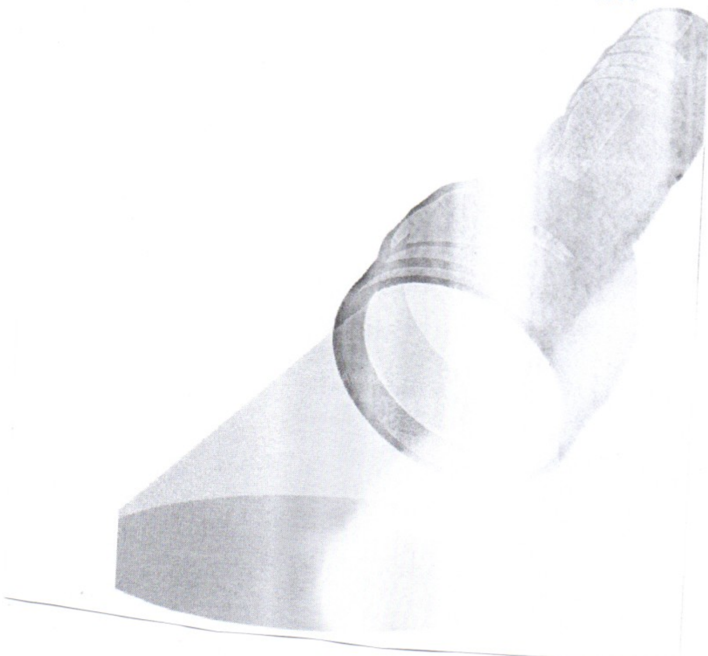
"This slide shows business documents. If I truly had business documents I would be mentally focused on more math. I always wanted to go to college in the field of business. It's based on hard work, commitment, and loyalty. This could put me more focused on math for life."

Scrapbook of Digital Metaphors for Case Study #3

"When I think of math, I am reminded of…."

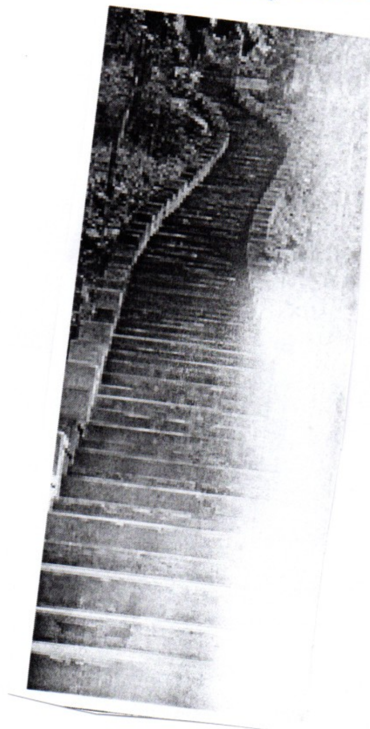
I chose this picture of an iphone because in math you don't understand the equations and formulas for the problem or word problem you are trying to do. Also in math you spend time trying to learn how to worth out those problems, So just like an iphone it takes time to navigate. With the iphone you have alot of apps and ~~gadg~~ gagets that your trying to figure out how to use and along with that just like math it takes time and effort to figure out those apps and how to use the phone.

"My math teacher thinks I am …."



I chose this picture of a flashlight because my teacher thinks that I am a bright student but my teachers also thinks that when I do not turn in work or forget work at home or certain places that like a flashlight my brightness cuts off for a little while, but I always find away to cut that flashlight right back on. Like my teacher and my family thinks I am a bright student like that flashlight, but like everybody else sometimes the light gets dim or cuts off but it always comes back on and shines even brighter than before.

"When I think of my future, I see…."

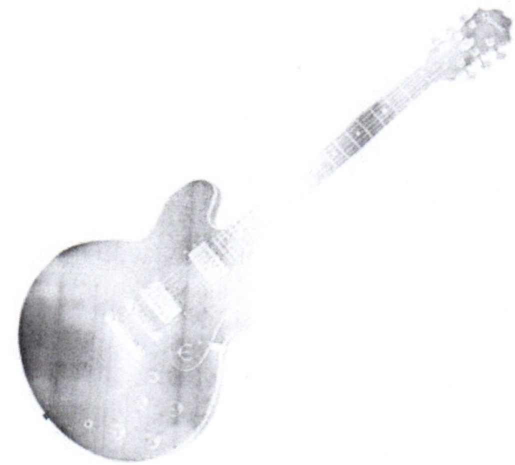


I chose this photo of stairs that lead up becaus in my past and present I feel that I have had alot of pain and heartaches and I feel that I have been through alot of issues and drama, but like the stairs in the picture I feel that my future can go nowhere else than up. I feel that my future is bright and I feel that I'm ready for anything that is thrown at me.

"A perfect math class reminds me of …"

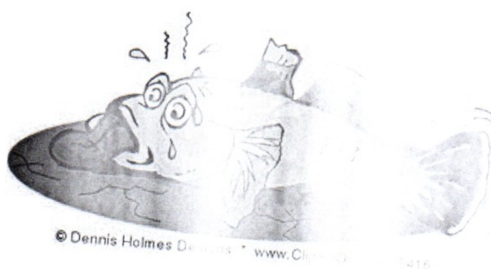
I chose this picture of a state championship ring because I feel that a perfect math class is a class that has all A's and everybody does their homework and takes notes an everybody works hard for their A's in that class. A state championship team does the same thing a perfect math class does and that is they work hard and they strive for excellence and they work hard to get their prize which is a state championship ring. So both of these are the same in work ethic and striving for excellence to reach their goal.

"My parents' understanding of math is like…."



I chose this picture of a guitar because my parents didn't understand math when they were young, but as time went on they slowly got used to math and they learned the concepts of how to do the ecuations and word problems. It is also the same way as a guitar because with a guitar you don't understand ho to fully play a guitar, but as time goes on you get the hang of it and you learn where to position your fingers and how to tune up your guita

"When I think about how I fit in in math class, I am reminded of...."



I chose this picture of a fish on dry land because when I am in my math class I feel like I don't belong for the simple fact of I don't understand the material most of the time but when I look around me and I see that most of the people around me get it and it makes me feel as if I'm the only one in the class that doesn't understand. with the fish on dry land he doesn't belong because fish don't belong on dry land they belong in water.

"I wish my math teachers knew this about me…."

I chose this picture of music notes because I wish my math teachers knew that with music I could get alot more done because music helps me with alot of things that I do like reading and writing etc.... I also wish my math teachers knew that music helps the brain think more clearer because yes you might have a catchy tune in your ear, but your mind is clear and relaxed and that way you have time to think clearly and you have the ability to get the work done on time.

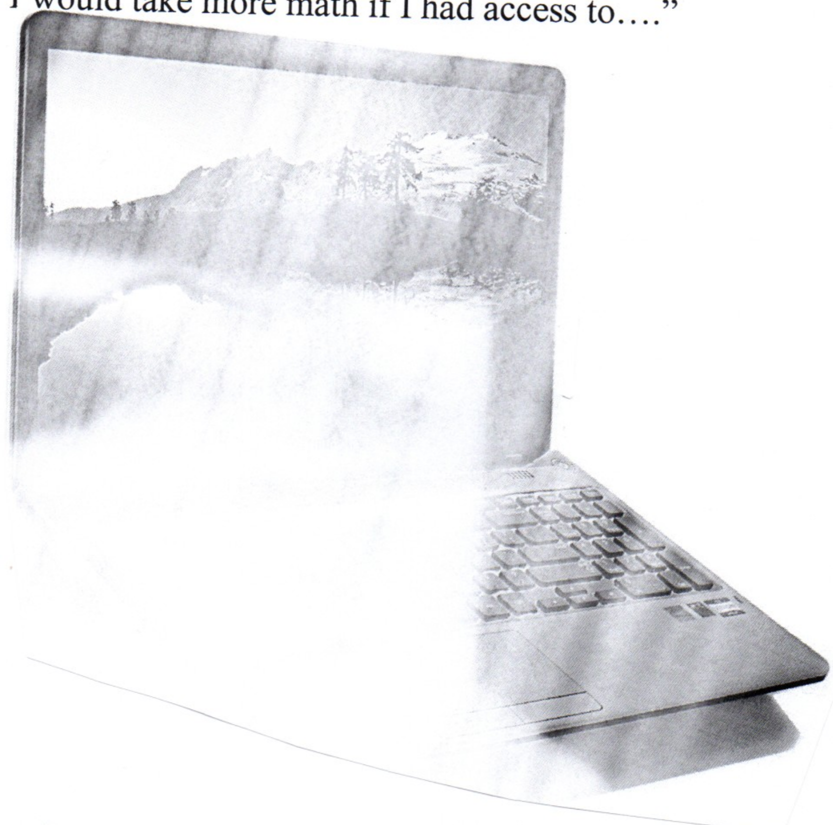
"My peers are important to me because…."

I chose this picture ~~[illegible]~~ of a teacher because my peers to me are like teachers. They help you and support you in any way they can and they also show tough love when it's needed. Just like teabers peers make mistakes to, but they will admit that they made a mistake and they will fix it and try to make up for that mistake that they made. Teachers may be mean some times, but what I have come to realize is that the teachers only have your best intrests at heart and all they want to do is help you get to the next level so that you can be successful.

"Most math classes are like this…."

I chose this picture of a football player because in most math classes you have equations and formulas that you must learn and sometimes memorize in order to be successful when test and quiz time come. In football you have plays and x's and O's that you have to know and memorize so that when it's time for you to suit up in pads and get ready for game time you won't be hesistant when a coach calls out a play to you because you will already know what that play is.

"I would take more math if I had access to…."



I chose this picture of a laptop because I would love to be able to worth more on the computer in math so that I could have more time to be able to finish the worth. With math worthsheets and math worth out of the booth I feel like I am being rushed to do it, but on the computer I have alot more time and freedom to do it and I feel that the worth would get done alot more quicther because I wouldn't feel so rushed for time,

Scrapbook of Digital Metaphors for Case Study #4

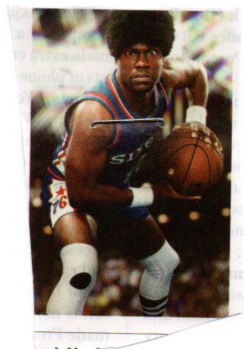
"When I think of math, I am reminded of…."

I am reminded of a bike. Because like riding a bike, math was hard at first. It took some practice, but I got better at it, as I did with math. Over the years I thought math was getting harder. Honestly if you think about it logically, like riding a bike its always been easy. As long as you follow the steps and remember. to never give up.

"My math teacher thinks I am …."

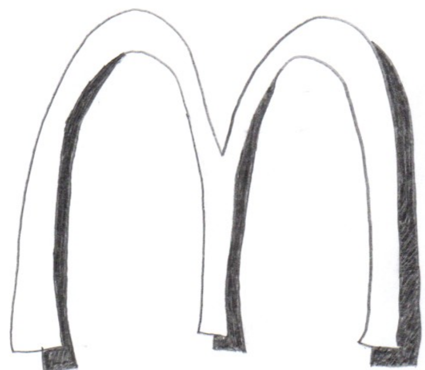
Strong minded. Smart. Cool
I choose this picture because it depicts Strenght and touchness. The man above didn't magically get to were he is. He worked at it. And it gives me motivation, that if I wanna be good at math I got to work at it. My teacher thinks I am awesome and smart.

"When I think of my future, I see…."



I see a future of sports, fame and accomplishment. I choose this photo because I Love basketball. But anyone can play basketball, but to go pro, to the NBA you have to make good grades. You have to pass MATH class. You have to understand 3 pointers, and free throws. Math has just about everything to do with basketball.

"A perfect math class reminds me of …"



"i'm lovin' it"

I choose Mcdonalds because it's delicious. And it would be amazing if we had Mcdonalds in my Geometry class. There Slogan "i'm lovin' it" fits perfect for the way, I feel about math. I Love math. I love mcdonalds.

"My parents' understanding of math is like…."

like this piggy bank. Pointless, you fill it up and then break it. You might as well deposit your money into a bigger bank. Then think there smart but in reality there not. Piggy banks are useless. My parents understanding of math is like filling a piggy bank up and then breaking it.

"When I think about how I fit in in math class, I am reminded of…."

I fit in. I get math most of the time. My classmates help me get along and pass. I'm almost never alone. My teacher Mr. Gonye or Coach Gonye is very helpful and considerate. He encourages me to take ap math or advanced. I'm remided of love and appreciation

"I wish my math teachers knew this about me…."

My math teacher thinks i'm really smart. I'm not as smart as he thinks I am. I choose this picture of rock and bolders cause that's how hard math can be and I feel stupid sometimes. Math is still and has been my favorite subject. I enjoy numbers and money but this is how I feel after a hard test.

"My peers are important to me because…."

I choose this picture because me and my "peers" or friends like to "monkey" around. We like to have fun. We, me and my friends get along and talk about activites we like to do. My peers and I love each other. We are like a big family. Class of 2014.

"Most math classes are like this…."

I choose this picture because it's boring. Most math classes are all work no fun. In my class we have fun, but we work hard. We joke around, but get our work done. At times we work the whole class period, other times we work and discuss the problem or do other fun activity.

"I would take more math if I had access to…."

If I had acess to extra credit.
I chose this picture of an Iphone and the Search engine google. I chose it because a cell phone is commonly used and I could easily access the internet off of my phone. I'd take more math if I could focuss. Honestly I don't focuss and at times I let my grade slip. Takin a moe advanced math class would be a challenge.

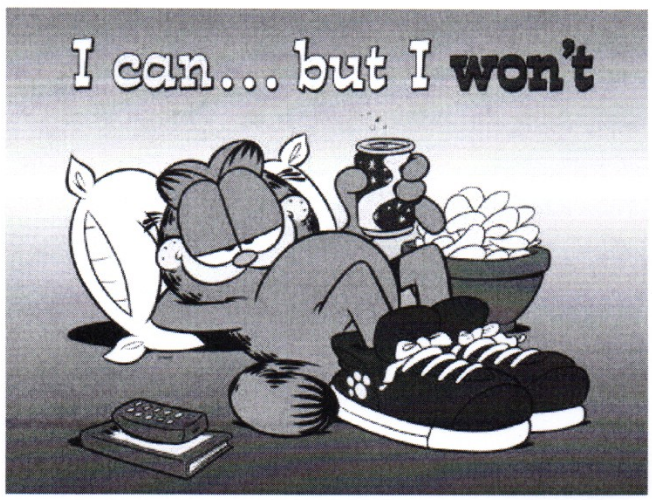
Scrapbook of Digital Metaphors for Case Study #5

"When I think of mathematics, I am reminded of …"

I am reminded of the Chicago Bulls triangle offense when I think of mathematics. Basketball uses a lot of geometry. Coaches draw plays and then the players make the play happen. There are many different angles that players create when playing basketball. Also, when the game is close and on the line, players sometimes might foul intentionally and send a poor free throw shooter to the line. Percentages matter in mathematics and in basketball.

"My math teacher thinks I am …"

My geometry/math teacher knows I am smart, but thinks I am lazy. I have averaged an A in his class for the whole year and he still thinks I am lazy. He knows that I am a good student he hopefully has high expectations for me.



"When I think of my future, I see …"

I see happiness when I think of my future. A smile on my face when I wake up and live everyday is what I see. I see myself doing the things that I want to do and being around the people I want to be around. I also see myself doing what I love and helping those who have helped me. I want to be able to make a difference and have purpose in my life instead of just settling for the average.

"A perfect math class reminds me of…"

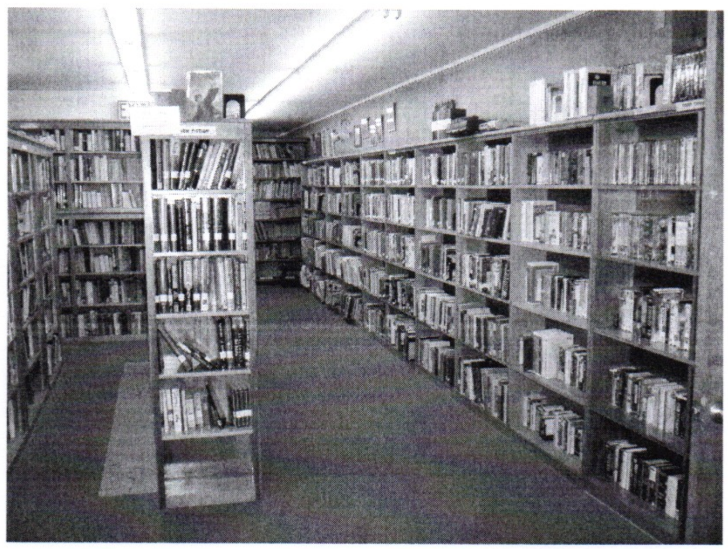
The YMCA reminds me of a perfect math class. The YMCA is a place where everyone is accepted. Everyone there is friendly and will help a person in need. All races and ethnic backgrounds are welcome at the YMCA. People come and enjoy themselves at the YMCA. The people work hard there, but are rewarded with kindness and self-accomplishment.

"My parents understanding of math is like …"

Math is like <u>space</u> to my parents. It is <u>very distant</u> and <u>most of it is unknown</u>. It could take a <u>long time</u> before most of it is <u>discovered</u>. Learning math is going to be a <u>challenge</u> to my parents considering that they did not finish college. My parents <u>struggle</u> with math and a lot of it is <u>confusing</u> to them. Even though math is a struggle for my parents, if they <u>work hard</u> they can <u>succeed</u> in it.

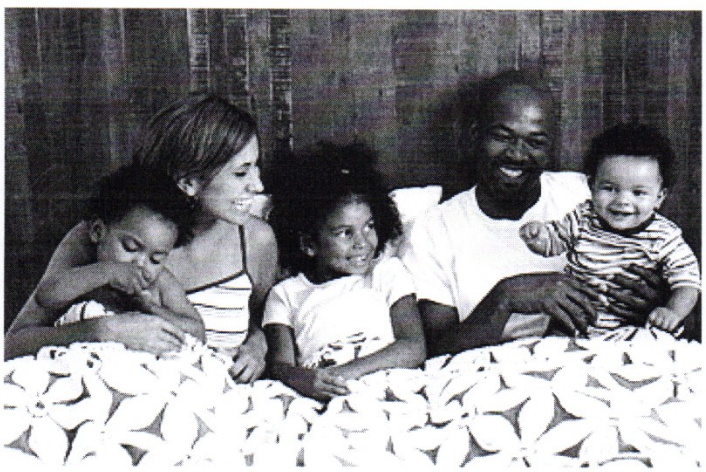
"When I think of how I fit in math class I am reminded of …"

A book on a shelf is me in math class. There are many books on a shelf, and many are different. If all the books were the same, then there would be no variety for the reader. The reader would not know of all the other wonderful books he or she is missing. At the end of the day, all of the books fit into place nicely.



"I wish my teachers knew this about me …"

I am biracial. I see both sides of black and white in society. I associate myself with all different types of people. I understand things a little bit better as far as life in general and have a view on what both races feel. I think that being biracial is great and it helps me more to understand life and people.

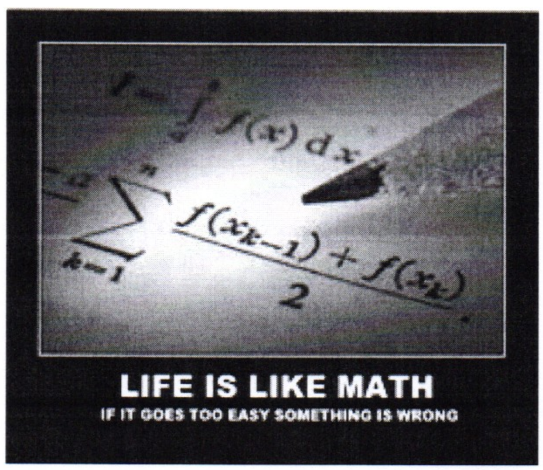


"My peers are important to me because ..."

My peers are like family. They pick me up when I am down. They make me stronger. They stand behind me no matter what and raise me to another level as a person. My peers understand me and some of the situations I'm in.

"Most math classes remind me of …"

Life is what math class reminds me of. In life and in math, you are not always going to have good days. Some days you will be confused and maybe not all of your questions can be answered. But, some days you will feel accomplished and confident in your abilities. You are not always going to have a smile on you face and might ask yourself what is the point of all this. But, your life and math is what you make of it and if you work hard you will prosper.

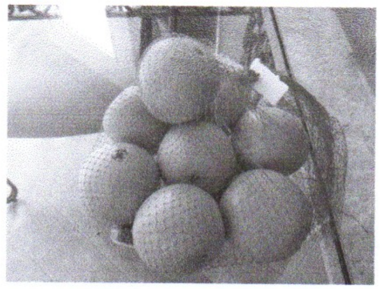


"I would take more math if I had access to …."

If I had a personal math teacher then I would take more math. He or she could help me as an individual rather than just lecture a whole class. My teacher could have more patience and time with me. He or she could help me in areas that I am weak in and allow me to go at my own pace. I would benefit because my teacher would have a better chance to know me and make learning that much easier.

Scrapbook of Digital Metaphors for Case Study #6

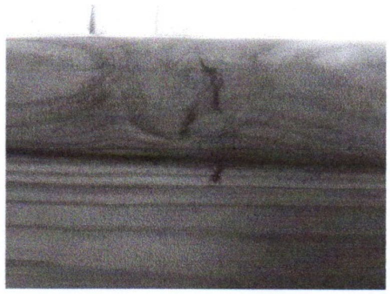
"When I think of mathematics, I am reminded of…."



