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Jamaican Girls' Ethnic Identity and The Mathematics Classroom: An Ethnographic Case Study

Sandra Vernon-Jackson

ACCEPTANCE

This dissertation, JAMAICAN GIRLS' ETHNIC IDENTITY AND THE MATHEMATICS CLASSROOM: AN ETHNOGRAPHIC CASE STUDY, by SANDRA VERNON-JACKSON, was prepared under the direction of the candidate's Dissertation Advisory Committee. It is accepted by the committee members in partial fulfillment of the requirements for the degree Doctor of Philosophy in the College of Education, Georgia State University.

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ABSTRACT

JAMAICAN GIRLS' ETHNIC IDENTITY AND THE MATHEMATICS CLASSROOM: AN ETHNOGRAPHIC CASE STUDY

by

Sandra Vernon-Jackson

Changing demographics in the U.S. student population have led educators to focus increased attention on issues of equity in the mathematics classroom. This focus has sparked many discussions on the experiences of ethnically diverse students, particularly those of African descent. It has been suggested that improving equity in the mathematics classroom will require further investigation on how the linguistic, ethnic identity, racial, gender and socioeconomic backgrounds influence the learning of mathematics. In light of this there is a scarcity of scholarly literature that examines the impact of ethnic identity on the educational experiences of Jamaican-born girls in mathematics. The purpose of this study was to explore the influences of ethnic identity on the learning perspectives of four Jamaican-born females as they negotiate their mathematics schooling experiences in the United States. More specifically, the research questions were (1) What is the nature of the participants' perceptions and attitudes towards their identities as mathematics students and (2) How are the participants' actions and behaviors in the mathematics classroom informed by their ethnic identity?

Framed in a multiple case study design, the study utilized Collins' (1990) Black Feminist thought, and ethnic identity theory as the theoretical framework. Three individual interviews and one focus group interview were conducted with the participants, as well as two interviews with their mathematics teacher and two interviews with their parent(s). A constant comparison method (Strauss & Corbin, 1990) was utilized to analyze the data. The nature of these participants' perceptions of Jamaican ethnic identity was seen as a source of motivation and empowerment as they negotiated their individual mathematics classrooms. These participants appeared to have negotiated their mathematics learning by ascribing to specific actions and behaviors that were informed by the nature of their perceptions of "Jamaicanness". Findings from the study suggest that perceptions of ethnic identity could facilitate mathematics ability by building confidence, and promoting and building mathematics collaboration.

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CHAPTER 1

INTRODUCTION

Rationale and Background

For over a decade, the debate on mathematics reform has addressed issues of equality and equity. These issues include access to quality curriculum, teachers and resources. More recently the National Council of Teachers of Mathematics (NCTM, 2000), a leading entity in mathematics standard-based reform, called for all students to engage in rich mathematics education, which will equip them to be informed citizens able to compete in our global technological society. However, this notion of "all students" is problematic because it implies that all students have the same needs and require the same support. Meyers (1991) argued that the deliberate use of the term *all students* carries with it an implicit assumption of "what is good for the majority will also be good for minorities" (p. 91). NCTM published a new vision for mathematics pedagogy. For example, Professional Standards for Teaching Mathematics recommended that all mathematics teachers know the following: how students' linguistic, ethnic, racial, gender and socioeconomic backgrounds influence their learning of mathematics. If educators are interested in improving equity in the mathematics classrooms, further investigations are needed on the influence of how language, ethnic identity, racial identity, gender, and socioeconomic backgrounds impact the learning of mathematics (Boaler, 2007; Tate, 2002).

In a classroom of racially diverse students, what do educators see? Some would claim a student's racial identity is not a consideration when planning and implementing instruction. Ladson-Billings (1995) suggested teachers who claim that they are colorblind do a disservice to their students. These teachers are "dismissing one of the most salient features of the child's identity" (p. 33); this salient feature is race. Unfortunately, race is not the only feature that teachers dismiss in the classroom. When educators view students of color in a classroom, especially students of African descent, they often view these students merely by their racial classification—Black. While this classification may be socially acceptable, it often hides students' ethnic identification. Race as a socially constructed notion (Bell, 2004; Hilliard, 2003, Omi & Winant, 1986) does not encompass the various ethnic identities that people of African descent possess. Therefore, when teachers view all students of African descent as one and the same, they operate with the implicit assumption that these students' ethnic identities are the same. In doing so, teachers fail to address specific interests and needs of their ethnically diverse students. These interests and needs may include but are not limited to the following: the knowledge of students' background; the importance of mathematics and academic success as well as the mathematical knowledge students carry with them, which may connect to their ethnicity; and diminished support systems at home or within the school (Martin, 2007; Nasir, 2007; Ladson-Billings, 1999).

The Changing Landscape in U. S. Schools

Due to the changing demographics in the United States, ethnic identity, as opposed to racial identity, has also been brought to the forefront of identity discussions. According to the most recent U.S. Census report (2004), 33% of this nation's population

is immigrant and 30% of that number is people from the Caribbean region. The Caribbean population can be broken down even further with one-third of the population being Jamaicans (U.S. Census, 2004). At present, Jamaicans are the largest group of American immigrants from the English-speaking Caribbean. The 2000 census placed the total number of documented Jamaicans living in America at 934,305 however this number is difficult to verify because of the high Jamaican undocumented workers phenomenon and the attitude toward census response. More than 40% of that population is made up of minority youth of school age (Pickoff-White, 2003). Documented by the Global Atlanta Snapshots in 2004, an estimated 13,500 Jamaicans live in the metropolitan Atlanta area with more than half of that number living in Dekalb County. Thus, the changing landscape in our population, and more specifically our classrooms, has fueled debates over critical issues in ethnic identity. These critical issues include the degree and quality of involvement that is maintained with one's own culture and heritage (Hilliard, 1997; Isajiw, 1997; Phinney, 1996; Tajfel, 1978, 1981); ways of responding to and dealing with the dominant group's often disparaging views of the minority group (Atkinson, Morten, & Sue, 1983); and the impact of these factors on the students' overall well-being (Alba, 1985; Weinreich, 1988; Zinn, 1980). Additionally, ethnic identity and its relationship to education have been a key area of debate (Phinney, 1996). Several scholars maintain that educators must seek to understand the strengths and needs of students from ethnically diverse backgrounds in order to ensure that these students receive an education that is culturally relevant (Altschul, Oyserman & Bybee, 2006; Becker, & Gilmer, 2001; Boaler, 2007; Ladson-Billings, 1995; Matthews, 2003; Martin, 2007; Strutchens, Johnson, & Tate, 2000; Uttal, 1996).

Ethnic Identity and Mathematics

In this study, I define the term ethnic identity as the identity of a person or group of people who share the same culture, nationality, historical connection, communal beliefs, values, and/or language (Chávez and Guido-DiBrito, 1999). This definition also encompasses the perceptions, feelings, and behaviors that are due to the ethnic group membership (Isajiw, 1974; Phinney, 1996; Hilliard, 2001).

Concerning mathematics education, scholars have begun discussions about ethnic identity in the mathematics classroom (Boaler, 2007; Hilliard, 1997; Malloy & Malloy, 1998; Martin, 2007; Tate, 2002; Weist, 2002). Hilliard (1997) and Martin (2007) suggested that going beyond racial classification and exploring a student's ethnic affiliation helps educators understand behaviors, motivation for learning, and how to better support and promote academic success for students. These scholars have argued that ethnic identification plays a key role in mathematics education, among other subjects, in that it promotes confidence in students' ability and the willingness to try new ideas. Unfortunately, educators' understandings of the mathematics experience of students from ethnically diverse backgrounds have been limited to the exploration of gender (males to females) and/or racial comparisons (Black students to White students) in regards to mathematics underachievement and lack of participation (Boaler, 2007). Rarely have researchers paid attention to gender and ethnic identity without comparing the group to other groups of mathematics learners.

The relationship between ethnic identity and learning has important consequences in educating specific groups of students. Hert and Allexsaht-Snider (1996) argue that if educators do not valued student's unique ethnicity in learning, students will lose any

sense of belonging with which they may have entered the classroom. According to Ames (1992), ignoring ethnic identity is dangerous because it leads to students' disengagement and detachment from learning mathematics. Although some researchers have expressed concern over the relationship between ethnic identity, including culture, and mathematics learning (Malloy & Malloy, 1998; Weist, 2002), other researchers have pointed out that strong racial ethnic identity in students could provide a buffer against negative messages and behavior exhibited by educators in the mathematics classrooms (Altschul, Oyserman, & Bybee, 2006). These researchers argued that a relationship exists between strong ethnic identity and academic achievement.

Altschul et al. (2006) pointed out that strong racial ethnic identity in students could ameliorate negative messages and behavior found in classrooms of certain disciplines such as mathematics. The authors identified a strong relationship between identified ethnicity and increased academic achievement in the students who selected specific ethnic labels associated with their nationalities. These students exhibited stronger ethnic identity and, in turn, higher academic achievement. Zarate, Bhimji, and Reese (2005) argued that students who demonstrated pride in their specific ethnic heritage (usually country of birth) had higher academic achievement. It stands to reason that recognition of each student's ethnicity as unique could contribute to students' mathematics learning experiences. Therefore, researchers should explore the role individual ethnic identity plays in learning mathematics successfully.