{Oranges}

"Math is a lot like oranges in a way. On the outside, the skin is tough, bitter, and uneatable. On the inside, however, it taste sweet. Eating oranges is messy; peels and juice gets everywhere. Everyone has there own way of eating oranges, weather it is sucking out all the juice or eating the flesh and leaving nothing but the peel behind. In math class, you may not understand everything right away, but if you work at it you will soon get it."

"My math teacher thinks I am…"



{Ant}

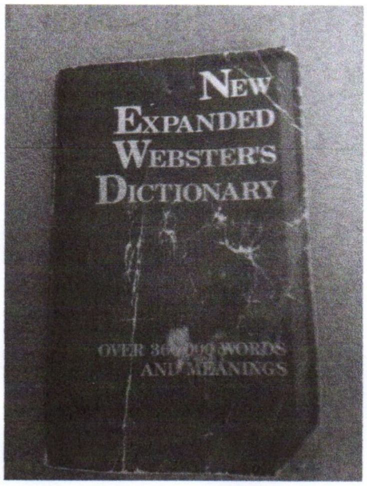
"Ants are interesting creatures. They communicate, do their assigned job, and work well with other ants. They are always out looking for something, whether it is building materials, food, etc. In math class, I am not hesitant in asking questions if I don't understand something. I do all my class work and homework and do my best to turn it in on time. In group work or projects, I work well with other students and make a fair contribution to the work. I never lose my focus during class, I am always in tune to what is going on."

"When I think of my future, I see…"

{Construction Site}

There is a lot of time and planning that goes into construction. In the picture above, apartments are being built. The land you see used to have very dense tree life and vegetation. Before they could start building, they had to clear the area. After they did that, they started to flatten the land by blasting and clearing the rubble with bulldozers. Now, it seems to me that they are beginning to install the sewer and pluming. Pretty soon they will start laying down the foundation and start building. I think of my future in the same way. First, I have to clear out any obstacles and stay away from anything that will keep me from my goals. Moreover, I have to make sure that I establish my goals and know what it is that I want to do. Next, I will do the fundamental things that I have to do first before I start working on my ultimate long term goal. And after I do all of that, I will build upon it. I want to be an environmental engineer. Next year will be my senior year. I will be taking Pre Cal and AP Environmental Science. I will also be touring colleges over the summer and looking for scholarships.

"A perfect math class reminds me of…"



{Dictionary}

A perfect math class is like a dictionary. Whenever I have a question about a word, whether it is what it means or how to spell it, I look in the dictionary. In a dictionary there are thousands of words that are neatly organized in alphabetical order. Each word can be easily found and understood with a clear cut definition to help people understand what it means. A perfect math class operates pretty much in the same way. The teacher is the dictionary. She is organized, prepared, and knows how to give information in a clear and understandable way. If a student is unsure on how to do something, he or she can go to the teacher and learn how to do it."

"My parents understanding of math is like…"

{Money}

My parents understanding of math is that math is a part of everyday life. Money is probably the most prominent figure my parents think about when they think of math. My parents use math and money when buying food, paying bills, paying taxes, and budgeting. Math is very important with making all these decisions involving money. Math may seem unimportant while you are in school, but as you get older, you realize that math is a big part of life.

"When I think about how I fit in in math class, I am reminded of…"

{Grass}

When I think about how I fit in in math class, I am reminded of grass. Every blade of grass on the lawn is similar, yet each one is unique. In math class it is pretty much the same way. We all learn different, we act different, we may even look different, but at the end of the day we are all part of the same class and are willing to help each other learn together. My peers and I seem to fit in in math class very well.

"I wish my teachers knew this about me…"

{Truck}

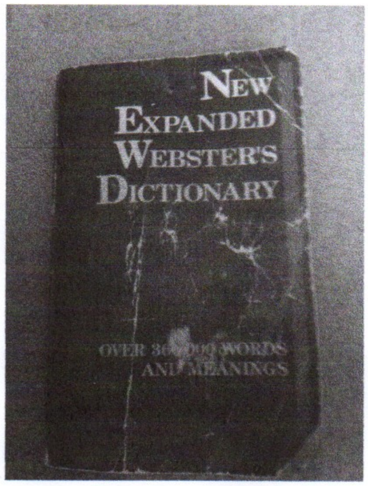
I believe I am much like this <u>truck</u>. Trucks can go <u>anywhere there is a road</u>. As long as the driver keeps up <u>maintenance</u>: oil checks, car washes, vacuuming, engine checks, and gas- <u>you can go anywhere</u>. I am the same way- in order for me to be <u>successful</u>, I must always make sure that I <u>understand what is happening at all times</u> and that I <u>stay on task</u> and <u>up to date</u> with what is going on in class. As long as I do that, <u>I can do anything</u>.

"My peers are important to me because…"

{Soccer game}

Team work is very important in soccer. You cannot win the game by yourself, but you have your teammates there to help you. The game depicted above was won by my team. In real life, my peers are important to me because the right ones can help me towards my future. Making contacts and knowing people helps a lot later on in life. Even right now in the present, just like in a soccer game, your peers are there if you need help.

"A perfect math class reminds me of…"



{Dictionary}

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"I would take more math if I had access to…"

{Watch /Time}

I would take more math if I had access to more time. For me, math is not all that difficult- it just takes time. If I did something like doubling up on math next year, that might add too much work or stress. I don't want to put myself in a situation that might kill my grade. I do pretty well in math and will be in Pre Calculus next year.

APPENDIX E

CLASSROOM OBSERVATION NOTES

Observation Notes for Case Study #1

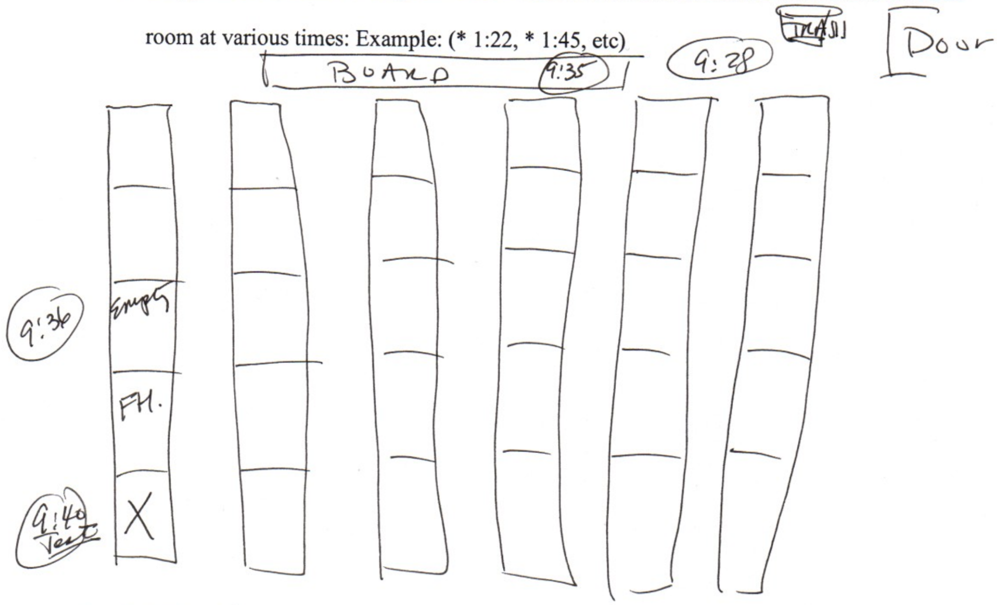
— Black 5/1 30 m. 1

Observation Protocol (Observation #1 #2; Duration of 30 minutes each)

Student's Name: ____________ Date: 5/1 Time: 9:25

Subject: Geometry Teacher's Name: Trea.

1. **Diagram of Classroom Layout**. Use an asterisk with time to denote student's location in room at various times: Example: (* 1:22, * 1:45, etc)



9:28 Trash can

9:35 Paper Towel to blow nose.

9:37 accidently knocked calc to floor – resumed test.

Most Q&A - general/choral

2. Classroom Population (Number of Students by Race and Gender)

	White	African American	Hispanic	Other	Total
Males	4	3	5	0	12
Female	5	1	1	1	8
Total	9	4	7	0	20

3. Describe the grouping structure throughout the lesson (small group, working with a partner, no grouping), noting transition times, activities, etc. No grouping. Review for upcoming test. Ss turn-in review for few.

4. Cite any evidence of differentiated instruction/evidence of VAK teaching methods (visual, auditory, tactile, kinesthetic). Visual - geom diagram on board during instr. 10/20 Test question have accompanying diagram/visuals.

5. Tally the number of times the teacher calls on each category of student:

	White	African American	Hispanic	Other	Total
Males		I	IIII		5
Female			0	1	1
Total		1	5		

6. Describe the student's level of participation (passive, eager, etc.) with notes describing his participation (asking questions, volunteering, interacting with peers, etc).

appears to be reviewing notes before test, ~ paying attn to T's example. No eye contact. "Cross multiply." Textbook open to review page. He is finishing review. T wrote key formula on board. S is looking at them as he works problem.

7. How does the student contribute to group activities/discussions? Casual conversation w/ Female Hispanic student in front of him.

8. Is there evidence of nonconformity or disruptive behaviors? Be specific.

No, only one of two not seated when bell rang. Other peer also AA m. Out of seat twice — more than any other student. No evidence of swagger, chip-on-shoulder attitude (found in some research).

9. Does the student seem to have his expected materials and assignments? Explain.

Textbook, paper, pencil. Completed Test Remain HW while teacher was taking questions
Calculator (during test - ok). Calculator (personal, ~ from school's inventory)

10. Do the student's peers interact with him? If so, describe the interactions.

Casual, brief conversation w/ girl in front of him. Not any different from rest of class.

11. Were any unexpected events, positive or negative, observed during the lesson? No.

12. Other Information

a. How many students? Provide a description by race/ethnicity and gender. See chart!

b. Notes:

Test Day - opens up ques. BF asks ques.
Jeans / Gray T-Shirt (casual, in dress code).

Observation Protocol Wordlist Matrix

Case 1 Observation 1 or 2 Date: 5/1/13

Circle behaviors/dispositions observed, and then write comments to explain the word choice. Others may be added as needed.

Words to Describe *Positive* Peer-to-Peer Interactions:

Caring	Enthusiastic	Funny	Thoughtful
Considerate	Excitable	Pleasant ✓		Other:

Smiling Eye Cont. Shy?

Words to Describe *Negative* Peer-to-Peer Interactions:

Aggressive	Domineering	Manic	Thoughless
Argumentative	Inconsiderate	Manipulative	Other:
Bossy	Irritating	Rude	None

Words to Describe *Personal* Attributes:

Active	Conceited	Introverted	Perfectionist	Volatile
Ambitious	Creative	Inventive	Pragmatic	
Assertive	Curious	Nervous	Reserved ✓	
Careless	Extroverted	Nervous	Serious ✓	
Cautious	Impulsive	Passive ✓	Shy ✓	

Observation Protocol (Observation #1 #2: Duration of 30 minutes each)

Student's Name: Case #1 Date: 5/10 Time: 9:30

Subject: Geometry. Teacher's Name: Tree.

1. **Diagram of Classroom Layout**. Use an asterisk with time to denote student's location in room at various times: Example: (* 1:22, * 1:45, etc)

Same as before

St. in back of room talking w/peer. Friend showing him his geometric design. 3 rows from seat. He had been out day before. Getting some direction on how to do graph exercise ??"

St turns around – "How many columns are there supposed to be?" "I don't remember." St: "You can't write on it." "Yeah, I'm gonna trace it."

Using grid, rulers, & coloring pencils. Graphing geometric designs + their reflections.

To peer (in front) "How do you do this one?" "These #s have to add up to 10... [counts aloud]." "Aww!

To him, "Which one should I do? I did this one." "I did, too. I like that." Referring to a particular diagram.

To him "Do you have to do this one?" "You have to do the first & last. You didn't do that? [laughs].

To her [she is showing]. "It looks good." →

out loud to peer in front "Hei is taking forever. When is it due?" Her: "Today." "Today." To T: "When is this due?" Tea: "Monday. Where you been, I haven't seen you in a few days?" Ans: inaudible.

Purple hoodie, khaki shorts, black socks, tennis shoes.

To peer, as he returns from reading bulletin board. "I am still hurting." Football? Mentioned workouts last week causing soreness. Returned to reading continued working while dialoguing w/ peer in front of him.

To T: "You can't even see my lines." T: You can use a coloring pencil." T goes to get him one. T returns w/ Peer turns to share her picture/graph. T returns w/ coloring pencil. "Thanks".

Hisp girl in front of him.

2. Classroom Population (Number of Students by Race and Gender)

	White	African American	Hispanic	Other	Total
Males	4	4	3	0	11
Female	6	1	1	1	9
Total	10	5	4	1	20

3. Describe the grouping structure throughout the lesson (small group, working with a partner, no grouping), noting transition times, activities, etc.

Individual but ~ structured per se,

4. Cite any evidence of differentiated instruction/evidence of VAK teaching methods (visual, auditory, tactile, kinesthetic).

Colorful. diagram

Using ruler marker. drawing

St. allowed to comment/ share ideas, etc.

Teacher walks around room assisting all as needed.

5. Tally the number of times the teacher calls on each category of student:

	White	African American	Hispanic	Other	Total
Males					
Female					
Total					

6. Describe the student's level of participation (passive, eager, etc.) with notes describing his participation (asking questions, volunteering, interacting with peers, etc).

w/ peer.

Socializes w/ peer
talks w/ girl in front of him.

7. How does the student contribute to group activities/discussions?

Asks question w/ peers to seek understanding.

8. Is there evidence of nonconformity or disruptive behaviors? Be specific.

None.

9. Does the student seem to have his expected materials and assignments? Explain.

Yes: ruler, graph, pencils.

10. Do the student's peers interact with him? If so, describe the interactions.

Yes, answering question/providing clarification.

11. Were any unexpected events, positive or negative, observed during the lesson?

None. Yes, clerk selling cookies on a cart. Looked up & kept working.

12. Other Information

a. How many students? Provide a description by race/ethnicity and gender.

b. Notes:

Observation Protocol Wordlist Matrix

Case 1 Observation 1 or 2 Date: 5/10/13

Circle behaviors/dispositions observed, and then write comments to explain the word choice. Others may be added as needed.

Words to Describe *Positive* Peer-to-Peer Interactions:

Caring	Enthusiastic	Funny	Thoughtful
Considerate	Excitable	Pleasant	Other: Task-oriented

Words to Describe *Negative* Peer-to-Peer Interactions:

Aggressive	Domineering	Manic	Thoughless
Argumentative	Inconsiderate	Manipulative	Other:
Bossy	Irritating	Rude	

Words to Describe *Personal* Attributes:

Active	Conceited	Introverted	Perfectionist	Volatile
Ambitious	Creative	Inventive	Pragmatic	
Assertive	Curious Seeks clar.	Nervous	Reserved	
Careless	~~Extroverted~~	Nervous	Serious	
Cautious	Impulsive	Passive	Shy Soft spoken.	

Observation Notes for Case Study #2

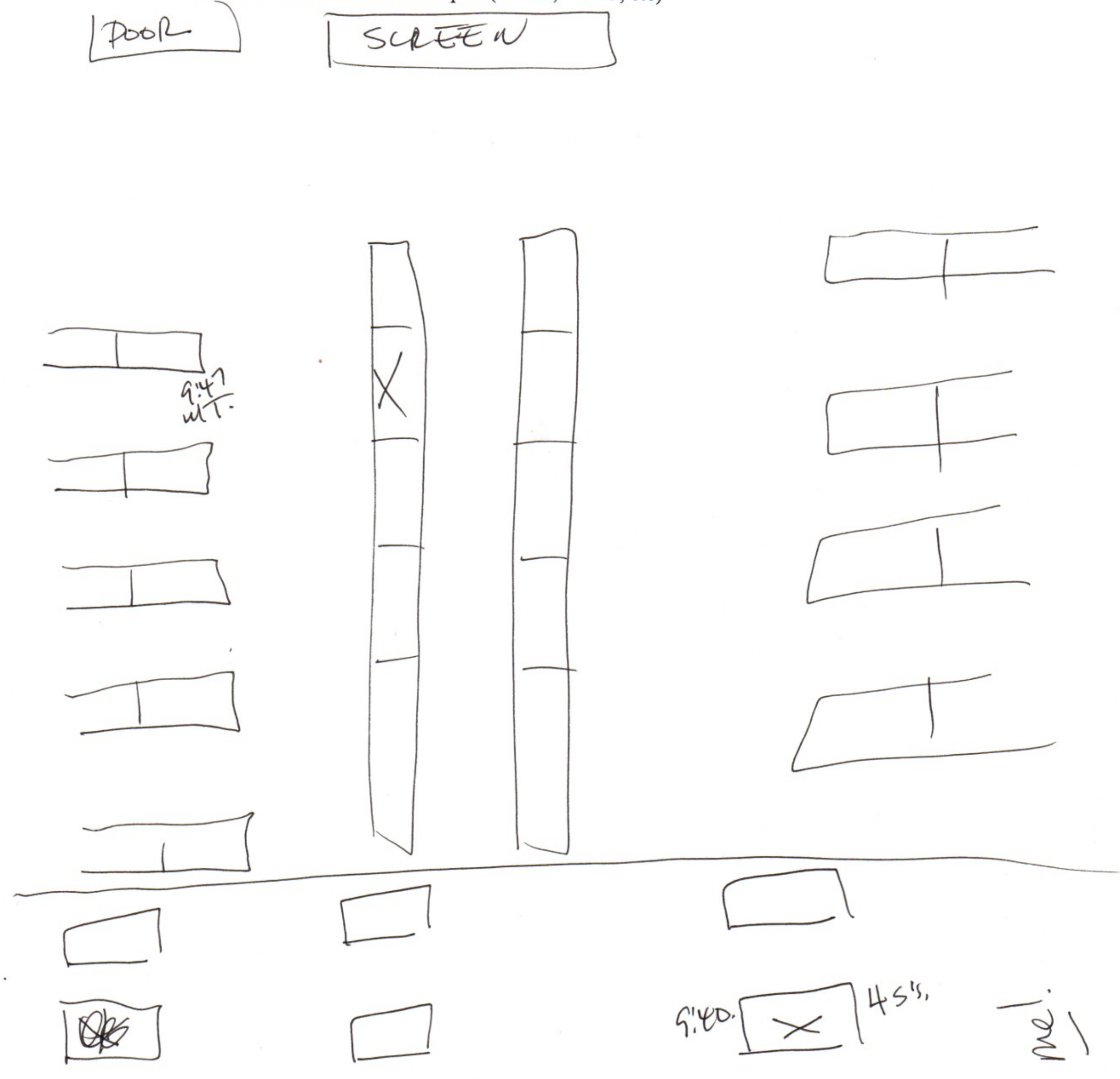
40 ^ 2

Observation Protocol (Observation #1 #2; Duration of 30 minutes each)

Student's Name: ______________________ Date: 5/1 Time: 10:25

Subject: Geometry Teacher's Name: James.

1. **Diagram of Classroom Layout**. Use an asterisk with time to denote student's location in room at various times: Example: (* 1:22, * 1:45, etc)



2. Classroom Population (Number of Students by Race and Gender)

	White	African American	Hispanic	Other	Total
Males					
Female					
Total					

3-5
6 group.

3. Describe the grouping structure throughout the lesson (small group, working with a partner, no grouping), noting transition times, activities, etc.

9:40 Tras.

1 ↑. When trying to find height, do we use [the
formula?" T explains. Does understanding. Explain triangle base length
to peer. "No, they are ~ ≅." Peer looks to him — "Is base
4?" "Yeah." To peer: "I think what you said first is right because
...." 1 ↑, Goes to T to ask ques. Returns w/T: S: "That ain't right (to
peer). To T: "Is it the Pythag Thm?" To peer (pointing at paper): "I
think this one is just like #2." References textbook to find ans.
Pts to board ^ To peer: "Did you use that [formula]?"

4. Cite any evidence of differentiated instruction/evidence of VAK teaching methods (visual, auditory, tactile, kinesthetic).

Interactive / white board.
Visuals / graphs / geo figures.
Tactile = No. Kin = Group wk.
Aud – Group dis.

5. Tally the number of times the teacher calls on each category of student:

	White	African American	Hispanic	Other	Total
Males					
Female					
Total					

6. Describe the student's level of participation (passive, eager, etc.) with notes describing his participation (asking questions, volunteering, interacting with peers, etc).

taking notes as teacher walked & explained problem. - Asks clarification on problem. Asks which formula would work, incorrectly stated the height formula — T re-directed to use Pyth!. Then [illegible] responds to Ts request to put things away & get w/ group.

7. How does the student contribute to group activities/discussions?

8. Is there evidence of nonconformity or disruptive behaviors? Be specific.

9. Does the student seem to have his expected materials and assignments? Explain.
Borrowed notebook paper to take notes.
textbook & calculator.

10. Do the student's peers interact with him? If so, describe the interactions.

11. Were any unexpected events, positive or negative, observed during the lesson?

12. Other Information

a. How many students? Provide a description by race/ethnicity and gender.

b. Notes: red & white striped Polo-style shirt
white ~~dress~~ shorts
black tennis shoes / red & black socks.
Several bands on wrists – one SHS ...

4um

Observation Protocol Wordlist Matrix

Case 2 Observation 1 or 2 Date: 5/1/13

Circle behaviors/dispositions observed, and then write comments to explain the word choice. Others may be added as needed.

Words to Describe *Positive* Peer-to-Peer Interactions:

Caring	Enthusiastic	Funny	Thoughtful
Considerate	Excitable	Pleasant	Other:

Words to Describe *Negative* Peer-to-Peer Interactions:

Aggressive	Domineering	Manic	Thoughless
Argumentative	Inconsiderate	Manipulative	Other:
Bossy	Irritating	Rude	

Words to Describe *Personal* Attributes:

Active	Conceited	Introverted	Perfectionist	Volatile
Ambitious	Creative	Inventive	Pragmatic	
Assertive	Curious	Nervous	Reserved	
Careless	Extroverted	Nervous	Serious	
Cautious	Impulsive	Passive	Shy	

* Turned in dig. metaphor next day. Concerned re quality of pics = Dedmon e-mailed me.