Weist (2002) discussed the influence of ethnic identity and its connection to mathematics education. According to Weist (2002), ethnic identity encompasses who we are as human beings and dictates the way we think and communicate, as well as the way

we process and interact with our surroundings. Furthermore, Weist argued, it is culture and ethnic identity that give a child purpose and meaning in mathematics. Malloy and Malloy (1998) explain that students' cultural experiences and ethnic identities are important in the learning of mathematics because culture is related to mathematics learning, and influences students' perceptions of themselves as members of the mathematics community. These scholars and others argue that the link between ethnic identity and the discipline of mathematics allows students to gain a better sense of how to operate in and out of their many communities and negotiate their connections within these communities and their mathematics classrooms (Malloy & Malloy, 1998; Weist, 2002).

In many mathematics classrooms, students' multi-ethnicity is invisible. In fact, students, regardless of their individual ethnicities, are all seen as "Black" (Waters, 2004). Waters asserted, "Americans tend to see race and ethnicity as interchangeable for African/Black Americans – failing to recognize any ethnic heterogeneity within the racial category of black" (p. 5). This notion of "Black" becomes problematic because the students' ethnic identity is ignored. Within this "Black" population, students have other ethnic backgrounds including African-American, Mexican, Ethiopian, Nigerian, Haitian, Trinidadian, East Indian, and Jamaican, to name some of the most common.

Mathematics Equity for Caribbean Students

Ferguson (2004) pointed out that relatively little is known in the literature about Caribbean students' ethnicities (e.g. Haitian, Trinidadian, and Jamaican) and their experiences in the U.S. mathematics classroom. The limited studies conducted on Caribbean students only explore their underachievement (e.g. Demie, 2003; Hunte, 2004;

Rhamie & Hallam, 2002) and often group all students as the same – Caribbean or West Indian. Moreover, these studies are usually done outside the U.S., primarily in Canada and the United Kingdom. Therefore, relatively little is known in the literature about the mathematics experiences of students from the Caribbean region in America's classrooms as well as how their individual ethnicities have influenced their learning in mathematics. Kirkwood (2002) argued that Caribbean students are at a disadvantage when they are treated as though their experiences are similar to those of their African-American counterparts. Mitchell pointed out that Caribbean-American immigrant students in the United States have exhibited low achievement scores and high dropout rates. This author attributed some of these issues to the fact that some of these students like their African-American counterparts typically attend segregated, urban schools with limited resources. Cummings, Lee and London (1983) stated children from each Caribbean nation come from different social settings and they have unique problems with which their teachers must be familiar in order to provide them with a meaningful learning environment. Some of these problems, according to the authors, may include but are not limited to: social and emotional issues of being in a new environment (culture-shock), adapting to a new method of assessment (multiple-choice tests); teaching styles (liberal and democratic); and language disparity (the speaking of Patois and Creole).

More studies are needed which explore the intersection of individual ethnic identity within the Caribbean population, as it relates to mathematics learning. Specifically, students' individual ethnic differences must be recognized in the mathematics classroom in the United States in order for students to experience academic success. Teachers must see each student's race and ethnicity when viewing their

classroom. However, this is not the only factor influencing students' success. The focus, as educators, should be on students' individual ethnic differences as well as their gender differences.

Gender Identity and Mathematics

Scholars suggest there is a need to further consider female students' mathematics achievement, focusing on the influence of age, ethnic identity, and socio-economic status (SES) (Crosswhite, Dossey, Swafford, McKnight, Cooney, & Downs, 1986; Fennema & Hart, 1994; Ledar, 1990). However, these influences need further individual investigation if we are to illuminate the way each might shape mathematics learning in female students. My study examines female students' individual ethnic identities in isolation, within the United States.

In an attempt to focus on individual ethnic identify, Driver (1980) observed that Jamaican female students in the United Kingdom outperformed white females and males in English Language, mathematics, and science. Driver argued, "The superior performance of these Jamaican females was most likely due to their Jamaican ethnicity" (p. 21). He pointed out that in most Jamaican families, children are reared to understand their responsibilities and the benefit their achievement will provide their families and communities. Driver also suggested whereas males are the dominant figures in most societies, in Jamaican society, the mother/woman is the center of all family life and "runs the show." Driver posed the following questions: "What about this particular ethnicity drives girls to succeed? Why do most researchers seem to ignore ethnicity? Do Jamaican female experiences warrant further study?" (p. 113). In an attempt to address these questions and others, researchers in mathematics education should start critically

exploring ethnicity and gender so that we as educators can better serve the diverse population in our many mathematics classes as well as the need to examine the many components, which may contribute to issues of inequity.

Educational researchers and school practitioners in the United States have been concerned with the underachievement and non-participation of female students in mathematics for quite some time (Boaler, 2007). Several studies, including the results from the Third International Mathematics and Science Study (TIMSS), reported female students in both middle and high schools scored lower than their male counterparts on most standardized tests (Beaton, Mullis, Martin, Gonzalez, Kelly & Smith, 1996; Crosswhite et al., 1986; Halpern, 1986). Some studies indicate that middle and high school girls are more likely to avoid taking advanced mathematics courses in high school due to low self-confidence in mathematics (Eccles, Adler, Futterman, Kaczala & Meece 1983; Meece, Wigfield, & Eccles, 1990).

While other studies conclude that to acquire academic success, ethnic identity (Nasir, 2007) and gender identity (Roger & Kariser, 1995) must be compromised. This was not the case for a small group of female students from the island of Jamaica. Jackson and Matthews (2005) did a study investigating four Jamaican female middle grade students. The girls in this study had maintained a strong ethnic identity as Jamaican in U.S. classrooms. These female students also exhibited strong self-confidence in their ability to do mathematics, a heightened appreciation for the subject, and a drive to be successful mathematics students. Jackson proposed that the girls' strong ethnic identification and ethnic awareness might have fostered the need for success in

mathematics because, from a young age their teachers back home in Jamaica, emphasized the importance of the subject mathematics.

Few studies consider both ethnicity and gender, or specific ethnicity, and the aspects of that ethnicity that influence success in mathematics. As with the limitations of research on ethnicity, few studies in mathematics education directly address either gender differences within ethnicity, or gender individual ethnicity interaction and how these factors relate to the achievement of African-American girls in grades four through eight (Lockheed, Thorpe, Brook-Gunn, Casserly, & McAloon, 1985). Furthermore, the American Association of University Women (AAUW, 2003) concluded the amount of research diminishes when ethnicity and race issues are entered into the equation, and the interaction of race/ethnicity and gender is rarely studied in mathematics and other sciences. The AAUW also found that most research conclusions in mathematics and other sciences are based on predominantly white respondents, which cannot be generalized to girls of color. Therefore, more studies are needed which specifically explore girls' individual ethnic identities and their influence on the learning of mathematics in the middle grades in schools in the United States.

Statement of the Problem

The purpose of this study is to explore the influences of ethnic identity on the learning perspectives of Jamaican-born females as they negotiate their mathematics schooling experiences in the United States. More specifically, the research questions are:

1. What is the nature of the participants' perceptions and attitudes towards their ethnic identity and identities as mathematics students?

2. How are the participants' actions and behaviors in the mathematics classroom informed by their ethnic identity?

It is reasonable to assume that because the majority of Jamaican students are indeed African or Black by race, educators and other school officials may categorize them into the ethnic group of African-American. As previously mentioned, scholars who study African-American students are grouping all African-American students as one group, regardless of their ethnicity and their country of origin. Frequently, teachers perceive Jamaican students as native African-American or Black (Kirkwood, 2000; Waters, 2004). What is not known from the literature is the extent to which Jamaican students in American classrooms share similar cultural experiences and perspectives of their mathematics experiences with other Blacks such as African-Americans.

By attending American schools, Jamaicans will naturally be composed within the minority or multicultural grouping. Therefore, the reasoning may be that since studies of other ethnic students such as African-American, Mexican, Korean, and Native-American students have been documented within the mathematics literature; this will suffice for Jamaican students. However, the unique idiosyncrasies and characteristics of Jamaican students demand their own considerations in mathematics education. Indeed, if the goal of mathematical knowledge is crucial in empowering intelligent citizenship, mathematics education needs to be tailored to these students. Furthermore, this study is not about the division of the Black population; it simply suggests that we, as educators, must recognize the uniqueness of each ethnicity within the Black population in order to better facilitate and empower children of African descent especially females (hooks & Mesa-Bains, 2006).