Observation Protocol (Observation #1 #2; Duration of 30 minutes each)

Student's Name: # 2 Date: 5/10 Time: 10:25

Subject: Geo. Teacher's Name: James.

1. **Diagram of Classroom Layout**. Use an asterisk with time to denote student's location in room at various times: Example: (* 1:22, * 1:45, etc)

Red shirt, Jean, Tenni shoes.

Same as before —
small group pod.

2. Classroom Population (Number of Students by Race and Gender)

	White	African American	Hispanic	Other	Total
Males	4	2	3	1	10
Female	9	2	2	0	13
Total	13	4	5	0	23

3. Describe the grouping structure throughout the lesson (small group, working with a partner, ~~no grouping~~), noting transition times, activities, etc.

4. Cite any evidence of differentiated instruction/evidence of VAK teaching methods (visual, auditory, tactile, kinesthetic). white board (interactive).

5. Tally the number of times the teacher calls on each category of student:

	White	African American	Hispanic	Other	Total
Males					
Female					
Total					

6. Describe the student's level of participation (passive, eager, etc.) with notes describing his participation (asking questions, volunteering, interacting with peers, etc).

Turned to peer, smiled, inaudible. turned around!

7. How does the student contribute to group activities/discussions?

Taking notes, using calculator, checking hw as Teacher discusses. Passes up HW. Working w/ two Hisp males.

8. Is there evidence of nonconformity or disruptive behaviors? Be specific. No.

Leader – They following – "$1^2 = 1$, $7^2 = 49$, so it is 50." They nod & write as he explains. 'Mr. [illegible]!' Motion for T. "I don't know if we do it like this or use the target. I'm [illegible]." T answers. "No, ~ 90° angle. Which one? Think about it... [inaudible]. "Right, use the inverse. Good." Other looks at his paper while he writes.

9. Does the student seem to have his expected materials and assignments? Explain.

yes —

10. Do the student's peers interact with him? If so, describe the interactions.

yes —

11. Were any unexpected events, positive or negative, observed during the lesson?

No.

12. Other Information

    a. How many students? Provide a description by race/ethnicity and gender.

    b. Notes:

Observation Protocol Wordlist Matrix

Case 2 Observation 1 or 2 Date: 5/10

Circle behaviors/dispositions observed, and then write comments to explain the word choice. Others may be added as needed.

Words to Describe *Positive* Peer-to-Peer Interactions:

Caring	Enthusiastic	Funny	Thoughtful
Considerate	Excitable	Pleasant	Other:

Words to Describe *Negative* Peer-to-Peer Interactions:

Aggressive	Domineering	Manic	Thoughless
Argumentative	Inconsiderate	Manipulative	Other:
Bossy	Irritating	Rude	

Words to Describe *Personal* Attributes:

Active	Conceited	Introverted	Perfectionist	Volatile
Ambitious	Creative	Inventive	Pragmatic	
Assertive	Curious	Nervous	Reserved	
Careless	Extroverted	Nervous	Serious	
Cautious	Impulsive	Passive	Shy	

Observation Notes for Case Study #3

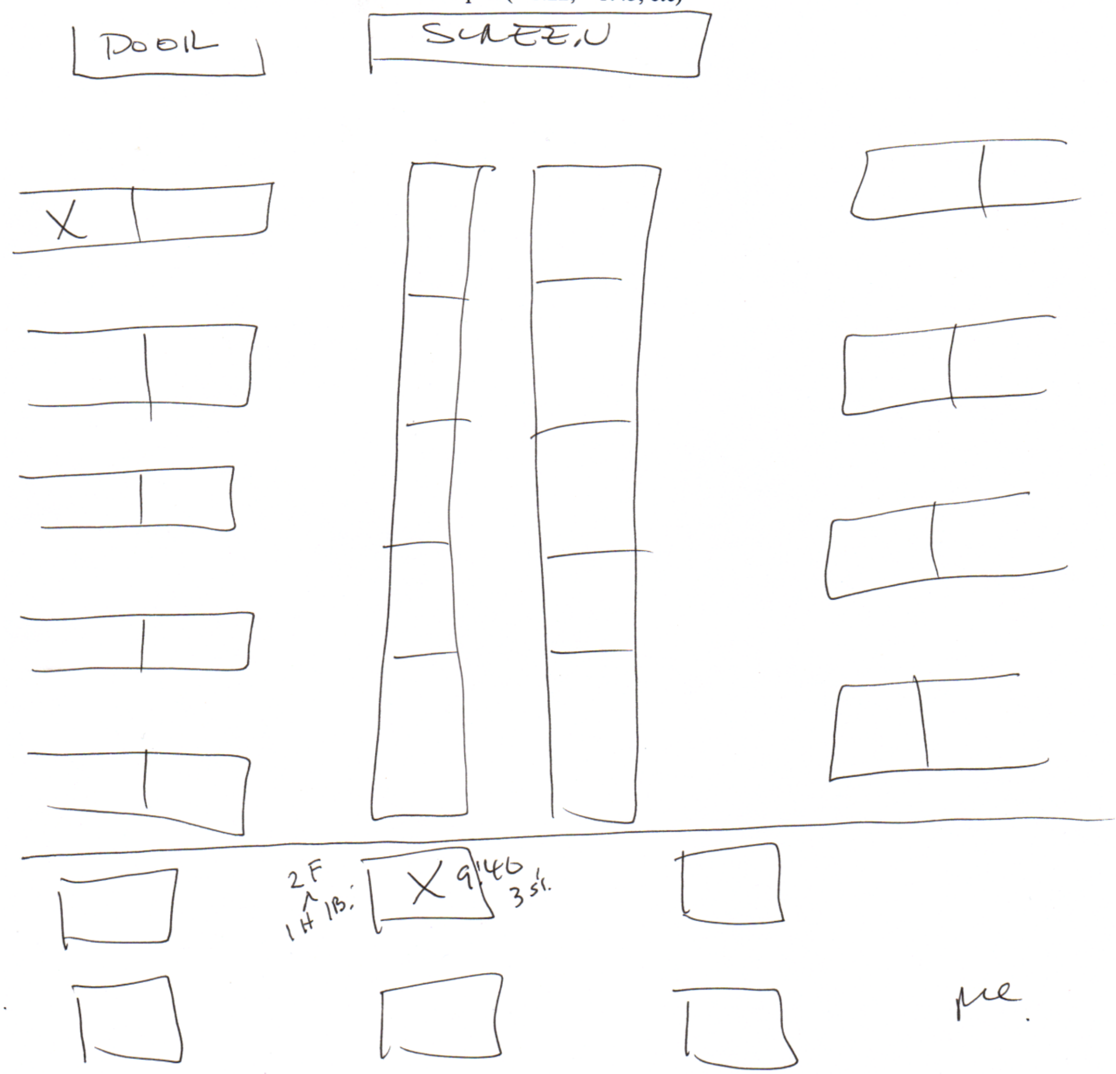
3

Observation Protocol (Observation #1 #2; Duration of 30 minutes each)

Student's Name: ______________________ Date: 5/1 Time: 10:25

Subject: Geometry Teacher's Name: James

1. **Diagram of Classroom Layout**. Use an asterisk with time to denote student's location in room at various times: Example: (* 1:22, * 1:45, etc)



2. Classroom Population (Number of Students by Race and Gender)

	White	African American	Hispanic	Other	Total
Males					
Female					
Total					

3-5
6 groups

3. Describe the grouping structure throughout the lesson (small group, working with a partner, no grouping), noting transition times, activities, etc.

Taking notes- attentive - during lecture.
Works independently, using calculator, taking notes. Very quiet group (1 FAA, 1HF). When I ask ? = Looks at peers as if he expects them to answer.

4. Cite any evidence of differentiated instruction/evidence of VAK teaching methods (visual, auditory, tactile, kinesthetic).

↓ ↓ ↓
Graphs/ Visuals. Group disc. Group

5. Tally the number of times the teacher calls on each category of student:

	White	African American	Hispanic	Other	Total
Males					
Female					
Total					

6. Describe the student's level of participation (passive, eager, etc.) with notes describing his participation (asking questions, volunteering, interacting with peers, etc).

taking notes. class resp to T req to put away & move into group.

7. How does the student contribute to group activities/discussions?

8. Is there evidence of nonconformity or disruptive behaviors? Be specific.

9. Does the student seem to have his expected materials and assignments? Explain.

Paper, pencil, calc (School issued)
Textbook ~ seen

10. Do the student's peers interact with him? If so, describe the interactions.

11. Were any unexpected events, positive or negative, observed during the lesson?

12. Other Information

a. How many students? Provide a description by race/ethnicity and gender.

b. Notes:

Black t-shirt
Dark ~~pants~~ short
Black sock.
" Sandal / slide.
Red lanyard.

9. Does the student seem to have his expected materials and assignments? Explain.

Paper, pencil, calc (School issued)
Textbook ~ seen

10. Do the student's peers interact with him? If so, describe the interactions.

11. Were any unexpected events, positive or negative, observed during the lesson?

12. Other Information

a. How many students? Provide a description by race/ethnicity and gender.

b. Notes:

Black t-shirt
Dark ~~pants~~ short
Black sock.
" Sandal / slide.
Red lanyard.

40m

Observation Protocol Wordlist Matrix

Case 3 Observation 1 or 2 Date: 5/1/13.

Circle behaviors/dispositions observed, and then write comments to explain the word choice. Others may be added as needed.

Very little interaction
Smiles at peer if they talk to him.

Words to Describe *Positive* Peer-to-Peer Interactions:

Caring	Enthusiastic	Funny	Thoughtful
Considerate	Excitable	Pleasant	Other:

Words to Describe *Negative* Peer-to-Peer Interactions:

Aggressive	Domineering	Manic	Thoughless
Argumentative	Inconsiderate	Manipulative	Other:
Bossy	Irritating	Rude	

Words to Describe *Personal* Attributes:

Active	Conceited	Introverted	Perfectionist	Volatile
Ambitious	Creative	Inventive	Pragmatic	
Assertive	~~Curious~~	Nervous	Reserved	
Careless	Extroverted	Nervous	Serious	
Cautious	Impulsive	Passive	Shy	

Pointing at handout

Observation Protocol (Observation #1 #2; Duration of 30 minutes each)

Student's Name: #3 Date: 5/10 Time: 10:25

Subject: Geo. Teacher's Name: Jame.

1. **Diagram of Classroom Layout**. Use an asterisk with time to denote student's location in room at various times: Example: (* 1:22, * 1:45, etc)

Gray & blue striped hoodie.
Jeans, Black tennis shoes.

Ames, Chad 1 ⊙

2. Classroom Population (Number of Students by Race and Gender)

	White	African American	Hispanic	Other	Total
Males	4	2	3	1	10
Female	9	2	2	0	13
Total	13	4	5	0	23

3. Describe the grouping structure throughout the lesson ~~(small group~~, working with a partner, ~~no grouping~~), noting transition times, activities, etc.

4. Cite any evidence of differentiated instruction/evidence of VAK teaching methods (visual, auditory, tactile, kinesthetic).

5. Tally the number of times the teacher calls on each category of student:

	White	African American	Hispanic	Other	Total
Males					
Female					
Total					

6. Describe the student's level of participation (passive, eager, etc.) with notes describing his participation (asking questions, volunteering, interacting with peers, etc).

Small talk (smiling) w/ peer during transition to group. "I hope you'll win." Waves @ peer across room / smiles. Legs jittery – listen / eye contact while T explains.

7. How does the student contribute to group activities/discussions?

Connecting problem from hw a teacher discussed. Using calculator. Passes up hw. Works w/ 1HM, 1HF, 1AAF. Works ind overall, watches if others ask teacher. T asks him question, inaudible.. "Right, let's do that." Won't vol ask. T has to prompt. Defers to peer but will answer direct ques. Peer next to him looks at his paper, discusses w/ him. Soft spoken. Calculator used.

8. Is there evidence of nonconformity or disruptive behaviors? Be specific. None

Group Activity – Hopewell AIs / Indian Mounds. Reg geo problem in real-life scenario.

9. Does the student seem to have his expected materials and assignments? Explain.

yes – calc, paper, pencil, hw.

10. Do the student's peers interact with him? If so, describe the interactions.

yes –

11. Were any unexpected events, positive or negative, observed during the lesson?

No.

12. Other Information

    a. How many students? Provide a description by race/ethnicity and gender.

    b. Notes:

Observation Protocol Wordlist Matrix

Case 3 Observation 1 or 2 Date: 5/10.

Circle behaviors/dispositions observed, and then write comments to explain the word choice. Others may be added as needed.

Words to Describe *Positive* Peer-to-Peer Interactions:

Caring	Enthusiastic	Funny	Thoughtful
Considerate	Excitable	Pleasant	Other:

Words to Describe *Negative* Peer-to-Peer Interactions:

Aggressive	Domineering	Manic	Thoughless
Argumentative	Inconsiderate	Manipulative	Other:
Bossy	Irritating	Rude	

Words to Describe *Personal* Attributes:

Active	Conceited	Introverted	Perfectionist	Volatile
Ambitious	Creative	Inventive	Pragmatic	
Assertive	Curious	Nervous	Reserved	
Careless	~~Extroverted~~	Nervous	Serious	
Cautious	Impulsive	Passive	Shy	

OBSERVATION NOTES FOR CASE STUDY #4

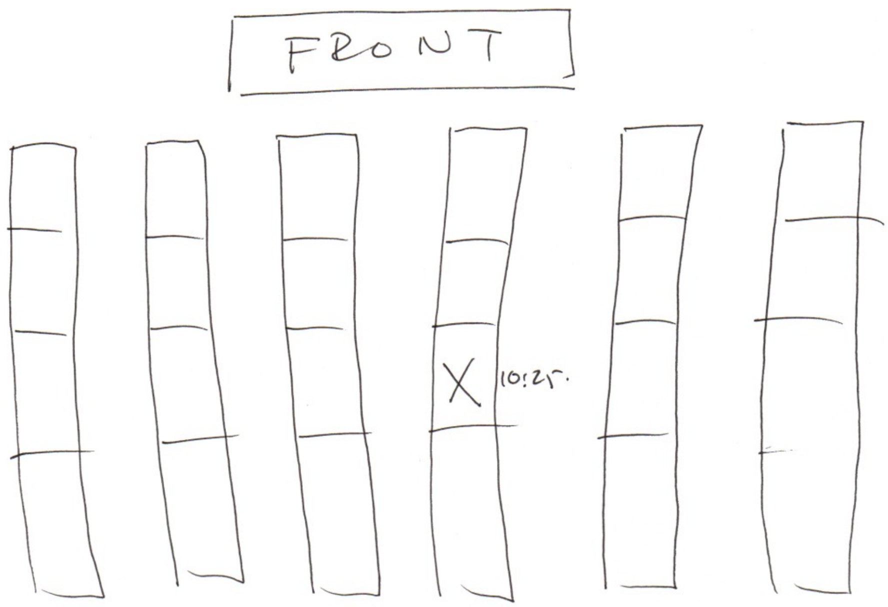
Inclusion but he is a reg ed. student? Vol seating!

Observation Protocol (Observation #1 #2; Duration of 30 minutes each)

Student's Name: 4 Date: 5/2 Time: 10:25

Subject: Geometry Teacher's Name: Gonza

1. **Diagram of Classroom Layout**. Use an asterisk with time to denote student's location in room at various times: Example: (* 1:22, * 1:45, etc)



10:27 stapler.

2. Classroom Population (Number of Students by Race and Gender)

	White	African American	Hispanic	Other	Total
Males	6	3	1	0	10
Female	4	1	1	0	6
Total	10	4	2	0	16

3. Describe the grouping structure throughout the lesson (small group, working with a partner, no grouping), noting transition times, activities, etc.

Whole group. - Stay on task, sequencing through problem as teacher dictates. T says "Write down this formula: base x height." S responds accordingly. Raise hand to "who thinks they have an answer?" T: Frequently responds aloud w/ other.
"Area = $\frac{1}{2}$ $b_1 \times b_2$ ...." T: "What area of trap.
Andrea, help me out. Andrea gives formula aloud.
Responds when T asks, where does $\frac{1}{2}$ come in. [inaudible].

4. Cite any evidence of differentiated instruction/evidence of VAK teaching methods (visual, auditory, tactile, kinesthetic).

Diagram on Screen
Worksheet

Repeat
answer.

5. Tally the number of times the teacher calls on each category of student:

	White	African American	Hispanic	Other	Total
Males	~~ǀǀǀǀ~~	ǀǀǀ			
Female	ǀ				
Total					

6. Describe the student's level of participation (passive, eager, etc.) with notes describing his participation (asking questions, volunteering, interacting with peers, etc).

Observing Handout on Overhead. "Divide by y"
Taking Notes "Cancel"
Answers chorally laughs at T's humor.
Nods agreement.
Shakes head w/app. "We can't divide by 4, can we?"

1 ↑. "Can you have 2 x's in equation?" T used to segway into another problem.

1 ↑. "So don't worry about miles?" T explains why answer in miles. [illegible] ~~[illegible]~~ [illegible] to explain to class diff between mile n square miles. →

7. How does the student contribute to group activities/discussions?

Shares his findings w/ neighbor when neighbor leans in.

8. Is there evidence of nonconformity or disruptive behaviors? Be specific. No.

T: Andre what shape do we have on #2?
Andre: "Square." "Multiply what's inside." T repeats: "Thank you, Andre"

S sits upright. Focused.

[White male peer looks to him for help... Andre shares. To peer: "I got the small part. I got x. yeah.]

T: Who has that part figured out? A!"One sec...
35.8... [incorrect]... self corrects. "I didn't say that... [laughs].

9. Does the student seem to have his expected materials and assignments? Explain.

Paper, pencil, calc, textbook.

10. Do the student's peers interact with him? If so, describe the interactions.

11. Were any unexpected events, positive or negative, observed during the lesson?

12. Other Information

   a. How many students? Provide a description by race/ethnicity and gender.

   b. Notes:

Red & White Striped Shirt
Khaki Shorts
Brown, casual loafer.

Observation Protocol Wordlist Matrix

Case _____ Observation 1 or 2 Date: 5/2/13

Circle behaviors/dispositions observed, and then write comments to explain the word choice. Others may be added as needed.

Words to Describe *Positive* Peer-to-Peer Interactions:

Caring	Enthusiastic	Funny	Thoughtful
Considerate	Excitable	Pleasant	Other: Good humor.

Words to Describe *Negative* Peer-to-Peer Interactions:

Aggressive	Domineering	Manic	Thoughless
Argumentative	Inconsiderate	Manipulative	Other:
Bossy	Irritating	Rude	

Words to Describe *Personal* Attributes:

Active	Conceited	Introverted	Perfectionist	Volatile
Ambitious	Creative	Inventive	Pragmatic	
Assertive	Curious	Nervous	Reserved	
Careless	Extroverted	Nervous	Serious	
Cautious	Impulsive	Passive	Shy	attentive

Observation Notes for Case Study #4

Observation Protocol (Observation #1 #2; Duration of 30 minutes each)

Student's Name: 4 Date: 5/10 Time: 10:50

Subject: Geo. Teacher's Name: Gonyea.

1. **Diagram of Classroom Layout**. Use an asterisk with time to denote student's location in room at various times: Example: (* 1:22, * 1:45, etc)

Exam Review

White dress shirt (untucked) jeans, brown camel shoes, braided hair.

Laughs at teacher sarcasm.

T prompts to clean area. Responds. Packs.

2. Classroom Population (Number of Students by Race and Gender)

	White	African American	Hispanic	Other	Total
Males	2	5	1	0	8
Female	3	1	0	0	4
Total	5	6	1	0	12

3. Describe the grouping structure throughout the lesson (small group, working with a partner, no grouping), noting transition times, activities, etc.

To teacher: "Add up all sides." "Very good [ ]." Vols answer
consistently as teacher solves various problems. "17." Correct. S
focused, taking notes, nods. Complete T's sentence: T: "So area is
base times ___." "Height." To T: "I couldn't see 16..."
T: Sorry, my handwriting. [ ] what is height? "16" Correct.
How did you find area? Talks aloud w/ other: Mult bxh.
"What do we have, Arthur" "Add 'em." "Is it 1/2(b1+b2)xh?
T answers & directs. "In parenthesis" when asked where do bases go in
the formula. "b." divide. "That's what I was trying to say." T: "I know I was w/ you."

4. Cite any evidence of differentiated instruction/evidence of VAK teaching methods (visual, auditory, tactile, kinesthetic).

T asks: "How do you get 15?"
"9+6"

main lights off -
6 lamps illuminate.

5. Tally the number of times the teacher calls on each category of student:

	White	African American	Hispanic	Other	Total
Males					
Female					
Total					

6. Describe the student's level of participation (passive, eager, etc.) with notes describing his participation (asking questions, volunteering, interacting with peers, etc).

7. How does the student contribute to group activities/discussions?

Ask T questions..
Answer question.
Choral resp.

8. Is there evidence of nonconformity or disruptive behaviors? Be specific.

No.

9. Does the student seem to have his expected materials and assignments? Explain.

Yes – calc, exam review packet, pencil.

10. Do the student's peers interact with him? If so, describe the interactions.

Yes – B Gonda: "Use b_1 and b_2 times height."
"Yes, sir!" w/ Bryan asked class ques.

11. Were any unexpected events, positive or negative, observed during the lesson?

No.

12. Other Information

    a. How many students? Provide a description by race/ethnicity and gender.

    b. Notes:

Observation Protocol Wordlist Matrix

Case ______ Observation 1 or 2 Date: ____________________

Circle behaviors/dispositions observed, and then write comments to explain the word choice. Others may be added as needed.

Words to Describe *Positive* Peer-to-Peer Interactions:

Caring	Enthusiastic	Funny	Thoughtful
Considerate	Excitable	Pleasant	Other:

Words to Describe *Negative* Peer-to-Peer Interactions:

Aggressive	Domineering	Manic	Thoughless
Argumentative	Inconsiderate	Manipulative	Other:
Bossy	Irritating	Rude	

Words to Describe *Personal* Attributes:

Active	Conceited	Introverted	Perfectionist	Volatile
Ambitious	Creative	Inventive	Pragmatic	
Assertive	Curious	Nervous	Reserved	
Careless	Extroverted	Nervous	Serious	
Cautious	Impulsive	Passive	Shy	

Observation Notes for Case Study #5

Circles, Points of Tangency.
PSYCHOSOCIAL FACTORS CONTRIBUTING Group – Graded exercises.
Review ∠t, similarity,

Observation Protocol (Observation #1 #2; Duration of 30 minutes each)

Student's Name: Case # 5 Date: 5/10 Time: 12:57.

Subject: Geometry. Teacher's Name: James.

1. **Diagram of Classroom Layout**. Use an asterisk with time to denote student's location in room at various times: Example: (* 1:22, * 1:45, etc)

working w/ 1 WF & 1 AAF. Copying into problem from overhead. Ss grouped in "pods" as before.

T: a = b. Who agrees. S raised hand. S copying bellwork from Samantha, a neighbor. P: "Which days are you missing? Were you not here?" "I am missing 5 and 6..." T puts answers to hw sheet on overhead. Continues to copy prior bellwork rather than ✓ correct hw assignment. Missed a lot of inst due to copying prior notes from peer. Has he been absent? Didn't turn in HW.

Light banter, laughter, mundane, w/ peer in group. Both peers thinking aloud & talking. "What, No! 7.1. Round up," he adds. "Hypotenuse is larger. If this angle is 45, the other has to be 45°." Aloud, "Is it sine or cosine?" Laughs when teacher gets, "I don't know how to do it. Tell me..." No eye contact w/ teacher approaches his group. Points to diagram on peer's paper, "Which angle did he say to use?" Peer answers. To peer & points to her paper "We're trying to find this one, right?"

(White v-neck shirt, gray jeans, black shoes.)

Using calc to solve. Peer to him: "I got 36.8." To peer: "This is adj, this is hyp, this is opp. Oh, that's why I messed up. Ugh!" Peer to T: "Did we do this right?" S: "We did it right." To peers: "Remember to type in inverse." Peer aloud. "Which one?" "Triangle A. 45, 45, 90?" "You mean Δ3? It is a 45, 45, 90." "I put Δ3. No, read it," then reads directions to group."

To peer, "It might be ΔE." Continues to use cal.
"I think it is ΔE." Peer – could be G or E.
"I think it is E. I am going w/ E." "Are you putting
ΔE, too?" To peer.

2. Classroom Population (Number of Students by Race and Gender)

	White	African American	Hispanic	Other	Total
Males	5	1	1	0	7
Female	7	3	1	0	11
Total	12	4	2	0	18

3. Describe the grouping structure throughout the lesson (small group, working with a partner, no grouping), noting transition times, activities, etc.

4. Cite any evidence of differentiated instruction/evidence of VAK teaching methods (visual, auditory, tactile, kinesthetic).

diagram,

group discussion.

movement into group.

5. Tally the number of times the teacher calls on each category of student:

	White	African American	Hispanic	Other	Total
Males					
Female					
Total					

6. Describe the student's level of participation (passive, eager, etc.) with notes describing his participation (asking questions, volunteering, interacting with peers, etc).

7. How does the student contribute to group activities/discussions?

Seeks clarification
asks quest to peers.
Answers peer questions

8. Is there evidence of nonconformity or disruptive behaviors? Be specific.

None.

9. Does the student seem to have his expected materials and assignments? Explain.

yes – calc, paper, pen

10. Do the student's peers interact with him? If so, describe the interactions.

yes, see notes

11. Were any unexpected events, positive or negative, observed during the lesson? No.

12. Other Information

   a. How many students? Provide a description by race/ethnicity and gender.

   b. Notes:

Observation Protocol Wordlist Matrix

Case 5 Observation 1 or 2 Date: 5/10.

Circle behaviors/dispositions observed, and then write comments to explain the word choice. Others may be added as needed.

Words to Describe *Positive* Peer-to-Peer Interactions:

Caring	Enthusiastic	Funny	Thoughtful
Considerate	Excitable	Pleasant	Other:

Words to Describe *Negative* Peer-to-Peer Interactions:

Aggressive	Domineering	Manic	Thoughless
Argumentative	Inconsiderate	Manipulative	Other:
Bossy	Irritating	Rude	

Words to Describe *Personal* Attributes:

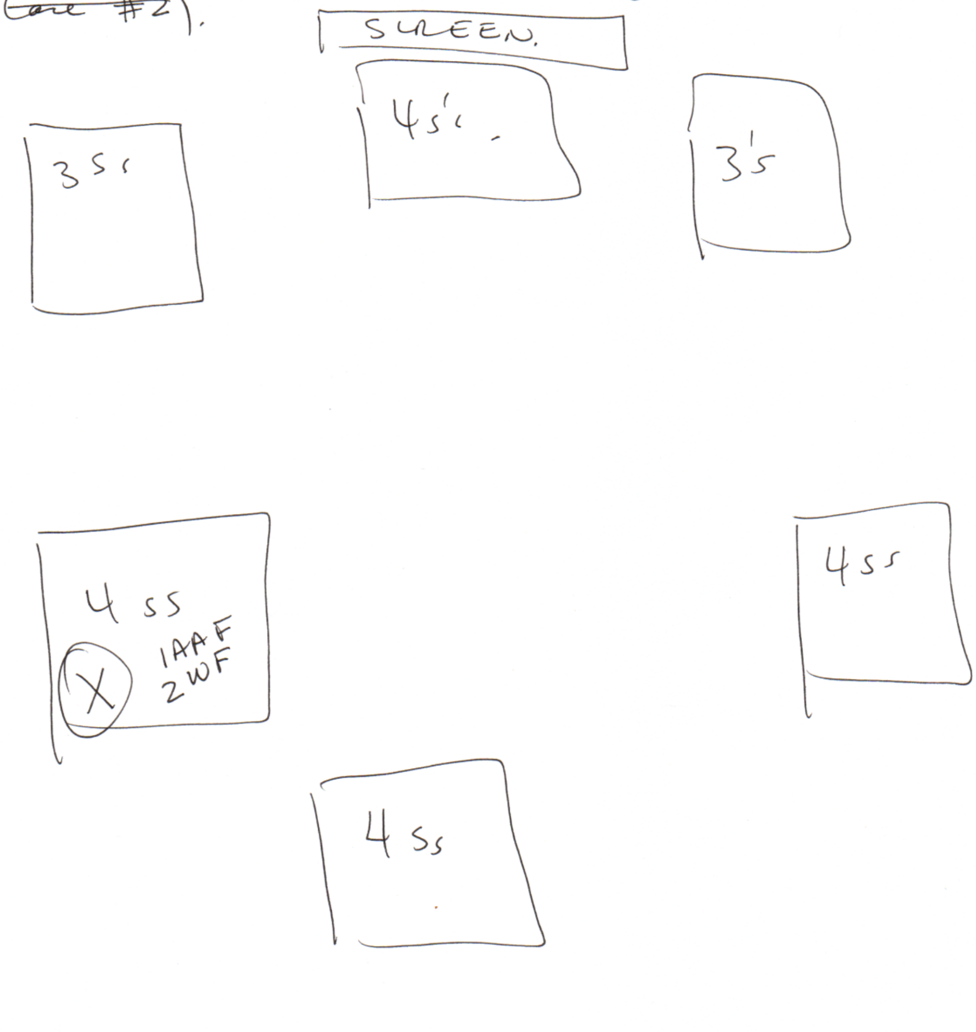
Active	Conceited	Introverted	Perfectionist	Volatile
Ambitious	Creative	Inventive	Pragmatic	
Assertive	Curious	Nervous	Reserved	
Careless	Extroverted	Nervous	Serious	
Cautious	Impulsive	Passive	Shy	

Observation Protocol (Observation #1 #2; Duration of 30 minutes each)

Student's Name: #5, Date: 5/1 Time: 12:57

Subject: Geom. Teacher's Name: James.

1. **Diagram of Classroom Layout**. Use an asterisk with time to denote student's location in room at various times: Example: (* 1:22, * 1:45, etc) (~~See diagram~~ from ~~Case~~ #2).



2. Classroom Population (Number of Students by Race and Gender)

	White	African American	Hispanic	Other	Total
Males	4	2	2	1	9
Female	8	4	0	1	13
Total	12	6	1	2	22

3. Describe the grouping structure throughout the lesson (small group, working with a partner, no grouping), noting transition times, activities, etc.

Group Quiz – Talk within group to complete it." BF – "Can we move into our groups, please (5 min delay). Come on, C, sit there." S: Would that be Pyth Thm?" C: "Of course. Did you get 5.8?" Using calc. "That's what I said 20². I got 14.2". "My bad," when teacher corrected his use of π in wrong context of answer. Tried to explain to T his rationale. T: "I know. I know what you meant." "What did you get for #2?" "I got a decimal – does it matter whether we use a fraction or decimal?" P: "#3? yeah." "Yeah." T: Tell me about #4. "Area of a square?" T: "Looks like you have more to do." To peer: "Yeah, the area of a rectangle. To peer: "That's what I got the 1st time." P: "Do you need help." S: "Yeah." P: "Why dividing?"

4. Cite any evidence of differentiated instruction/evidence of VAK teaching methods (visual, auditory, tactile, kinesthetic).

Graph
Diagram Geom.

Group
dialogue

Some
movement

Follows peer's advice on algorithm "11/2 or 9?"
Shakes head: "I feel dumb. Thanks." Sarcasm.
P: "What did you get for that?" S: [inaudible].
To peer: "So you got 5.8?"
"I got 11. Let me count again. No, I got 12 blocks."
"I learned something new today."
Submitted work for group to turn in.
To peer: "Do ya'll have basketball game? UT plays A&M?
Did you go?

Most clinical
QnA

5. Tally the number of times the teacher calls on each category of student:

	White	African American	Hispanic	Other	Total
Males		ll			
Female	lll	ll			
Total					

6. Describe the student's level of participation (passive, eager, etc.) with notes describing his participation (asking questions, volunteering, interacting with peers, etc).

volunteering.
asking question
justifying solution.

7. How does the student contribute to group activities/discussions?

peer to peer conversation
Shares his answer, procedure, etc.
Seeks clarification from peers.

8. Is there evidence of nonconformity or disruptive behaviors? Be specific.

Eating Peanut Butter Bar — NOT out of ordinary.
Talk of Basketball once finished.

9. Does the student seem to have his expected materials and assignments? Explain.

Borrowed sheet of paper to take in his notes.
Did not have homework. – didn't take notes while teacher
" " " textbook   explained answer to HW.
Calculator ^ Binder.

10. Do the student's peers interact with him? If so, describe the interactions.

Yes – converse w/ him. One peer enc him to turn seat
around to face group.

11. Were any unexpected events, positive or negative, observed during the lesson? NO.

12. Other Information

a. How many students? Provide a description by race/ethnicity and gender.

b. Notes: Gray jeans
Black Tennis shoes
White ~~Gx~~ Sports shirt.

Observation Protocol Wordlist Matrix

Case 5 Observation 1 or 2 Date: 5/1

Circle behaviors/dispositions observed, and then write comments to explain the word choice. Others may be added as needed.

Words to Describe *Positive* Peer-to-Peer Interactions:

Caring	Enthusiastic	Funny	Thoughtful
Considerate	Excitable	Pleasant	Other:

Words to Describe *Negative* Peer-to-Peer Interactions:

Aggressive	Domineering	Manic	Thoughless
Argumentative	Inconsiderate	Manipulative	Other:
Bossy	Irritating	Rude	

Words to Describe *Personal* Attributes:

Active	Conceited	Introverted	Perfectionist	Volatile
Ambitious	Creative	Inventive	Pragmatic	
Assertive	Curious	Nervous	Reserved	
Careless	Extroverted	Nervous	Serious	
Cautious	Impulsive	Passive	Shy	

Observation Notes for Case Study #6

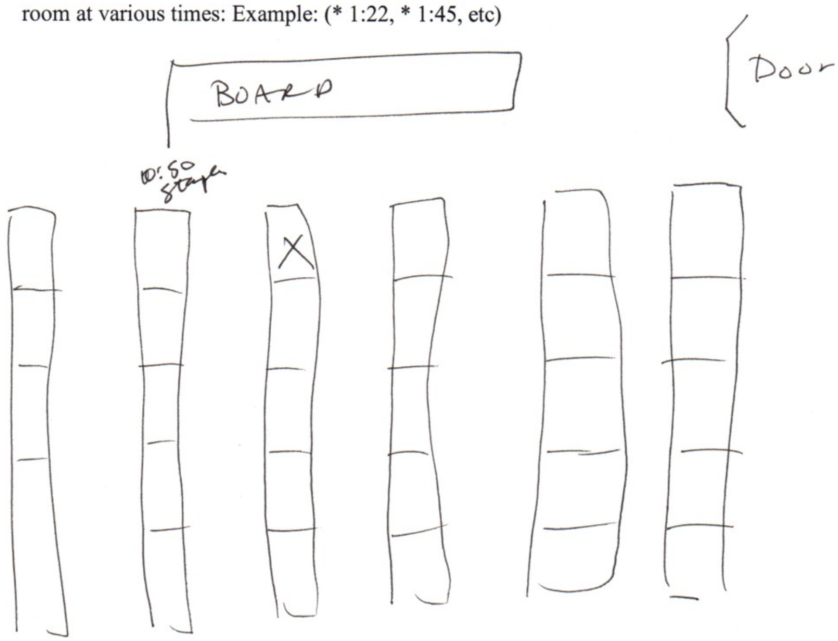
6

Observation Protocol (Observation #1 #2; Duration of 30 minutes each)

Student's Name: ______________________ Date: 5/3 Time: 10:27

Subject: Geometry ______________________ Teacher's Name: Trea

1. **Diagram of Classroom Layout**. Use an asterisk with time to denote student's location in room at various times: Example: (* 1:22, * 1:45, etc)



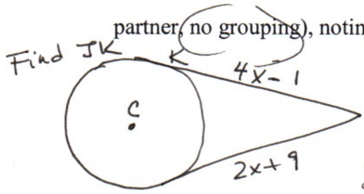
Arcs & Chords.
Tangents & Secants.

2. Classroom Population (Number of Students by Race and Gender)

	White	African American	Hispanic	Other	Total
Males	10	2	1	0	13
Female	8	3	1	2	14
Total	18	5	2	2	27

3. Describe the grouping structure throughout the lesson (small group, working with a partner, no grouping), noting transition times, activities, etc.

watching peers at board. Vol to go to board.



$4x-1=2x+9$
$2x-1=9$
$2x=10$
$x=5$
$JK=19$

T: "This is correct! Anyone else get JK = 19? Good." see hands raised.

4. Cite any evidence of differentiated instruction/evidence of VAK teaching methods (visual, auditory, tactile, kinesthetic).

diagrams visuals

working at board.

5. Tally the number of times the teacher calls on each category of student: All vols to board.

	White	African American	Hispanic	Other	Total
Males	||||	|			
Female	|	||			
Total					

6. Describe the student's level of participation (passive, eager, etc.) with notes describing his participation (asking questions, volunteering, interacting with peers, etc).

T allowed for some minor small talk w/ neighbor while peers worked at board. Other never engaged. On task or interested?
Sits nonchalantly w/ arms crossed in lap & legs crossed – relaxed.

Observer – focused & vocal.
Knows material – No nodding – hand raising to confirm agreement.
occasionally hand to chin – pensive!

7. How does the student contribute to group activities/discussions? N/A

S passed up HW – got up to staple.

① T's prompt – gathered paper & pencil for notetaking.
"Who re what chord is?" No response. Seems fam w/ material, so why not respond? As T worked several examples, he

8. Is there evidence of nonconformity or disruptive behaviors? Be specific. None.

Maroon T-shirt
Blue Jeans
Black tennis shoes

9. Does the student seem to have his expected materials and assignments? Explain.
Textbook, pencil, coloring pencil, folder.

10. Do the student's peers interact with him? If so, describe the interactions. No.

11. Were any unexpected events, positive or negative, observed during the lesson? No.

12. Other Information

a. How many students? Provide a description by race/ethnicity and gender. See grid.

b. Notes: Students vol to come to board to work problem. 2AA F.

Observation Protocol Wordlist Matrix

Case 6 Observation 1 or 2 Date: 5/3

Circle behaviors/dispositions observed, and then write comments to explain the word choice. Others may be added as needed.

Words to Describe *Positive* Peer-to-Peer Interactions:

Caring	Enthusiastic	Funny	Thoughtful
Considerate	Excitable	Pleasant	Other: To himself

Words to Describe *Negative* Peer-to-Peer Interactions:

Aggressive	Domineering	Manic	Thoughless
Argumentative	Inconsiderate	Manipulative	Other:
Bossy	Irritating	Rude	

Words to Describe *Personal* Attributes:

Active	Conceited	Introverted	Perfectionist	Volatile
Ambitious	Creative	Inventive	Pragmatic	Quiet
Assertive	Curious	Nervous	Reserved	
Careless	Extroverted	Nervous	Serious	
Cautious	Impulsive	Passive	Shy	

Observation Protocol (Observation #1 #2; Duration of 30 minutes each)

Student's Name: Case #6 Date: 5/13 Time: 10:25

Subject: Geom. Teacher's Name: Trea

1. **Diagram of Classroom Layout**. Use an asterisk with time to denote student's location in room at various times: Example: (* 1:22, * 1:45, etc) Same as before.

T working various problem pertaining to area of ⊙s, watching, & writing. Takes out calculator & enters data as he watches teacher. T: "You guys try 3-6. Entering data into calc & writing on sheet.

↓ Solve for central angle measures.

Loose discipline climate (talking not w/ neighbor is not a problem). S is quiet w/ no peer interaction. When T asks, "Everyone agree," he says nothing. No nod. Good posture - watches intently. Pencil down for most part. Lots of students provide choral resp. yet he remains quiet. If teacher gives specific problem & instructs to solve, he will write. T: "Do that please." Picks up calculator & pencil & solves. Finishes next problem quickly, several others still working. Peer vol. to go to board.

Yellow t-shirt, blue jeans, black shoes.

2. Classroom Population (Number of Students by Race and Gender)

	White	African American	Hispanic	Other	Total
Males	11	2	0	1	14
Female	8	2	2	1	13
Total	19	3	2	1	27

3. Describe the grouping structure throughout the lesson (small group, working with a partner, no grouping), noting transition times, activities, etc. Whole group.

T: Why is 3x + 22 = 4x. No resp from CG. T: Do 8 please.
Leaves seat to dispose of Kleenex – he moved + can. allergies?
On back – the assignment. As T explains directions & offers
hints, CG 'digs in' – entering data on calc & performing
alg to solve. Works alone & diligently. T MBWA – he asks no
ques.. T glances at his work + moves on. X2. Smiles to herself.

4. Cite any evidence of differentiated instruction/evidence of VAK teaching methods (visual, auditory, tactile, kinesthetic).

geo drawings choral res. none.

5. Tally the number of times the teacher calls on each category of student:

	White	African American	Hispanic	Other	Total
Males					
Female					
Total					

6. Describe the student's level of participation (passive, eager, etc.) with notes describing his participation (asking questions, volunteering, interacting with peers, etc).

~~[illegible]~~ ni'd.

7. How does the student contribute to group activities/discussions?

None.

8. Is there evidence of nonconformity or disruptive behaviors? Be specific.

None.

9. Does the student seem to have his expected materials and assignments? Explain.

Yes, calc, pencil, handout.

10. Do the student's peers interact with him? If so, describe the interactions.

No.

11. Were any unexpected events, positive or negative, observed during the lesson?

No.

12. Other Information

    a. How many students? Provide a description by race/ethnicity and gender.

    b. Notes: See quid.

Observation Protocol Wordlist Matrix

Case 6 Observation 1 or 2 Date: 5/13

Circle behaviors/dispositions observed, and then write comments to explain the word choice. Others may be added as needed.

Words to Describe *Positive* Peer-to-Peer Interactions:

Caring	Enthusiastic	Funny	Thoughtful
Considerate	Excitable	Pleasant	Other: None.

Words to Describe *Negative* Peer-to-Peer Interactions:

Aggressive	Domineering	Manic	Thoughless
Argumentative	Inconsiderate	Manipulative	Other:
Bossy	Irritating	Rude	

Words to Describe *Personal* Attributes:

Active	Conceited	Introverted	Perfectionist	Volatile
Ambitious	Creative	Inventive	Pragmatic	
Assertive	Curious	Nervous	Reserved	
Careless	Extroverted	Nervous	Serious	
Cautious	Impulsive	Passive	Shy	

APPENDIX F

FIELD JOURNAL NOTES FROM CLASSROOM OBSERVATIONS

Field Journal Notes from Observations of Case Study #1

Topic
Case #1. Area of Polygons.

Snapshot Info.

Student. Tall, athletic stature, average weight for HS football player. Jeans, Gray t-shirt, casual shoes.

Teacher was a female teacher w/ 9 yrs' experience. Subj: Geometry.

The class consisted of 20 students: four white males, 5 white females, 3 AA ♂, 1 AA ♀, 5 HM, 1 HF, and one female Asian.

Obs #1 5/1/13 Classroom was traditional in layout, with 6 rows, 5 chairs deep facing toward white board. Class began at 9:25. At 9:28, as students were still settling down, Case #1 was standing at the trash can disposing of some paper. The teacher indicated that a test was about to be given, but she would answer any questions students may have.

5 ass. seat in last seat in 1st row on left facing front.

Case #1 began ~~reviewing his notes by himself,~~ ~~rapidly scanning his class notes~~ and homework ~~assignments. His scanning his notes~~ scurrying to complete HW... This created a distraction for him as the teacher was working several problems at students' requests. Case #1 never made eye contact w/ the board. When the teacher asked a procedural question, however, he did say "Cross multiply", along w/ a few other students, yet he could be distinctly heard. When Teacher prompted students to turn their textbook to the review page, Case #1, readily complied. Teacher began putting key formulas on the

board that Ss could reference during the test. Case #1 did watch as the teacher wrote these formulas on the board & explained how they are to be used. As the T worked a few problems illustrating the formulas' usage, Case #1 made some quiet casual conversation w/ female Hispanic sitting in front of him. S left his seat and blew his nose, then disposed of the tissue in the trashcan. S returned to his seat w/o incident.
After Teacher finished explaining problems, she collected HW. Case #1 passed his up.
After test began, Case #1 worked diligently, using his calculator and referencing the formulas written on the board as needed.
No out of ordinary behaviors were observed. He did leave his seat twice — once to throw paper away + once to blow his nose, but was in no way overtly distractive. His casual conversation w/ peer sitting in front of him was not unusual compared to other peer-to-peer dialogue throughout the room.
The student did not have his assignment completed prior to class. He did, however, have proper materials for class — textbook, paper, graphing calculator.

Word Matrix:

Pleasant - smiling, eye contact w/ peers during conversation. Seems shy / unassuming. Glances away frequently as ~~people~~ peer speaks w/ him.

No negative peer-to-peer words.

personal attributes:
passive - didn't request to see any problem worked, never sought clarification, didn't have HW.

Reserved - Only interacted w/ female in front of him. She initiated most dialogue.

Serious - Tended to stick to tasks at hand.
Shy - Not really communicative; smiles wryly & looks away often

Case #1 Obs #2 5/10 9:30.

As class was settling down, Case 1 was in back of room conversing w/ peer, another AA male. Peer was showing Case 1 his geometric drawings that may have been part of HW assignment. S had Case 1 had been absent a few days before, which was apparent after the T approached him & asked "Where have you been. I haven't seen you in a few days?" Answer inaudible. Case 1 was having peer explain how the geometric pattern were created.

Assignment – On graph paper, students were plotting various Coordinates + connecting the dots to create geometric shapes and their reflection + transformations.

Conversed w/ Hispanic female in front of him. "How do you do this one?" Peer turns around + points to his sheet, "These have to add up to 10." After peer counts aloud to 10, Case #1 responds, "Aww."

Peer later turn to Case #1 and, holding up her drawings, she says, "Which one should I do? I did this one." His reply, "I did, too. I like that," referring to a particular diagram.

Peer asks, "Do you have to do this one?"
His reply, "You have to do the first & last.
You didn't do that," he says while quietly
laughing.

Later she shows him a completed diagram.
"It looks good," he says.

~~Con~~ Refering to assignment, says to peer,
"This is taking forever. When is it due?"
She replied, "Today." "Today?"
To teacher, he asks "When is this due?"
She replies, "Monday." T then made
inquiry about previous days' absences. His
answer was inaudible.

~~Tom~~ Leaves seat & meanders to bulletin
board & reads a few sheets of paper
stapled to it. On way back to seat,
says to AA male student - "I am still
hurting." Obvious reference to their
football condition, ~~the~~ a few days before.
<Carl had commented to me earlier
last wk about rigorous football workouts.>
Carl returned to his seat & continued to
work as he dialogued w/ peer in front of
him.

To her, "You can't even see my lines."

T agrees. "Let me get you a coloring pencil."
"Thanks," to teacher after she hands him the coloring pencil.

20 Students: 4 WM, 6 WF, 4 AAM, 1 AAF, 3 HM, 1 HF, & 1 Asian Female.

No grouping but not formally structured atmosphere. Talking to neighbor was not a problem for teacher.

VAK – Colorful diagram.
use of rulers & drawing utensils.
Casual conversation allowed
Sharing / ques w/ peers.

smile
quiet
voice

+ Peer To Peer: caring, considerate, pleasant, thoughtful.

assists peer w/ the ask for sugg & clar.

"Thank you" to T.
"Looks good." to peer.

No Neg P to P.

Personal attributes:

Curious – seeks clarification from peers & teacher.

Reserved – Mainly limited dialogue to H. fem in front of him.

Clatuncited – connected w/ team mates & fellow AA male briefly.

Shy – soft spoken

Field Journal Notes from Observations of Case Study #2

Case #2. Snapshot clips.

(1)

Geometry Class taught by WM with 7 years of teaching exp. Room nontraditional set up: Screen on front wall w/ two rows of desks in middle of room, 5 desks deep. Perpendicular to these rows, on both sides of room, ~~there are the~~ other desks are placed. Left has 5 rows 2 deep, right has 4 rows 2 deep. S sitting on one of See diagram. When group work began, Ss re-arranged room into pods of 3 to 5 desks. See diagram. See diagram.

(3) Obs #1 5/1 10:25. Topic. Area of Geom Figures. Student appears well-groomed, clad in a red + white striped Polo-style shirt, white casual shorts, red socks, and black tennis shoes. Student wears several colored wrist bands, one prominently displaying his school's logo.

Students working in small groups of 3 to 5 students. As group begins solving problem, Case 2 raises his hand, "When trying to find the height, do we use [this formula]?" T responds, giving some information about

how to determine which formula to use. Case 2 repeatedly nods to teacher, indicating that he understood the info. Case 2 then proceeds to point to her diagram on the worksheet and explain to peer how to find the triangle's base length. When peer questions Case 2 [inaudible], he replies, "No, they are not congruent." The other three members are watching Case 2 and listening intently (?). One peer asks, "Is the base 4 [units long]?" "Yeah."
Case 2, after some contemplation, turns to same peer, "I think what you said first is right because ..." Case 2 then raises his hand and approaches the teacher to ask a question. Case 2 returns w/ Teacher + says, "That ain't right." Then turns to teacher, "Is it the Pythagorean Theorem?" Then addresses another peer while pointing to problem, "I think this one is just like [problem] two." Case 2 then references textbook to find a similar example. After closing the book, Case 2 pts to board + says to peer, "Did you use that [formula]?"

2

Before group activity, Case 2 took notes + maintained eye contact as teacher worked problems. Case 2 asked for clarification on one problem. When teacher called on him to provide correct formula, he incorrectly chose the midpoint formula. Teacher redirect Case 2 to Pyth. Theorem. Teacher asks class to put things away + move into small groups.

All materials: Had to borrow notebook paper to take notes. Had calc + text.

Word Matrix:

Considerate
Enthusiastic
Pleasant
Thoughtful
Active
Ambitious
Assertive
Extroverted
Serious.

Curious
Ext.
Senior.

Obs #2. 5/10.

Red shirt, jeans, + tennis shoes.
~~A~~ Gave demographics.

Small Group. Interactive White Board.
Turned to peer, smiling, inaudible conversation. Taking notes, using calculator as teacher explains HW.
Passed up HW.

During group – 2 HM partners.

Explain to them – they appeared lost + looked to him to explain – they listened as he said, "$1^2=1$, $7^2=49$, so it is 50."
Peers nod + write as he explains.
"Mr. James." Motions to teacher. T leans over. "I don't know if we do it like this or use the tangent," he says to peer. "I'm going to ask him." T replies, "No, not a 90 degree angle. Which one? Think about it." Case 2 replies [inaudible], ...
"Right, use the inverse. Good," replies T.
Peers look at Case 2's paper as he writes.

Word Matching: Considerate, Enthusiastic, Pleasant, Thoughtful, Ambitious, Assertive,

Field Journal Notes from Observations of Case Study #3

Case #3 Ob 1

Snapshot. Data.

Black t-shirt, Dark shorts, Black socks, + Black slip on sandals. Red lanyard.

Obs #1. 5/1. 10:25. Mr. James.

T working problems from HW. Taking notes. Attentive during lecture phase. Immediately responds to T's request to put things away + transition to group. Case 3 + 1F AA, 1 HF. As group solved probs on handout, Case 3 worked independently, using his calculator, taking notes if T added any commentary. When T approaches group, Case 3 makes ~~very little~~ no eye contact w/ T. If T poses general question, Case 3 looks to peer to provide answer.

Considerate

Pleasant – smiles when peer spoke to him.

Introverted

Reserved

Serious

Shy.

Obs #2. 5/10. Gray + Blue Striped Hoodie, Jean, Black tennis shoes.

Refer to demographics.

Area, Chords of Circle.

Working w/ 1 HM, 1 HF, 1 AAF. Corrects HW problems as teacher discusses, using calc. Passes up HW when prompted. Overall, works independently. If peer asks T ques, looks at peers. No eye contact w/ Teacher. When T asks "Circ 3 questions", soft spoken, inaudible response. T replied, "Right, let's do that." Will ~ vol ques. T must prompt. Defers to peers unless T asks him a direct question. Peer next to him looks onto his paper & he has quiet discussion w/ him. Soft spoken, calc. used.

Group Act: Hopewell Triangles w/ real-life scenarios.

Calc, paper, pencil, HW.

Considerate
Pleasant
Clear-minded
Reserved
Serious
Shy.

Field Journal Notes from Observations of Case Study #4

Case 4 Obs #1 5/2. 10:25.

Snapshot Data, Dem. Congu.

Whole group. Stays on Tasks, taking notes & sequencing through problem as T dictates. T prompts class, "Write down this formula: base x height." S writes formula. T then asks, "Who thinks they have an answer?" Case 4 raises hand. Case 4 provides choral resp to T ques: "Area equals one-half of b_1 times b_2." "What is area of a trap?" "(Case 4), help me out." Case 4 gives formula aloud. T then asks, "Where does 1/2 come in?" Case 4 provides inaudible resp.

Watches as T works problem on overhead. "Divide by 2." 1↑. Case 4: "Can you have 2 x's?" T uses question to segway into next problem. 1↑. "So don't worry about mile?" T then uses ques to explain diff between miles & square miles. "Cancel?" Laughs at teacher's humor. Nods agreement. Shakes head in disagreement. Answers chorally. "We can't divide by h can we?" When neighbor leans in, Case 4 shares.

T: [Case 4] what shape do we have on #2?" "Square." T: How do we solve?
Case 4: "Mult what's inside." T repeats & says, Thank you [Case 4]."

S sits upright. Focused.

White male peer looks to him for exp. He shares. To neighbor: "I got the small part. I got x. Yeah!"

↑ Prematurely. T: "Who has this figured out?" Case 4: "One sec...?... 35.8...
[incorrect]... self corrects, laughing, "I didn't say that."

Considerate
Pleasant
Good Humor.
Ambitious
Assertive
Curious
Serious
Attentive.

Paper, pencil, cal, text
Red + white striped shirt
Khaki shorts
Brown casual loafers.

Obs # 2 5/10. Gonza.

Exam Review. White dress shirt (untucked) blue jeans, brown casual shoes, Braided hair.

Laughs at teacher sarcasm.
T prompts to clean area (end). Responds & Packs.

Whole group To T: "Add up all sides." T Very Good [C4]." Vol answers consistently as teacher works various problems.
"17." Correct. Focused, takes notes, nods. Completes T's sentence: "So the area is base times ....?" C4: "Height." T teaches: "I couldn't see 16." T: Sorry, my hand writing. [C4] what is the height?"
"16." "How did you find height? Chorally. Mult b×h." T: "What do we do w/ the base [C4]?" "Add 'em." Is it 1/2 ($b_1 + b_2$) × h?" T responds & redirects. "In parentheses?" when asked where do bases go in the formula. "6." "Divide."
"That's what I was trying to say." T: "I know. I'm with you." "How did you get 15," asks T.
" 9+6." Dark - 6 laughs ill room.
"Yes, m." When T asks class gen. ques.
Calc, Review Packet, pencil.

Considerate
Enthusiastic
Pleasant
Thoughtful
Active
Ambitious
Assertive
Extroverted

Field Journal Notes from Observations of Case Study #5

Case 5 Obs 1 5/1 12:3? Jane

Stats & Char.

Small group - "Talk within group to complete it," T. To BF peer, "Can we move into our groups please?" after 5 min delay. She directs, "Come on, C5, sit there." After beg first prob, BF peer asks him, "Would that be the Pythagorean Theorem?" "Of course," C5 replies. He then asks her, "Did you get 5.8?" Then, after entering data into calc, followed up w, "That's what I said, 20½. I got 14.2." T looks over his should & correct C5 improper use of π in algorithm. His reply, "My bad," then tried to explain his rationale to T. T: "I know. I know what you meant. Later to peer, "What did you get for #2?" ~~She replied~~ He asks peer, "I got a decimal. Does it matter whether we use a fraction or a decimal?" Peer, "Yeah." He follows up, "Yeah." Teacher approaches group, "Tell me about #4." C5: "Area of a square?" T warns: "Looks like you have more to do." To peer: "Yeah, it is the area of a rectangle. Then to peer after seeing her answer: "That's what I got the first time.

Peer checks his ans, "Do you need help?" "Yeah." Peer asks, "Why are you dividing?" Follows peer advice of algorithm, then asks, "1/2 or 9?" After she answers, he adds, "I feel dumb. Thanks." Sarcasm, not defeated.

P– "So what did you get for that?" His reply is inaudible. Then he asks her, ~~"What did you~~ "So you got 5.8?" "I got 11. Let me count again. No, I got 12 blocks." Later, "I learned something new today."

Submitted work for group to turn in.

To peer: "Do y'all have basketball game? UT plays Au? Did you go?" Class ends.

- volunteering
- asking question
- justifying solutions.

Eating peanut butter bar. Not out of ordinary. Lots of peer-to-peer dialogue. Shares answers, procedures, etc. Seeks clarification from peers.

Had to borrow sheet of paper to take notes. Did not have HW – didn't take notes while teacher explained sol to HW. Did n have textbook.

Had calc & Binder.

– Gray jeans Black tennis shoes, white sports shirt.

Considerate
Pleasant
Thoughtful
Curious
distracted
Reserved.
Serious
Shy.

Quiet
communicator.
→ Somewhat.

Ob #2 5/20 12:57
Group, graded exercise. Circles, Points of Tangency, Review of ∠'s & ~ △'s.

W/ w/ 1 WF & 1 AAF. Copying probs from overhead. SS grouped in pairs as before. T claims "a = 6. Who agrees?" CS raises hand. Begins copying bellwork from previous day from F peer. She asks "which days are you missing?" "Were you n here?" He replies, "I am missing 5 & 6." Rather than complete w/ that T is explain, continue to copy old

White v-neck shirt, gray jeans, black shoes.

Bw. Also didn't turn in HW.

Light banter, laughter, inaudible comments. Both peers thinking aloud, talking. "What? No. Round up. 7.1." "Hypotenuse is larger. If this angle is 45, the other has to be 45." Aloud, "Is it sin or cos?" Laughs when T jests: "I don't know how to do it. Relax!"

No eye contact w/ T as T approaches group. Points to diagram on peer's paper: "Which angle did he say to use?" After peer replies, he points to his paper: "We're trying to find this one, right?"

As he puts data into calc, peer says to him, "I got 36.8." He replies, "This is adj. This is hyp. This is opp. Oh. That's why I messed up. Ugh!" Then cautions peers: "Remember to type in inverse." Peer to T: "Did we do this right?" CS: "We did it right." When peer seems confused, he says, "No, read it," then reads directions to group. Then reconsiders his answer. "It might be A. E." Cont to use calc. Then, "I think it is A E." Peer: "Could be G or E." "I think it's E. I'm going w/ E. Are you putting E, too?"

Considerate
Pleasant
Ambitious
Careless
Anxious.

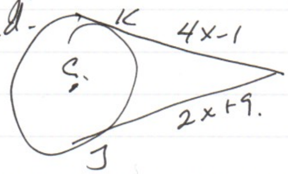
Introverted?
Reserved.
Shy.

Field Journal Notes from Observations of Case Study #6

Case 6: Obs. #2

Teacher puts prob. on board. Peer goes to board & Solve. C6 watches.

He goes to board.



Find JK

$4x-1=2x+9$
$2x-1=9$
$2x=10$
$x=5$
$JK=19.$

T: Anyone else get JK=19? Good" S raise's hand.

Although T allows for small talk w/ neighbor while st go to board, C6 never engages in disc. Sits nonchalantly - arm & leg crossed, relaxed. intently focused. ~ visual.

Raises hand & nods, indicates understanding. S passed up HW.

As prompted, gathered paper/pencil for note-taking. Who recalls what Chord is? No resp.

Maroon t-shirt, blue jeans, black tennis shoes. textbook, pencil, col pen, folder.

Pleasant
Introverted
Passive
Reserved
Serious.

Shy

Very quiet

Provide Summary explaining obs. prot & word matrix list.

Continuity

1) Teacher dem.
2) Subj / Topic
3) Class dem. / layout w/ pic
4) Stud Particular - Snapshot
5) Dress
6) Word Matrix - explain each word selection w/ examples, quotes, referencing Obs 1 & Obj 2.

APPENDIX G

TRANSCRIPTS FROM PERSONAL INTERVIEWS

All interviews were conducted in a private conference room within the participating school. If the participant did not fully answer a particular question, or if he seemed to misunderstand a question, the question would be reread fully or in part to redirect the participant and allow him another opportunity to respond. Each of the following questions was answered in order:

1. You are about to begin your senior year! Think back on some of your math classes for a moment. Describe your mathematical journey from 7th grade until now. Feel free to mention the classes you took, how well you did, your willingness to participate, how the teachers made class exciting or boring, and whatever else comes to mind.
2. Now that you have reflected on your math experiences over the past few years, tell me about your favorite learning experiences in math classes.
3. What about negative learning experiences in math classes? Do any particular incidents stand out that you remember as being difficult, stressful, or just simply bad experiences?
4. You just described some good and bad experiences from past math classes. You are used to your math teacher giving you grades and feedback, so what if you had to give math teachers a grade on their teaching. To make it easy, let's think about a pass/fail grade for your former teachers. Which teaching methods would you give a passing grade? Which teaching methods would you assign a failing grade?

In other words, if you could tell them what they do right or wrong, what would you say? Let's begin with what they do right in order to teach mathematics.

5. Now that we have visited the past, let's think about now. Which math class did you sign up for next year? Do you believe that course will prepare you for the future? If so, how? If not, then why did you take this course?
6. Which factors helped you to decide to take that class?
7. Let's shift our focus to the future. Do you often think about your future in education?
   c.) If yes: When you think about your future in education, with whom do you discuss your future? Whose advice matters most to you about your education?
   d.) If no: Would you please explain why you choose not to think about your future education?
8. Suppose who had to make a big decision about an educational issue, maybe which class you should take or which college you should apply to. Are there any particular people you might turn to for advice? If so, who?
9. I have read that African American males avoid the more difficult math courses, such as precalculus, calculus, and statistics. Do you think that is true? If so, why? If not, then why do some people believe that?
10. We have talked about math as it relates to your past, present, and future, and how others influence your course-taking decisions. Let's talk about how you may help others choose their math journeys. Do you have any younger brothers or sisters, or another young person in your life who looks up to you?

c.) If yes: What would you tell them about math courses? Which ones to take? How they can be good math students?

d.) If no: Then, suppose you could go back in time. What if you could go back and change some things about your math journey, what would some of those things be? Why?

11. Let's turn to the issue of race, and how that may affect one's math journey. Some people have said that American males opt to take easier math courses or refuse to participate because they don't want to be seen as "acting White." What do you think that means?
12. Do you believe that racism plays a part in African American males choosing not to take advanced math courses, such as trigonometry, precalculus, and calculus? Explain.
13. You are about to finish your final year of high school. Suppose a teacher, principal, or guidance counselor asked you for your advice on how they can encourage more African American males to take harder math classes. What are some things that you believe would help?
14. I do not have any other questions for you. But I do want to give you the opportunity to ask some questions about the study, make some comments about your experience participating in the study, or anything else you would like to say.

Transcription from Audiotaped Interview with Case Study #1

R - Q1 – You are about to begin your senior year! Think back on some of math classes for a moment. Describe your mathematical journey from 7th grade until now. Feel free to mention the classes you took, how well you did, your willingness to participate, how the teachers made class exciting or boring, and whatever else comes to mind.

CS1 – I feel like math in middle school was harder than it is now because the teachers weren't teaching as hard as they do now. Geometry and algebra are easier, I believe, because the teachers explain in more details than all other teachers do. My freshman year in algebra, it was quite easy, too. I still don't understand it but it is not that hard at all to me.

R – How well did you do in the classes?

CS1 – I averaged around a B or a C the whole year.

R – What about your willingness to participate? Did you go to the board? Did you?

CS1 – Sometimes, depending on how easy it was.

R – Can you think of anything that made the classes exciting or boring?

CS1 – Having my friends around me and the teachers just having fun and showing us how to learn.

R – So having your friends with you made in fun?

CS1 – Yes, sir.

R – Q2 – Now that you have reflected on your math experiences over the past years, tell me about your favorite learning experiences in math classes.

CS1 – Probably the Pythagorean Theorem. That is helpful to me I guess. I still don’t understand it, but the teacher, she is going to help me and show me how to do it.

R – So what learning experiences make that your favorite?

Just coming to class and her showing me how to do it more and more, just more experience.

R – Q3 - What about negative learning experiences in math classes? Do any particular incidents stand out that you remember as being difficult, stressful, or just simply bad experiences?

CS1 – Not really, but like missing school. That is the worst. Because when you come back and have to learn the work by yourself, that is hard.

R – So nothing particularly bad stands out?

CS1 – No, sir. Nothing bad.

R – Q4 – You just described some good and bad experiences from past math classes. You are used to your math teacher giving you grades and feedback, so what if you had to give math teachers a grade on their teaching. To make it easy, let’s think about a pass/fail grade for your former teachers. What teaching methods would you assign a failing grade? In other words, if you could tell them what they are doing right or wrong, what would you say? Let’s begin with what they do right in order to teach mathematics.

CS1 – Her doing work on the board and having us write notes out.

R – So that is not good?

CS1 – That’s good.

R – Which teaching methods would you assign a failing grade?

CS1 – Her explaining it without giving us time to write it down or showing us how to do it.

R – So if you could tell a math teacher what they do right, or what they do wrong, what would you say?

CS1 – That when she is writing everything down, show us how to do it. Her not showing me how to do it pretty much confirms a failing grade.

R – Q5 – Now that we have visited the past, let’s think about now. Which math class did you sign up for next year?

CS1 – I signed up for Bridge Math.

R – Do you believe that course will prepare you for your future?

CS1 – I hope so. I try to be good at math. That is my favorite subject.

R – What made you decide to take this course?

CS1 – There aren’t any other subjects to take. I am trying to get a better experience at math.

R – So you don’t think there are any other subjects to take?

CS1 – No.

R – Q6 – Okay, which factors helped you to decide to take that class?

CS1 – My parents helped me out talking about how I will use math in everyday life, and how I should take it.

R – Q7 – Let’s shift our focus to the future. Do you often think about your future in education?

CS1 – Yes, sir.

R – Okay, who do you talk with about your future. Whose advice matters about your future?

CS1 – Really, my parents. They talk about how they want me to succeed in life and how education is important.

R – Q8 – Suppose you had to make a big decision about an educational issue, maybe which class you should take or which college you should apply to. Are there any particular people you might turn to for advice. If so, why?

CS1 – My mom really because she went to college. I might talk to my teacher or principal because they have master's and stuff.

R – Q9 – Okay. I have read that African American males avoid the more difficult math classes, such as precalculus, calculus, and statistics. Do you think that is true?

CS1 – No, sir, because everyone is smart in their own way. I think some people just want to take the easy route.

R – So why do you think people believe that about African Americans?

CS1 – They just obviously believe things they have heard.

R – Q10 – We have talked about math as it relates to your past, present, and future, and how others influence your course-taking decisions. Let's talk about how you may help others choose their math journeys. Do you have any younger brothers or sisters, or another young person in your life who looks up to you?

CS1 – Yes, sir. I do.

R – What would you tell them.

CS1 – I would tell them to study more and bring their homework home. Ask questions if they don't understand something.

R – What courses would you tell them to take?

CS1 – I would tell them to take algebra since it is the easiest one and my favorite besides geometry.

R – If you wanted to give them advice on how to be good math students, what would you tell them?

CS1 – I would tell them don't miss school.

R – Is that it?

CS1 – Yes, sir.

R – Q11 – Okay. Let's turn to the issue of race, and how that may affect one's math journey. Some people have said that African American males opt to take easier math courses or refuse to participate because they don't want to be seen as "acting White." What do you think that means?

CS1 – I don't think that is true because we are both smart. I mean, we are just as smart as them. I am not trying to be negative but we try, we do our best, and we are going to succeed at whatever we do.

R – Why do you think some African American say that? Acting White. What do you think that means?

CS1 – Those are the ones who are jealous and not trying. They just don't want to see African Americans succeed, I guess. I think they say stuff just to say it.

R – Q12 – Do you think racism plays a part in African American males choosing not to take advanced math courses such as trigonometry, pre-calculus, and calculus?

CS1 – No, sir. I think they don’t want to do it. That just want to take the easy way out.

R – Q13 – You are about to finish your final year of high school. Suppose a teacher, principal, or guidance counselor asked you for your advice on how they can encourage more African American males to take harder math classes. What are some things that would get them to take, say, calculus? What would help?

CS1 – I would say more tutoring. Have them stay after school more and get involved in activities more, like sports related or bring them food and stuff, too. That would help them to.

R – Like feed them in class?

CS1 – yes, sir. Like for after school activities and stuff like that.

R – Okay, what about the sports?

CS1 – Like show them how sports applies.

R – Like how they relate to math?

CS1 – Yes, sir.

R – Q14 – Okay. I don’t have any other questions for you. But I do want to give you the opportunity to ask some questions about the study, make some comments about your experience participating in the study, or anything else you would like to say.

CS1 – Why do people think African Americans are not taking math?

R – A lot of research says some of the things you said, like stereotypes. Like "acting White," some African Americans have this mindset. I don't know whether they get it from their friends or their teachers. But they for some reason think that math is for White people like they think basketball is for Black people. What do you think about that?

CS1 – I think everyone can do what they set their minds to do. If you try hard, you will succeed.

R – Okay, anything else?

CS1 – No, sir.

Transcription from Audiotaped Interview with Case Study #2

R – Q1 - You are about to begin your senior year! Think back on some of your math classes for a moment. Describe your mathematical journey from 7th grade until now. Feel free to mention the classes you took, how well you did, your willingness to participate, how the teachers made class exciting or boring, and whatever else comes to mind.

CS2 – Okay. My 7th grade teacher. I don't remember her name, but she was quite rough because she was never there, and when she came back we always had tests. I never got that. In 8th grade, I was still struggling but we did like little games like puzzle games and we played BINGO, like math BINGO, and we had to know the answer. That got me started a little bit. In 9th grade I had Mr. D--- - I don't remember his name. He was a good teacher. We had two different semesters. They flip flopped me. Then I had Mr. Drewry. Mr. Drewry I understood his teaching. We had an assistant in there, Ms. D, and she was real good at it. She helped me out. The first day we were in there, she gave me 30 multiplication problems. She helped me do it. I got all of them correct my first try. If you didn't get them all, you had to keep doing them till you got them all correct. So we could do our multiplication problems.

R – What did Mr. D--- do that helped you when you weren't getting help from anybody else.

CS1 – The way he explained it to us and drew it and put steps up on the board. All the other teachers made us take notes ourselves. With Mr. D--- we stopped, we talked about it. He drew it up on the board, and I got it. Once we got a routine, I got it. My 10th grade year, I had Mr. C---. He was a real good teacher. He was hard on me at first, but sometimes you have to be hard on a student to get him to do his work. That is when a teacher cares. He made me study. He didn't solve the problems on the board. He wouldn't tell you how to do it, like the teacher before me. But my mom knew how to do math. So I took it home; we worked it out. Then we got the problems together, so I would know how to do it. Now 11th grade, I have Mr. J---, a real good teacher. He is a really good teacher. He knows what he is doing. It is just hard when you get into shapes and everything. But he is here in the mornings to help tutor me in the mornings or in the afternoon after school. So I try to get here in the mornings. He shows me the steps. He plays games with translations and all that.

R – Q2 – Now that you have thought about your math experiences over the past few years, tell me about your favorite learning experiences in math classes.

CS2 – Like out of all classes? Like 7th or 8th grade? Probably the puzzle piece game. It was not an actual puzzle, but pieces were made out of paper. We would work problems. She would put hard problems on the board. And if we had the answer, we would tell her. We would go to the spot. There was always an open spot. We would try to get the puzzle pieces correct. We had to get all our pieces in the correct spot to make this one big puzzle shape.

R – So you would have one piece of the puzzle with the problem, and the other piece would have the answer?

CS2 – Uh, hu. Yes, she wrote the problem on the board. You had to stand on a spot she picked. And you would write the answer. And if you got the answer, she would look at it. If you didn’t, she would send you back, or send both of you back. But you had to have the correct answer to the problems to get the puzzle to work.

R – To get the pieces together?

CS2 – Yes, sir.

R – Anything else.

CS2 – One other thing that stands out…Mr. J---‘s tessellations. The shapes, you had to have the right shapes to keep the pattern going. You had to use math to keep the shapes going. So those two things stand out the most.

R – Q3 – Okay. What about negative learning experiences in math? Do any negative experiences stand out? Anything difficult, stressful, or just bad experiences?

CS2 – Okay, I had not had any negative experiences. Just maybe teachers not writing stuff out on the board.

R – Q4 – You just described some good and bad experiences from math classes. You are used to math teachers giving you grades and feedback so what if you had to give math teachers a grade on their teaching, like a pass/fail grade. What would you give them?

CS2 – Okay, my 7th grade math teacher, a passing grade for at least trying to help, although she really didn’t. She was never there. But for at least trying to help. When she was there she gave tests. A failing grade for not being there. She had a substitute teacher. Substitutes, when they come, they really don’t care, so we would just sit there and hang out in class. So a passing grade for trying to help, but a failing grade for never teaching us.

R – What about your 8th grade teacher.

CS2 – My 8th grade teacher…I say both passing grades, for helping us out with the puzzle pieces.

R – What about 9th grade?

CS2 – I failed the first semester because I didn’t understand it at all. That was Mr. C---. But Mr. D---, I give him a passing grade for showing all the steps. My 10th grade, Mr. C---, definitely a passing grade on both sides. He was hard on me. He really didn’t explain it. Afterwards, I would talk to him and he would tell me to work it out at home. He was always on top of it, so I made a passing grade.

R – So are you saying he always made you work to figure it out?

CS2 – Yeah.

R – And this year?

CS2 – This year? Mr. J---, a passing grade.

R – Nothing failing?

CS2 – Trying to think back. No. No. Because he worked it out. And she stays on us all the time, too.

R – What about negative learning experiences. If you could go back to each of your teachers and say, ‘I really didn’t like it when this happened,’ what would you say?

CS2 – Well, I would tell them what we just did, with the passing and failing, and I would explain why. Like, my 7th grade teacher. I would tell her, 'You were never here. I wish you were. You did try to help. It kind of helped me, but it didn't.' My 8th grade teacher…he helped me, so nothing negative. 9th grade, the first thing I would tell him: 'We need to slow down because I didn't understand anything first semester.' I didn't get it at all. To Mr. D---, I would just say thank you. 10th grade, that was Mr. C---. If he were still here, I would talk to him every day and tell him 'Thank you.' This year, Mr. J---, he knows that I try, and he is always on top of me, so I have nothing negative to say about him.

R – Q5 – Okay, you just described some negative ---what math class did you sign up for next year?

Bridge Math.

R – Do you think that will help you prepare for your future?

CS2 – That? No. Not at all.

R – So what made you decide to take it?

CS2 – Well since geometry was so hard this year, but life is hard, so you should just suck it up and live it. I would rather not take an easy class just to graduate. I would take a harder class because I want to be a successful business man…

R – So why did you sign up for Bridge?

CS2 – I don't know. I didn't think about it. Like when we were signing up for classes. It is already too late. I talked to Mrs. H ---. She said based on my ACT scores --- I haven't seen my scores. But based on those I think I could take a higher math class next year.

R – So did any other factors help you decide to take that class?

CS 2 – No, I just heard it was easy, so…

R – Q7 – Do you often think about your future education?

CS2 – Yes.

R – So who do you talk to? Whose advice matters?

CS2 – Coach W---. I talk to Coach W---. He is my football coach. He explains to us. One day during class we were talking about WWII, and he just stopped and was like, ‘Life is gonna be pretty crappy if you don’t get your work together now. If you just slack off and like take the easy classes, whatever you want to be or do, you might as well strike that out. Because if you don’t push yourself, then nothing is going to come easy.’

R – So you look to him for advice. Is there anybody else you talk to?

CS2 – My mom. She tells me to do my best. She wants the best for me, so…

R – Q8 – Suppose you had to make a big decision in life, like maybe which class to take or which college to go to, who would you ask?

CS2 – My youth minister. He basically – we often get into deep conversations. My life is basically how he life was. We have been through the exact same things, so he tells me what colleges I should go to. I want to be a successful business major. He told me to go to Motlow for two years to get my GPA up. Then go to MTSU, North Carolina, or UT. The funny thing is, those three colleges, you on the ACT thing? I put those three.

R – Q9 – I have read that African American males avoid the more difficult math classes, like precalculus, calculus, and statistics. Do you believe that is true?

CS2 – No and yes. Some AA males, they want the easy way out. Some dropped out. Some do drugs and all that. I see no point in that. The other ones I know, those are the ones I respect because they are here to learn. They are not just here because their parents made them.

R – Why do you think people believe that?

CS2 – Because basically they see it. You know, most don't show that they are trying. When they see an AA male, with his pants sagging, they think he is a drug dealer and doesn't have a high education. Sometimes they do. They are very smart. They were just not set on a high path. Some just show it and tell it. That is why people believe AA are the way they are.

R – Q10 – W have talked about your past, present, and future. How would you help others on their math journey? Do you have any younger brothers or sisters, or another person in your life who looks up to you? What would you tell them about math?

CS2 – My little brother looks up to me. I am the second oldest. He looks up to me a lot. I would, I don't know, say never give up in math class. That is the most important. Teachers tell you that now and you think it is just to get you to do your work. But it is true because your whole life involves math. You will need math a lot.

R – So what math courses would you tell them to take?

CS2 – I would say, 'Start off easy and go hard.' Try standard classes. Like Algebra 1, take standard. Once you get into it, take the honors classes, take precal, take all of that.

R – Q11 – Let’s turn to the issue of race, and how that may affect one’s math journey. Some people have said that AA males opt to take easier math courses or refuse to participate because they don’t want to be perceived as “acting White.’ What do you think that means?

CS2 – Uh…I think it means that AA seem that they don’t want to look too smart to others. Like they don’t want to be looked down on by other AA males. So if they skip math and act dumb and hang out with other AA males, then White people would basically think, ‘Well, I know he is smart but he just doesn’t want to take it because of what they might think of them. My advice to them is, do your own thing. Don’t worry about what other people think because they are living their life and you are smart, so you can be successful in whatever you want to be.

R – What does it mean to “act White”?

CS2 – Acting white? Like basically, doing everything. Trying to dress proper, no sagging pants. Don’t do drugs. Smart. Good grades. Good GPA. That is acting White.

R – Q12 – Okay. Do you believe racism plays a part in AA males choosing not to take advanced math courses?

CS2 – Not really. I think it is just up to them. If you want to take it, take it. I don’t think it is a race thing. Anybody can be racist, but I choose not to be. I am not a racist person. Nobody in my family is a racist person. If you choose to be…live your life the way you want to live it. It is you. If I try to help you, and you take my advice, good. If you don’t, hey it is your life.

R – Q13 – Suppose a teacher, principal, or guidance counselor asked you for advice on what we can do in school to encourage more AA males to take harder math classes. What do you believe would help?

CS2 – Get more teachers to show they care. Not just AA males, but White males as well. If they showed they care, people would get more into math. They would work. A lot of times, AA males and white males, they probably don’t live with their parents. They probably live with their grandmas. Maybe their parents passed on, and they don’t have anybody to push them, to be hard on them. Who is going to guide them in their life. If you show you are, they will wanna push themselves. If the push themselves and learn, they will take harder classes.

R – So if I wanted more Black guys to take math next year, what should I do?

CS2 – Stay on top of them. Right there. That will help them out.

R – Q14 – I don’t have anything else. I do want to give you the opportunity to ask some questions about the study, make some comments about your experiences participating in the study, or anything else you’d like to say.

CS2 – I just had a great experience doing this. That is my only comment.

R – It has been fun?

CS2 – Yeah, it has been real fun.

R – Good deal.

Transcription from Audiotaped Interview with Case Study #3

You are about to begin your senior year! Think back on some of your math classes for moment. Describe your mathematical journey from 7th grade until now. Feel free to mention the classes you took, how well you did, your willing-ness to participate, how teachers made the class exciting or boring, and whatever else comes to mind. So start with 7th grade, what was boring, how you participated…that sort of thing.

CS3 – I think I took Algebra I, or sort of like Algebra 1, maybe like geometry. I really didn't understand that much in 7th grade math. There was one point when the teacher explained it to me and I got it. I though, 'I can really get this.' I participated a lot in class. I took a lot of note. I was a real bad test taker. It was okay, but it wasn't that…I mean, it helped me a lot, but ever since it has been downhill in math. I tried to bring it up.

R – What about 8th grade?

CR3 – 8th grade was a little bit better. I had a teacher that could explain it in a way that I could understand it, where I could strive and excel in that class. She, I don't know really how it go to my brain, but I guess it was because we did a lot of group activity wise, and a lot of just a lot of stuff on the board, and she got us involved, had a lot of games.

R – What about 9th grade?

CS3 – 9th grade was, I was slacking a lot my 9th grade year because I didn't.. I did the notes, but my homework..I would set my mind on it but when I got home I just didn't do it. Than closer to the end of the year I started trying to work on it but it was a little too late. But math my 9th grade year, I feel like my math teacher screamed a lot and I really didn't understand it, anything. If you asked a question, she got an attitude. So I was like, I will just let that be and not worry about it.'

R – 10th grade?

CS3 – 10th grade was about the same but I did the homework, but not constantly like I should have. I ended up in Fresh Start. My Fresh Start teacher explained everything that we went over. And my algebra teacher my 10th grade year explained it where I could understand it, and I did the work and was happy about the work and I got good grades in that Fresh Start class. I guess different teachers explain it in a way I understand it. I could understand it her way better than the original teacher I had.

R – What about 11th?

CS3 – Well my math teacher, he worked with me a lot when I came back from my injury. He helped me a lot, got me to understand what he was teaching, and I understood it somewhat. As time went on it got a little harder and harder. Then I got to where I didn't do the homework some nights. Sometimes I would forget because of football practice and coming home and being so tired. The tests – I am a horrible test taker, but I try my hardest on the test. I took notes and studied those at home and I'd try my hardest.

R – From 7th grade until now, what made you think class was boring?

CS3 – Probably just the teacher talking way too much. Trying to lecture and just doing PowerPoint notes and working on the projector. Doing that numerous times is just boring and it makes you real sleepy and makes students not want to be involved in class.

R – What made class exciting?

CS3- My 8th grade teacher got us involved by doing stuff on the board and playing games. Those are the things that are exciting because it makes you want to come to class and want to be involved in class and want to try to compete to get that answer, and at the same time she is trying to help you learn what you need to learn to fully understand what the lesson is for that day. That helps you a lot and gets you involved and real excited because you are we get to play this game for whatever it is for, for this subject. It is a learning experience at the same time.

R – Q2 – Now that you have reflected on your math experiences over the past years, tell me about your favorite learning experiences. You have kinda already don't that, but is there anything else you would like to add?

CS3 – No.

R – Q3 – What about negative learning experiences? Do any particular incidents stand out that you remember as being difficult, stressful, or just simply being bad experiences?

CS3 – I guess stressful…my 11th grade year, we were doing – I don't remember what formula or what method it was but during that time it was real stressful because he had explained it and I had asked five questions and other people had asked two or three questions but I felt I was the only one who couldn't get it cuz I would look around and see everyone doing the worksheet and working on it and it came real easy to them. It bothered me cuz I couldn’t understand why I couldn’t get that method, that certain method, you know. It was real stressful and I was real stress cuz I wanted to get it. I wanted…I didn’t want him to think I was asking too many questions about it. Even though teachers say ask all the questions you want about it, I just felt like I didn’t want to ask him too many questions, that I just wanted to try to figure it out on my own. But that was hard cuz I wanted to learn it.

R –Q4 – You just described some good and bad experiences from past math classes. You are used to your math teacher giving you grades and feedback, so what if you had to give math teachers a grade on their teaching. So go back to 7th grade. If you had to give each teacher a passing grade, what would it be. And if you had to give each teacher a failing grade, what would it be.

CS3 – My 7th grade teacher, I’d give her an A. She taught me a lot when my previous year I was not involved in math like that. I really didn’t like math. She kind of brought it to like where I could like math and really understand it. So I give her an A. My 8th grade teacher, I’d give her an A because, like my 7th grade teacher, she got me involved in math, and I really liked that. My 9th grade teacher, I give her a D cuz…she explained it…but it wasn’t to where I understand it, and a lot of other people didn’t understand it because if you asked a question she would scream like if you asked a question because you didn’t understand it. My 10th grade teacher, I would give her an A because she explained it and you understood it. It was just bad on my part for not putting forth the effort and trying not to do the work like I should have. I give her an A. My 11th grade teacher, I give him an A because he tried to work with me. He knew me coming back my injury I didn’t really know that much. I didn’t know nothing at all, and he would work with me. As time went on, he would help me out a lot.

R – Part of this question says, if you could tell teachers what they do right or wrong, what would you say, to your math teachers?

CS3 – I would tell them, don’t talk or lecture too much. Lecture does not get them involved. It makes them sleepy. Don’t have a lot of Power Point notes and a lot of overhead notes and a lot of writing. Don’t always cut the lights off during notes because that will help students go to sleep. That is not what you want. You want to have them involved in learning. Something math teachers do right. Some have students involved, have them working on the board, and have games and stuff like that. Just being involved with your students will help them be successful and succeed in life. They will down the road be like, ‘hey I remember that math teacher. She helped me and kept me involved. They will remember from that time period that you helped them with that lesson, but you were involved with that lesson, and they will remember that in their lifetime.

R – Q5 – We have talked about your past. Let’s talk about now. Which math class did you sign up for next year?

CS3 – Bridge Math because I feel like that I didn’t have that much fair advantage when I came back, and Bridge Math would help me. It is easier, and it would help me to try and understand and what I really didn’t know.

R – Do you think it will help prepare you for your future?

CS3 – Yeah I do think it will help prepare me for my future cuz it is a lot easier. I think it will come easier, and I will be involved in Bridge Math. I think it will help me out when I get to that point when I need to do math.

R – Q6 - So you elected to take Bridge Math. What factors helped you decide to take that?

CS3 – Well my grades. My work ethic. I feel like I just need to get my work ethic better. I think if I go to Bridge Math that will help me out a lot. I will do better in Bridge Math than in my previous math classes.

R – Q7 – So let's shift our focus to the future. Do you often think about your future in education?

CS3 – I have not…I have thought about being in the education field sometimes, but then I think, well, I don't think I could handle…

R – I am sorry. This question is not worded well. It should say, 'Do you often think about your future education?'

CS3 – I do think about my future education. I hope to be in college soon. I am going to Motlow for two years. To MTSU for two years. I really think those math classes will be a lot harder. It will come down to work ethic. It will come down to a lot of patience and a lot of studying because I know there is a lot of tests in those math classes and the teacher is not gonna tell you what you missed if you miss a day. So I will have to buckle down, do my best, and try my hardest and get to working.

R – Whose advice matters most when you think about your future education?

CS3 – My mom. Her advice matters most to me because she has been through it cuz when she was in school she had problems with math too. But she buckled down and got the work done. She was like, ‘I know I am having problems, but I need to try and do my hardest at it. So I talk to her about it. The things I talk to her about, she has been in the same situation, so she can help me and she understands where I am coming from in that situation.

R – Q8 – Suppose you had to make a big decision about an educational issue, such as while class you should take or which college you should apply to. Are there any people you would turn to for advice?

CS3 – The people I would turn to for advice would be my mom and my grand-mother and uncle because they have been in that situation before. I have had sit down talk situations where I sit down and talk about which college I should apply for and what is the best option for me. They help me a lot in that process. That is why I am going to Motlow for two years and MTSU for two years. I thank them a lot for that.

R – Q9 – I have read that AA males avoid the more difficult math classes, such as precalculus, calculus, and statistics. Do you think that is true? If so, why?

CS3 – No, I do not think that is true. I know some of my friends who are AA, and they are really smart and they love precalculus math, or advanced math, and they excel in…but then again, sometimes AA men, they have the ability to be in those advanced math classes and they have the grades to be in those advanced math classes but sometimes it is just they don’t wanna put forth the effort and time because in the advanced math classes it is a lot of work and a lot of time you have to study…real hard to keep those grades up. I think sometimes work ethic, but sometimes people do it because they love the work, and they love to do it because they love it.

R – Q10 – We have talked about math as it relates to your past, present, and future. Let’s talk about how you may help others choose their math journeys. Do you have any younger brothers or sisters, or another young person in your life who looks up to you?

CS3 – I have a little cousin that looks up to me. I do my best to teacher her the right way. She is making good grades in all her classes. I think she is an A/B student. I try to tell her not to slip, to study hard, and keep up the work, and try your hardest in whatever you do. If you come to a point where you can’t figure out a problem or question, then ask the teacher. If you still can’t figure it out, then try to ask your peers and others around you. Still, try your hardest. Don’t just quit or just give up on the problem. Just keep trying till you get the answer.

R – What math classes would you tell this person to take?

CS3 – I would probably tell them to take geometry because to me geometry is a good subject. It comes with a lot of problems that might make you frustrated and irritated, but there is a lot of excitement involved. You get to do some projects that get you involved in math and give you that happiness in math that you want, so I’d recommend geometry.

R – Q11 – Let’s turn to the issue of race, and how that affects one’s math journey. Some people have said that AA males opt to take easier math classes or refuse to participate because they don’t want to be perceived as acting White. What do you think that means?

CS3 – I disagree with that statement. To me there is no such thing as acting White. I mean, you are acting like you, who you are. If you want to participate in math or be an A student, you are just acting like your parents raised you. It all boils down to how your parents raised you. If you don’t come to class, or if you have a poor work ethic, or won’t participate, or sit in class sleeping and stuff, some people have been raised where they do work, but sometimes people get lazy and they don’t want to do it. If you do do it, you are not acting White, you are acting the way you should act. It is all on your own being. You are not copying anyone at all. Not acting White, just doing this on your own.

R – Q12 – Do you believe racism plays a part in AA males choosing not to take advanced math courses, such as trigonometry, precalculus, and calculus?

CS3 – No, I do not because I don’t want….AA men don’t…it is not a race thing. If it were a race thing we would probably go to being in advanced math classes with Black teachers all the time. It is not a race thing at all. It is just, some people don’t want to be in those advanced math classes because regular math classes come easier to them. They don’t want to put forth that effort, you know. They just want…they, a lot of AA men do want to be in advanced math class, and that class comes to them easier than other math classes so they want to be in that math class. I don’t think it is a racial thing at all.

R – Q13 – You are about to finish your final year of high school. Suppose a teacher, principal, or guidance counselor asked you for advice on how they can encourage more AA males to take harder math classes. What would you tell them? What would take them take harder math classes?

CS3 – I would say to take harder math classes, find a way to get them more involved in that class. Show them that class is a great class. That it is beneficial to you and can help you in this way and that way, and can help you. Have fun in that class but you can still learn if you put forth the effort and the work in that class and you do all the right things, then you should excel in that math class.

R – Q14 – Okay. I do not have any other question for you. But I do want to give you the opportunity to ask some questions about the study, make some comments about your experience participating in the study, or anything else you would like to say.

CS3 – Well, my experience has been a little weird because some of the questions were a little shocking to me, but I understood why you asked those questions, and this study has been good. It has taught me a lot. I learned a lot. It makes me want to try to prove that AA men can excel in math classes. And if I can get into a harder math class, I will consider getting into a harder math class because I like the challenge, and I like the opportunity to do my best and work hard in that math class.

R – Anything else?

CS3 – No.

R – Okay, good.

Transcription from Audiotaped Interview with Case Study #4

R – Q1 - You are about to begin your senior year! Think back on some of your math classes for a moment. Describe your mathematical journey from 7th grade until now. Feel free to mention the classes you took, how well you did, your willingness to participate, how the teachers made class exciting or boring, and whatever else comes to mind.

CS4 – In 7th grade, I had Ms. K--- at [the middle school]. She was cool. She made it fun. She would always laugh and do fun activities with us. She really helped me. I think 7th grade is when I really started to like math. It became my my favorite subject. She would tell us stories about her life. She wouldn’t make it boring. We had challenges and stuff, like competitions. I can’t really remember my 8th grade teacher. She was really tall. She would always help us and challenge us. Help us after school. She always made it where we could get better on our math skills. She really encouraged me to take higher math classes in high school. My 9th grade teacher, I don’t really remember her name. She left school last year, and Coach P--- is in her room now. She was my favorite. She was the most helpful. She broke every math problem down for me. She was good about that. And she helped everybody, not just me. She made it really easy for me. 10th grade, Mr. C---. Everybody hated him but he was my favorite. I had him 1st period every day for the whole year. I liked his class because I would always raise my hand and say the answer, and everybody always made fun of me because I answered the question. Everybody said, ‘Oh, so you wanna be a math teacher.’ Like joking around. He was a cool teacher. Nobody liked him, but I did. He was a cool teacher. I don’t know why he left. Maybe he had better things to do. He helped I passed with maybe a B average, but I worked for it. My junior year. I have Coach G---. I like him a lot. He encouraged me to take advanced math next year, but I am not sure if I can do that. But he is cool. He helps me after school before or after school. He stays late for his students. He is real nice, always smiling. I mean, every teacher has bad days, but he is mostly smiling when he comes in. But, I am glad to finish the year out with him because he is going to [another school] next year. I am sad he is leaving because the lower classmen won’t have him as a teacher. They won’t see how cool and helpful and accepting he was. They will be okay, and I hope he does good wherever he goes or decides to go.

R – Q2 – Now that you have reflected on your math experiences over the past few years, tell me about your favorite learning experiences in math classes.

CS4 – What makes it fun and memorable is all the joking around, all the jokes he says to make it fun. He makes up words to make it more fun. He jokes around. Sometimes he is serious. We have to get our work done. And sometimes we play games and it is pretty easy sometimes.

R – When you say games, do you mean math games?

CS4 – Yeah, math games.

R – Let’s go back to last year. What times of things did she do that were favorite learning experiences?

CS4 – Favorite learning experiences. She had us do this project. It was a poster. We used rules and crayons to make a city. We used shapes and turns and things, naming cities. That was cool. We played math BINGO and stuff. That made class more fun.

R – What about 7th grade?

CS4 – Ms. C---. She played games, like multiplication challenges. And we would see who could finish the test fastest, or go to the board to do a problem the fastest. Things like that.

R – Q3 – What about negative learning experiences in math classes? Do any particular incidents stand out that you remember as being difficult, stressful, or just simply bad experiences?

CS4 – Nothing comes to mind. I don't really think of any negative experiences. I like math so much I just think of it on the positive side.

R – Q4 – Okay, so you just described some good and bad experiences from past math classes. You are used to your math teacher giving you grades and feedback, so what if you had to give math teachers a grade on their teaching. To make it easy, let's think about pass/fail grades for your former teachers. Which teaching methods would you give a passing grade?

CS4 – What do you mean?

R – What do teachers do that you would say, this is a passing grade. [inaudible]. For example, you might say, 'I give him a failing grade on the types of tests he gives.'

Well, Mr. G---, he gets a passing grade because he is so nice and kind to me. His test can be hard. But if you think about it and push yourself, they are pretty easy. Ms. C---, my 7th grade teacher. I give her a passing grade because it wouldn't always be about math. It was about her family.

R – And your freshman year?

CS4 – I give her a passing grade because she was always so nice, so cheerful to everyone. So I give her a passing grade for always staying positive. Mr. C---, I give him a passing grade. I remember every day my sophomore year, he always had coffee. People didn't see him like it did, so I give him a passing grade.

R – What about a failing grade or some criticism?

CS4 – I could give a couple of them a criticism because maybe they blamed me for failing a test when they could have helped me more or explained it in a little more detail.

R – If you could tell them to do something better, what would you tell them?

CS4 – If I could tell them to do something better, just to maybe help me after school and encourage me to take an advanced class next year, an AP, maybe stay after school to help me get a better understanding of what that will be like since he has a degree in math.

R – Q5 – What class did you sign up for next year?

I signed up for Bridge Math because it is easy. I probably should have signed up for a harder math, just for college purposes. I think those things, but it will be hard though, but if I push myself, do my homework, and pay attention in class, I think I can do it.

R – Do you think Bridge Math will help you in your future?

CS4 – I really do because I heard Bridge Math is like Algebra I, Algebra II, and geometry all mixed up together. And, I already know most of that stuff. I don't think you need an AP or honors class to get by in life. I think basic math skills will help you in your future.

R – Q6 – The next question is - and I think you already answered it. [inaudible]. Is there anything you want to add?

CS4 – If I could pass that class with an A, I would try the next semester to get into an advanced class. Bridge Math just sounds easy because trigonometry and other classes just sound hard. And I don't know how the teaching experience is gonna be, so I could try both.

R – Q7 – Do you often think about your future in education – your future education?

CS4 – [nods]

R – Who do you talk with? Whose advice matters most?

CS4 – I would have to say my counselor and my mom. My mom is not that smart, but she still encourages me because she wants me to go to college and pass, so she pushes me. Even though she can't help me and I have to do the work myself, she pushes me to do better and tells me that failing is not an option. That I should succeed in life. So I try my hardest. And I would say my guidance counselor because she tell me – like I want to go to Kentucky, but my mom and her boyfriend want me to go to MTSU because it is less expensive. But I want to go to Kentucky. If I want to go to Kentucky, then I should push myself real hard and take a harder math class.

R – Q8 – Suppose you had to make a big decision about an educational issue, maybe which class you should take or which college you should go to. Are there any particular people you might turn to for advice? You mentioned your mom. Anybody else?

CS4 – My cousin. He graduated last Saturday from MTSU with a degree in concrete management or something like that. He encourages me. He tells me I need to get my grade point average up to a 3.0 or above. His ACT score was not that good, but he graduated with honors. He went to MTSU, and he already has job offers in Maryville and other places in [the state]. I want to be able to say that I graduated from college. So, I would say my cousin.

R – Q9 – I have read that AA males avoid the more difficult math courses, such as precalculus, calculus, and statistics. Do you think that is true?

CS4 – It isn’t that we avoid the math classes. It is just that maybe our teachers don’t think we can take harder classes. Coach G---, he encouraged me to take harder math classes, but other teachers tell me to take easier math classes instead of a hard one. So maybe 50/50. Maybe we do avoid them, maybe we don’t. We don’t give it a chance.

R – Why do you think people believe that is true? You say 50/50 and we avoid them. People who think AA avoid math classes. Why do they think that? If we were to ask them why Black people avoid harder math classes, what would they say?

CS4 – That they are stupid. But we are not there are Black professors, Black doctors, Black teachers. I mean, I guess it is just stereotypical to think that. Maybe it is 50/50. They should give us a change because a Black male is just as smart as a White male if they push their selves and encourages themselves. A White person may have a better background. Like maybe they have a parent who is a professor in college. Not like a Black student would. But I don't know.

R – Q10 – We talked about how others influence your decision making. Let's talk about how you may help others choose their math journeys. Do you have any younger brothers or sisters, or another young person in your life who looks up to you? What would you tell them about math?

CS4 – I would tell them to at least try. Just try to go with the hard math class. If you can do it, keep pushing yourself. If not, try an easier one. I think many of my younger siblings and cousins could do it if they try. Do your homework every night and ask questions and just put yourself. Then you could take harder math questions.

R – What classes would you tell them to take? The second part is, How can they be good math students? What is some advice you would give them?

I would tell them to take honors math classes. I didn't because I now I am too lazy. And I know honors classes give a lot of homework every night. And, like, challenge themselves. That would lead to good ACT scores and college offers. You might want to be a math teacher, so I encourage them to take honors math classes.

R – Q11 – Let’s turn to the issue of race. Some people have said that AA males opt to take easier math courses or refuse to participate because they don’t want to be perceived as “acting White.” What do you think that means?

CS4 – I think that is just stereotypical. I mean, I like to answer questions in class, and I don’t see anything wrong with that. If you want to answer a question, it doesn’t mean you are White. It means you just want to answer a question. It is kinda stupid to say. It is not that we AA males avoid questions; I think they just don’t want to. There are smart AA males who know the answer; they just don’t want to say it. Not because they are acting White but because probably think the teacher thinks they are dumb. But maybe they can show it on the test that they can ace it.

R – What do you think it means? Acting White?

CS4 – To be smart, to pass tests, and maybe answer every question right, correctly. Even White students can get the answer wrong. Maybe the Black student gets it right. So acting White..what if the Black student gets it right and the White student don’t?

R – Q12 – Do you think racism plays a part in AA males choosing not to take advanced math courses?

CS4 – In today’s view, I don’t think so. Maybe in the past. Not here at [this school]. I don’t think race has anything to do with it. A Black student having a White teacher doesn’t make a difference as long as the teacher does their job.

R – Q13 – You are about to finish your final year of high school. Suppose a teacher, principal, or guidance counselor asked you for your advice on how they can encourage more AA males to take harder math classes. What do you believe would help? If I wanted my calculus numbers to go up, what would help?

CS4 – Maybe encourage them a little more. Maybe help. Just tell them that they can do it. Maybe they think you only help the White students. Maybe you should have a meeting – well not a meeting because they may feel degraded because all the Black students got put into one place. Maybe just encourage everyone and go class to class. Encourage them before a test or before class. Be cheerful, I guess. Just give them hope.

R – Q14 – I don’t have any other questions for you. But I do want to give you the opportunity to ask some questions about the study, make some comments about your experience participating in the study, or anything else you would like to say?

CS4 – Well I am not sure. I kinda forgot the reason why you asked me to do this case study.

R – Well, for one, you are a junior. And you are AA. And you are male, so you met the criteria for that. I just took a roster of all Black males in the 11th grade. From the list, I tried to choose those [inaudible]. You were kinda average in that group.

CS4 – By me helping you, what do you get outta this?

R – What do I get outta this? Well, I get to include all of this data in my research paper, which helps me complete my doctorate. So it is a big help.

CS4 – A doctor degree? So you want to be a doctor?

R – It is a doctorate, a PhD that you can get. Not like a medical doctor. But you have PhDs in math and science. That would enable me to teach college.

CS4 – So will my helping you allow you to go farther than you are right now or are you trying to get a better job.

R – I would eventually like to get out of K-12 and teach college, maybe write a book. So this may actually end up in part of a book later in life.

CS4 – I don't have any other questions to ask.

R – Good job.

Transcription from Audiotaped Interview with Case Study #5

R – Q1 – You are about to begin your senior year! Think back on some of your classes for a moment. Describe your mathematical journey from 7th grade until now. Feel free to mention the classes you took, how well you did, your willing-ness to participate, how the teachers made class exciting or boring, and whatever else comes to mind.

CS5 – In 7th grade I went to [a local middle school]. I am not sure what math math I took, but my teacher, Ms. M---, I was horrible at math. I think I failed on my report card. I think it was a 60 something. But as the year went on I got better because they put me in Double Dose Math. I got better. It was just an up and down year. We also had a resource teacher, Mr. M--, and he left. That was when my grade started slipping. Then we got another resource teacher. When she came my grade kinda declined a bit. So it was a fluctuating year.

R – What about your 8th grade year?

CS5 – 8th grade. I didn't fail, but I still struggled. I had Ms. N--- for 8th grade. I wasn't in Double Dose that year, but I was kinda lazy. I really didn't apply myself as well as I should have.

R – What about 9th grade?

CS5 – My freshman year they put me in Algebra 1 Honors. I had Ms. T---, and I got moved out of there because I am a lazy student. Then I had Mrs. B---, and I did pretty well. She explained it, and I did pretty well. She's probably one of my favorite math teachers.

R – What about 10th?

CS5 – I had Mr. C--- for honors. I did pretty well in his class. He went a little fast, but I did pretty well. I think I averaged a B. That is when I started to step up, my sophomore year. My grades were a lot better than in my freshman year and middle school.

R – What about this year?

CS5 – This year, geometry. I am averaging an A. It is a lot better. I am doing my work. It is a lot easier for me. It just clicked.

R – So if you could go back to 7th till now. What did all the teachers do that you liked? How did they make classes exciting or boring?

CS5 – Well, to me middle school was just like busy work. When you get to high school, it is like, do your homework and study for the test. In middle school we had all these assignments and useless. What killed me was not going over it thoroughly.

R –Q2 – Now that you have reflected on your math experiences over the past few years, tell me about your favorite learning experiences in math classes.

CS5 – I think freshman year, tessellations, I guess. The geometry aspect makes it fun for me. Project and group activities, that is what we do in Mr. J---‘s class. He puts us in a group and lets us do tests and stuff like that. We go over them. That helps me: learning from someone who is in your shoes who can explain it more or better, I should say.

R – Q3 – What about negative learning experiences in math classes? Do any particular incidents stand out that your remember as being difficult, stressful, or just simply bad experiences?

CS5 – Taking notes because we have a block period for an hour and a half, and you don't really learn anything. You are so focused on copying the notes, making sure you got it that you don't have time to take it all in. Whereas, as a group, you can think about it, they can explain it. Younger people around your age have more patience with you because they know what you are dealing with. So that makes it, not a teaching but a helping.

R – Q4- You just described some good and bad experiences from past math classes. You are used to your math teachers giving you grades and feedback, so what if you had to give math teachers a grade on their teaching. To make it easy let's think about a pass/fail grade for your former teachers. What teaching methods would you give a passing grade? For example, you mentioned Mr. J-- did group work, so you may say, 'I give Mr. J—a passing grade for group work. But I give him a failing grade for…

CS5 – I give most of my teachers an A for, I guess, group work. But a failing for notes for so long for so many notes, and for busy work. A lot of it, like homework, from my experiences teachers don't check it anyway. People worry about all this homework, and they don't even check it anyway. So they give it to us. People nowadays, they don't want to do their homework. They just look in the back of the book and do it to get it done. For lots of teachers it's just for participation. That's where I would give them a fail.

R – Now that we have visited the past, let's think about now. What math class did you sign up for next year?

CS5 – I signed up, I think, for precal. But I think I am gonna get that switched to advanced algebra and trigonometry. I may stick with precal. I may not. It is kind of a debate. I am not sure.

R – I thought when I looked at your transcript you had signed up for Bridge.

CS5 – Naw, I didn’t sign up for that.

R – Why would you change it from precalc to advanced algebra?

CS5 – I don’t think I want to jump into something new. I have had Algebra II and geometry. I kinda wanna stay on that basis where I can get a reflection on the past and kinda know where I am at. I don’t wanna take something new and get a bad grade. That is where I was my freshman year. I came into Algebra I honors, and it killed my grade, so.

R – Do you think that whatever class you are in will help prepare you for your future?

CS5 - I do.

R – How so?

CS5 – Well, math you will need regardless. Some you might not. Math is always gonna be there. I am gonna major in business, and I am in accounting right now, and you are gonna need math for accounting. If you do business, or own your own business, do stocks or whatever, you are gonna need math.

R – Okay. Question 6 you technically answered. Do you want to add anything to that? No? Okay.

R –Q7 – Let’s shift our focus to the future. Do you often think about your future in education?

CS5 – I do. Like I said earlier, well I didn’t say it but you. Like I said my parents didn’t finish college. It’s not really pressure but my dad is like, ‘You are gonna be the first in our generation to go to college and hopefully complete,’ so it is a lot to deal with and hopefully I can make a good grade on ACT and get a scholarship to MTSU or whatever and hopefully finish. I don’t wanna have that same cycle. I wanna be successful at that.

R – Who do you discuss your future with? Whose advice matters most about your education?

My grandparents on my mom’s side. My mom is White, and her side is a little wealthier. He tells me, you know, like we can help you and stuff. I don’t really talk to him about that but it is like, uh, you know, he talks about meeting people, getting connections, going to college, get an education. I can talk to him because he understands it a bit more than my dad does. Certain things. He has been to college and he is pretty successful, so…

R – Q8 – Suppose you had to make a big decision about an educational issue, maybe which class you should take or which college you should apply to. Are there any particular people you might turn to for advice? If so, who?

CS5 – Umm, there is always my counselor, Mrs. B---. That is what she is there for. And maybe my business teachers because that is what I want to do. So I would probably talk to them about going to college. Like I said earlier, my grandpa. I don’t wanna sound negative, but I can’t really talk to my parents because they never really finished. I don’t wanna make them feel insecure about themselves, too. So it’s kinda…

R – Q9 – I have read that AA males avoid the more difficult math courses, such as precalculus, calculus, and statistics. Do you think that is true?

CS5 – Ummm, I would say so because it is not the laziness. I think it it is the fear because a lot of them aren’t’ use to it. Some of it is stereotypical because AA’s play sports, play football, basketball, whatever, track. That is a lot harder, so sports is their math. That is what they are devoting their time to. So I guess it might be that.

R – So they avoid taking harder math classes because they focus on sports?

CS5 – I would say so.

R – Q10 – Okay, so we have talked about math as it relates to your past, present, and future, and how others influence your course-taking decisions. Let’s talk about how you may help others choose their math journeys. Do you have any younger brothers or sister, or another young person in your life who looks up to you?

CS5 – I have two little sisters, but they kinda struggle with school, you know. They are like, it doesn’t come as easy for them as it does me. But they might be at that stage like I was where it snaps. I would say…

R – What would you tell them about math courses? What would you tell them to take? How to be good math students?

CS5 – Like high school or any?

R – In general.

CS5 – I would say take what you feel comfortable with. If math has always been trouble for you, like early on. I would say work over the summer on the little things. Start small and work your way up. You don’t just jump into an honors like I did. I wasn’t ready for it. I was lazy. It took me a little time to get up to there.

R – Okay. So as far as being a good math student: What would make somebody be a good math student?

CS5 – A person that pays attention, does all the notes, and helps other people that are struggling. That’s what I think a good math student – don’t just be smart and rub it in everyone’s face. I am not saying let them cheat off you, but help them sometimes.

R – Q11 – Let’s turn to the issue of race, and how that may affect one’s math journey. Some people have said that AA males opt to take easier math courses or refuse to participate because they don’t want to be seen as “acting White.” What do you think that means?

CS5 – Like the last part?

R – Yeah.

CS5 – I have never experienced or seen that before. I don’t think it is about acting White. It is about applying yourself. Laziness, like I say. Acting – I have never faced that. I am half white, and I have never seen anyone [say], ‘Why are you taking this class?’ If you are in that class and you are trying to be successful. That is what they are looking at. They don’t care what color your skin is.

R – Q12 – Do you believe that racism plays a part in AA males choosing not to take advanced math courses, such as trigonometry, precalculus, and calculus?

CS5 – Racism like from the teacher or themselves or…

R – Either.

CS5 – I would say it is more that pattern, that repetition, like if their parents didn't take any, then they won't be pushed to take it. I think they need a push to take it. I mean like if you come to high school as a freshman and you are educated about what to take then they will probably do it. But they will never step up if they don't apply themselves.

R – Q13 – You are about to finish your final year of high school Suppose a teacher, principal, or guidance counselor asked you for your advice on how they can encourage more AA males to take harder math classes. What are some of the things you believe would help?

CS5 – I would say, this might be difficult. But get a coach. A lot of AA's at this school play football. I would say get a coach and he talk to them about how grades count too. It is not just about sports, but about other things. Have the coach tell them about grades. You are not always gonna have – you might get injured or something. You might break a leg and not be able to play football anymore. I'd say the coaches have impact. Get their parents involved more. I don't know, have somebody go to the parents' houses and talk to them about that.

R – About what?

CS5 – You know, taking the classes and your future and life. Not everyone wants to go to college. Everybody wants to be the next athlete and think they will get that scholarship to college. But that doesn’t always work out.

R – Last page. I do not have any other questions for you. But I do want to give you the opportunity to ask some questions about the study, make some comments about your experience participating in the study, or anything else you would like to say.

CS5 – Like questions about? Is this study like an information to get help to them, or is it like…

R – Well, most of the people who will be reading this after it is published will be educators. So let’s say in five years you are in college and you want to be a math teacher. And you are AA, or at least you identify yourself as such. You might want to do look at some research. You may look at my study and say, ‘This guy at [the participating school], look what he found: they don’t like to take a bunch of classes.’ So we hope this will help teachers now and future teachers know how to better cater to AA’s.

CS5 – So it is about long term and short term.

R – The study will always be out there, online and in books, in the library. I hope there are some other things I can do, like publish in journals that teachers subscribed to, professional magazine.

CS5 – Add to the general knowledge out there.

R – Yeah, I could take this study and make smaller articles out of it over the years, and teachers could subscribe and look and say, ‘This is how I can reach the AA male. I could use this research.’ So, I am hoping that the right people read it, and the right people apply it. A lot of it does not get read.

CS5 – But some of it? That is the goal?

R – Yeah, I learned a lot. It has been a good experience for me. Any other questions?

CS5 – No, sir.

R – Okay, I appreciate it. How was that?

Transcription from Audiotaped Interview with Case Study #6

You are about to begin your senior year! Think back on some of your math classes for a moment. Describe your mathematical journey from 7th grade until now. Feel free to mention the classes you took, how well you did, your willingness to participate, how the teachers made class exciting or boring, and whatever else comes to mind.

CS6 – I think 7th and 8th grade I did pretty well in math, but it was kinda kinda hectic, like the teacher didn’t do a good job controlling the class, and we always got more homework than we should have. In high school it got a lot better. I feel like I learned a lot more in math. I took Algebra 1 in the 9th grade and geometry my junior year. I feel pretty good in math class. I understand the material and stuff.

R – How did you participate in your math classes? If you go back to 7th grade, how did you participate?

CS6 – I would raise my hand to answer questions if we were going over work and stuff.

R – And this year?

CS6 – This year? We don’t do a lot of group work, but when we go over work I will answer questions. When we go over homework, I will answer questions and that type of stuff.

R – What types of things made class exciting?

CS6 – I think, really, the most exciting part, just the general mood in the classroom. The teachers have different personalities and stuff. I think that adds to the excitement.

R – And what types of things make class boring?

CS6 – Busy work.

R – What is busy work?

CS6 - Crossword puzzles, coloring, and stuff. Like, that don’t really have anything to do with math. They just keep you busy.

R – Q2 – Now that you have thought about your math experiences over the past few years, tell me about your favorite learning experiences in math classes.

CS6 – I kind of like the graphs actually; learning about different functions and stuff.

R – Q3 – What about negative experiences? This is Question 3: What about negative experiences in math classes? Do any particular incidents stand out that you remember as being difficult, stressful, or just simply bad experiences?

CS6 – If I think back to middle school, like 7th grade, just trying to stay focused with the class being out of control and stuff. But I still managed to get through it.

R – Okay. You just described some good and bad experiences from past math classes. You are used to your math teacher giving you grades and feedback, so what if you had to give math teachers a grade on their teaching. to make it easy, let’s think about a pass/fail grade for your former teachers. Which teaching methods would you give a passing grade? So if you went back to 7th grade up till now. Which things would you give each teacher a passing grade?

CS6 – 7^{th} grade I'd probably give a D.

R – Right now we are doing passing grades. So if you could give your 7^{th} grade teacher a passing grade…

CS6 – I give 7^{th} grade a pass because I understood what she was teaching; a fail for not keeping the class under control. 8^{th} grade, probably a fail on both sides because I had a hard time understanding the materials and stuff. But 9^{th} grade I give a pass because she was pretty good. 10^{th} grade a pass because he was probably the best teacher I have had. He would use analogies and stuff. He was exciting and kept it interesting. This year a pass; the same kinda way.

R – If you could tell teachers what they do right or wrong, what would you tell them?

CS6 - What would I tell them? Probably not [laughs].

R - If they were to come to you and say, 'If I could do it again, what should I do different?', what would you tell them?

CS6 – Just make sure class is quiet so that the environment is better for them.

R – Q5 – Now that we have visited the past, let's talk about now. Which math class did you sign up for next year?

CS6 – I signed up for precal next year.

R – Do you think that will help prepare you for your future?

CS6 – Yeah, I am going into environmental engineering.

R – Good, so how do you think that will help your future?

CS6 – By taking math, it will help you get into college. Plus I am going into engineering. So it will help with that also.

R – Q6 – What factors helped you decide to take that class?

CS6 – Just a desire for higher education.

R – Q7 – Let's shift our focus. Do you often think about your future in education?

CS6 – Yes, pretty often.

R – Okay. So when you think about your future in education, with whom do you discuss your future? In other words, whose advice matters to you?

CS6 – My parents. I have an aunt on my dad's side I talked to recently.

R – Q8 – Suppose you had to make a big decision about an educational issue, maybe which class you should take or which college you should apply to. Are there any particular people you might turn to for advice? If so, who?

CS6 – I would talk to my parents. I would talk to my counselor. And teachers.

R – Q9 – I have read that African American males avoid the more difficult math classes, such as precalculus, calculus, and statistics. Do you think that is true?

CS6 – In some respects, yes, because it isn't they are not smart, but too lazy to do it.

R – Q10 – We have talked about math as it relates to your past, present, and future, and how others influence your course-taking decisions. Let's talk about how you may help others choose their math journeys. Do you have any younger brothers or sisters, or another young person in your life who looks up to you?

CS6 – No, I am the only child.

R – Okay, if you could go back in time and change some things about your math journey, what would those things be?

CS6 – Change some things? Like anything or myself?

R – In general, or both.

CS6 – I have a problem with procrastinating. So I would probably fix that.

R – Q11 – Let's turn to the issue of race, and how that may affect one's math journey. Some people have said that African American males opt to take easier math courses or refuse to participate because they don't want to be seen as "acting White." What do you think that means?

CS6 – Acting White? If there is an AA culture that is like – I don't know how to describe it, but a stereotypic Black person and a stereotypic White person. I think those two things are what they are talking about.

R – Can you elaborate more on stereotypes?

CS6 – Like Black people, stereotypical, they don't suppose to talk in a proper way or take higher education, just like basketball and stuff like that.

R – What about stereotypes for Whites?

CS6 – They are proper. They go to school, and they act in a certain mold or format.

R – Do you believe racism plays a part in AA males choosing not to take advanced math courses, such as trigonometry, precalculus, and calculus?

CS6 – Maybe not too much today. I know it still exists in some some derivations. I think it is a personal decision about taking higher classes and stuff.

R – Q13 – Okay, you are about to finish your final year of high school. Suppose a teacher, principal, or guidance counselor asked you for your advice on how they can encourage more AA males to take harder math classes. What are some things you believe would help?

CS6 – Maybe get their counselors to encourage them, to call them down to the office and talk to them about it.

R – Q14 – I do not have any other questions for you. But I do want to ask some questions about the study, make some comments about your experience participating in the study, or anything else you would like to say.

CS6 – I thought it was pretty cool. I liked the scrapbooking, and I think the purpose of the study is pretty cool because people can understand the situation better.

R – Okay, anything else?

CS6 – That is all.

R – Okay, thank you…

APPENDIX H

CONSENT FORMS

Introductory Letter to Parents and Students

June 6, 2012

Dear Parent/Guardian:

I am conducting a dissertation study at [redacted] University to determine what schools can do to encourage more African American males to enroll in advanced math courses. Your child has been selected to participate in the study. Data collection methods include two, half-hour classroom observations; your child's creating a scrapbook of photos and writings that describe his mathematics and schooling experiences; the completion of online surveys; and a one-on-one personal interview that will be audio recorded and transcribed. All questions and activities seek to determine what influences affect your child's view of math education, to better understand his mathematical journey, to determine which teaching strategies were positive and negative, and to discover his overall view of the importance of mathematics for lifelong success. Your child's reflecting on his past experiences and perceived obstacles should empower him to make informed decisions regarding his future math experiences.

Instructional time will not be jeopardized by participating in the study. You and your child may withdraw from the study at any time without duress. Participation is strictly voluntary. In accordance with university policy and [redacted] County guidelines, all personally identifiable information will be confidential. All research materials will be securely stored at [redacted] University for three years before being destroyed. During the course of research, your child's identifiable information will be safeguarded at the researcher's home. Your child will receive a $100 gift card at the conclusion of the study. Your child's involvement will take approximately two weeks. The tentative timeline for the study is April 22, 2013 through May 25, 2013.

There are no foreseeable risks by participating in the study. If, however, you have any questions about the study, feel free to contact me at [redacted] High School at rowlettj@[redacted], or call me at (xxx) xxx-xxxx. The compliance officer at [redacted] University may be reached by e-mail at compliance@[redacted]. If you agree to allow your child to participate in the study, please fill out the consent forms attached.

Sincerely,

Joel E. Rowlett, Assistant Principal
[redacted]

Comments:

Parent Agreement Form for Research Study

I agree to allow my child to participate in Joel Rowlett's dissertation study for Middle Tennessee State University. I understand and expect that all personally identifiable information will be kept strictly confidential. I also understand that my child may withdraw and/or restrict his participation at any time without negative consequences*. I also understand that my child's participation will not affect his academic standing at [redacted] High School.

Student's Name: ________________________________

Student's Signature: _____________________________ Date: _____________________

Parent's Name: _________________________________

Parent's Signature: ______________________________ Date: _____________________

Parent's Phone Number (optional): _________________

Comments:

*Students/participants will receive a $100 gift card for participating in the study.

APPENDIX I

IRB DOCUMENTS

MIDDLE TENNESSEE STATE UNIVERSITY

April 25, 2013

Joel Rowlett
RowlettJ@rcschools.net

Protocol Title: "The Psychosocial Factors Contributing to the Underrepresentation of African American Males in Advanced High School Math Courses"

Protocol Number: **13-333**

Dear Investigator(s),

The MTSU Institutional Review Board, or a representative of the IRB, has reviewed the research proposal identified above. The MTSU IRB or its representative has determined that the study poses minimal risk to participants and qualifies for an expedited review under 45 CFR 46.110 Category 7.

Approval is granted for one (1) year from the date of this letter for **6** participants.

According to MTSU Policy, a researcher is defined as anyone who works with data or has contact with participants. Anyone meeting this definition needs to be listed on the protocol and needs to provide a certificate of training to the Office of Compliance. **If you add researchers to an approved project, please forward an updated list of researchers and their certificates of training to the Office of Compliance (Box 134) before they begin to work on the project.** Any change to the protocol must be submitted to the IRB before implementing this change.

Please note that any unanticipated harms to participants or adverse events must be reported to the Office of Compliance at (615) 494-8918.

You will need to submit an end-of-project form to the Office of Compliance upon completion of your research located on the IRB website. Complete research means that you have finished collecting and analyzing data. **Should you not finish your research within the one (1) year period, you must submit a Progress Report and request a continuation prior to the expiration date.** Please allow time for review and requested revisions. Your study expires **April 24, 2014**.

Also, all research materials must be retained by the PI or faculty advisor (if the PI is a student) for at least three (3) years after study completion. Should you have any questions or need additional information, please do not hesitate to contact me.

Sincerely,

Cyrille Magne
IRB representative
Middle Tennessee State University

MTSU
IRB Approved
Date: 4/25/2013

Middle Tennessee State University Institutional Review Board
Parental Informed Consent Document for Research
Principal Investigator: Joel E Rowlett
Title of Study: The Psychosocial Factors Contributing to the Underrepresentation of African American Males in Advanced Math Courses
Institution: Middle Tennessee State University

Name of participant: ____ Age: __________

The following information is provided to inform you about the research project and your child's participation in it. Please read this form carefully and feel free to ask any questions you may have about this study and the information given below. You will be given an opportunity to ask questions, and your questions will be answered. Also, you will be given a copy of this consent form.

Your child's participation in this research study is voluntary. He or she is also free to withdraw from this study at any time. In the event new information becomes available that may affect the risks or benefits associated with this research study or your willingness to participate in it, you will be notified so that you can make an informed decision whether or not to continue your participation in this study.

For additional information about giving consent or your rights as a participant in this study, please feel free to contact the MTSU Office of Compliance at (615) 494-8918.

1. **Purpose of the study:**
   Your child is being asked to participate in a research study because he may provide unique insight about the underrepresentation of African American males in advanced math courses. The purpose of the study is to determine what African American males identify as psychosocial factors contributing to their underrepresentation in advanced mathematics courses, pedagogical strategies that are more conducive to their learning of mathematics, and their perceptions on how both psychosocial factors and pedagogical strategies affect their motivation to enroll in advanced mathematics courses.

2. **Description of procedures to be followed and approximate duration of the study:**
   The study will tentatively take place from April 22, 2013 through September 30, 2013. Activities include the following: completing three online surveys, creating a scrapbook of photos and writings about his mathematics experiences, being observed in the math classroom setting, and participating in a audio taped interview. All in-school activities will take place in the school's library during non-instructional times.

3. **Expected costs: None.**

4. **Description of the discomforts, inconveniences, and/or possible risks that can be reasonably expected as a result of participation in this study:**
   There are no foreseeable risks or discomforts from participating in this study.

5. **Compensation in case of study-related injury:**
   In the unlikely event of injury or discomfort, MTSU will not provide compensation that may result from participating in the study.

6. **Anticipated benefits from this study:**
   1. A better understanding of the barriers to success for African American males in mathematics education.
   2. Student reflection allows for informed decision making for future education plans.
   3. A better understanding of the African American males' experiences in mathematics education for educators and school administrators. These benefits should result in more meaningful classroom experiences and more overt efforts to recruit and retain African American males in advanced math courses.

4. An increased awareness of the personal and external barriers to success in math education, an awareness of the school's resources (or lack of) that may benefit your education experiences, and the satisfaction of knowing that your child's voice is contributing to the body of research that hopes to improve the experiences of African American males in our nation's schools.

7. **Alternative treatments available:** None

8. **Compensation for participation:** $100 gift card will be given to each participant at the conclusion of the study.

9. **Circumstances under which the Principal Investigator may withdraw you from study participation:** Any violation of the school's code of conduct, lack of participation, or any activity that infringes on other participants' abilities to participate.

10. **What happens if you choose to withdraw from study participation:**
    Nothing. There are no negative consequences if you choose to withdraw from the study. All participation is strictly voluntary.

11. **Contact Information.** If you should have any questions about this research study or possibly injury, please feel free to contact Joel Rowlett at (615) 904-3865 or my Faculty Advisor, Dr. Kyle Butler, at (615) 904-8142.

12. **Confidentiality.** All efforts, within reason, will be made to keep the personal information in your child's research record private but total privacy cannot be promised. Your information may be shared with MTSU or the government, such as the Middle Tennessee State University Institutional Review Board, Federal Government Office for Human Research Protections, *if* you or someone else is in danger or if we are required to do so by law.

13. **STATEMENT BY PERSON AGREEING TO PARTICIPATE IN THIS STUDY**
    I have read this informed consent document and the material contained in it has been explained to me verbally. I understand each part of the document, all my questions have been answered, and I give permission for my child to participate in the study.

____________________ ______________________________
Date Signature of patient/volunteer

Consent obtained by:

________________ ______________________________
Date Signature

____
Printed Name and Title

Middle Tennessee State University Institutional Review Board
Proposal for Research Using Human Participants
Assent Document for Research Study

MTSU
IRB Approved
Date: 4/25/2013

PI: Joel E Rowlett
Title of Study: The Psychosocial Factors Contributing to the Underrepresentation of African American Males in Advanced Math Courses
Institution/Hospital: Middle Tennessee State University

This assent document applies to: Student participants under the age of 18.
(Examples: children ages 7 – 12, or adults that are unable to legally give informed consent.)

Name of participant ____ Age________

Below are the answers to some of the questions you may have. If you have any questions about what is written below or have any other questions about this research, please ask them. You will be given a copy of this consent form.

1. **Why are you doing this research?** This research hopes to gain an understanding about why African American males are underrepresented in advanced math classes. You have been chosen because you meet the following criteria: You are an African American male, during his junior year of high school.

2. **What will I do and how long will it take?** You will complete three online surveys, create a scrapbook of photos and writings, be observed in math classes (two, thirty minute visits), and participate in a one-on-one audio recorded interview. The entire study will last approximately three months. Most activities will take place during Dawg's Time (study hall) or on your own time. The interviews will more than likely be held after school or on a Saturday, whichever is convenient for you.

3. **Do I have to be in this research study and can I stop if I want to?** No, this is strictly voluntary. You may opt out at any given time without penalty.

4. **Will anyone know that I am in this research study?**

   All efforts, within reason, will be made to keep the data in your research record private but we cannot promise total privacy. The data we collect on you may be shared with others (for example, *Rutherford County Schools, Middle Tennessee State University's IRB committee, or local authorities)* if you or someone else is in danger or if we have to do so by law.

5. **How will this research help me or other people?** You have the unique opportunity to participate in research specifically designed to benefit African American males in mathematics education. Educators will learn how African America males experience mathematics classes, what teaching methods are liked and disliked by African American males, and what types of activities improve their learning. School administrators will become aware of potential barriers that hinder their African American male students in mathematics education.

6. **Can I do something else instead of this research?** No, this research is the only option for contributing to this particular study.

7. **Who do I talk to if I have questions?** Mr. Rowlett is available during Dawg's Time (study hall) and through e-mail if you have any questions or concerns about this study. His e-mail is rowlettj@rcs.k12.tn.us. In addition, Dr. Kyle Butler, my faculty advisor, is also available. His phone number is 615-904-8142 and his email is Kyle.Butler@mtsu.edu.

____________ ________________________________
Date Signature of patient/volunteer

Consent obtained by: ____
Signature Printed Name and Title