Significance of the Study

This study will provide documentation of the experiences of Jamaican females in the U.S. mathematics classroom. I am not claiming that all Jamaican girls share the same ethnic identity. I am simply arguing that due to colonialism, imperialism, slavery, sexism, and other systems of domination, Jamaicans living in the United States may share common experiences of oppression. In this study, my aim is to document the experiences of four Jamaican born female students. Additionally, this study will provide educators with insights into the complexities and multi-dimensional aspects of ethnic identity and how ethnic identity may influence the teaching and learning of mathematics. Such insights are crucial to the development of teacher preparation programs for mathematics teachers and identify ways in which ethnic identity might help academic achievement of immigrant students, particularly students from the country of Jamaica. Furthermore, missing from education reform is the attentive ear of educators to the voices of students; this study will present the voices of a group that is rarely studied or considered in the dialogue on mathematics education reform.

Educators must help create an environment for all students regardless of their ethnic identity, one in which Jamaicans and other immigrants, find a balance between affirming their distinctive characteristics and pursuing their common interests within the classroom. The classroom must be a place where students feel safe in their culture, where their individual experiences, past and present, are valued and their own ethnic identities are utilized.

CHAPTER 2

LITERATURE REVIEW

This chapter will provide a review of the literature and is divided into three sections. The first section gives an overview of ethnic identity, which includes literature on the conceptual framework of the study, the definition and formation of ethnic identity, and examines the limited literature on ethnic identity in the learning of mathematics. The second section provides an overview of the literature on females and learning of mathematics. The final section will review studies on the mathematics achievement of students from the Caribbean, which includes Jamaican. The chapter concludes with a discussion of the theoretical framework guiding the research in the study.

Ethnic Identity

Traditionally scholars have viewed ethnic identity in terms of minority versus majority issues, which would link it to racial identity. Few researchers however, have chosen to critically view ethnic identity through the lens of ethnicity. Additionally, most of the studies examinations on ethnic identity are found in the disciplines of psychology, sociology, and anthropology. Rarely explored are studies of ethnic identity and its influences or relationship in the discipline of mathematics education.

According to Phinney (1990), studies in psychology about one's own ethnicity have been of no interest to members of the dominant groups. Additionally little attention has been paid by mainstream, mostly White researchers to the psychological or social

aspects of being a minority group member in a diverse society (Phinney, 1991, Hilliard, 1997).

Concerns with ethnic identity had derived in part from the ethnic revitalization movements in the 1960's. It was during the sixties when society became aware of the differences associated with ethnic group membership, (awareness) which was accompanied by social movements that led to increased ethnic consciousness and pride (Laosa, 1984). Prior to the sixties however, some scholars addressed the issue of ethnic identity by calling for ethnic group members to be conscious of the struggles made to gain understanding of their ethnicities (e.g. DuBois, 1903, 1983; Kingston, 1976; Malcolm X, 1970). Phinney (1990) pointed out that ethnic identity is central to the psychological functioning of members of any ethnic and racial minority groups. Furthermore, Weinreich (1983) stated that the concept of ethnic identity provides a way of understanding the need to assert oneself in the face of threats to one's identity.

The topic of ethnic identity has also been brought to the forefront due to changing demographics, which includes the differential birthrates and the increasing numbers of immigrants and refugees globally. According to the most recent U. S. Census Report (2004), and as mentioned earlier, 33% of this nation's population is immigrant and more than 40% of that population is made up of minority youth of school age (Pickoff-White, 2003). Due to the changing demographic landscape in our population, and more specifically our classrooms, there are some critical issues in ethnic identity, which have been addressed. These critical issues include the degree and quality of involvement that is maintained with one's own culture and heritage; ways of responding to and dealing with the dominant group's often disparaging views of their group; and the impact of these

factors on overall well-being. Scholars such as Alba (1985); Atkinson, Morten, and Sue (1983); Tajfel (1978, 1981); Weinreich (1988); and Zinn (1980) have conceptually addressed these issues from various perspectives.

However, what is missing are empirical research methodological studies. Most empirical work has focused on young minority children's racial misidentification or preference for White stimulus (Phinney & Tarver, 1988). Scholars such as Hilliard (1997); Phinney (1996); and Walker (2004) have pointed out that the findings from these studies are often inconclusive or contradictory and make generalized statements. Phinney (1990) asserts that what is needed, in the topic of ethnic identity, are more studies, which use various methodological designs with students between the ages of childhood and early adulthood, which is known as the transitional stage. Therefore, the focus of this paper is to review the limited literature on ethnic identity in adolescents. First, I will describe the various definitions used, secondly I will review the studies in ethnic identity in the area of ethnicity and more specifically individual ethnicity as it relate to mathematics education achievement.

Definitions of Ethnic Identity

The identity that students construct in relation to how they participate in the classroom is an important component of understanding learning. So critical is the relationship between identity and the learning of minority students that researchers started exploring these issues in the 1950s. One example is the doll study done by Kenneth and Mamie Clark (1950), which showed that when given a choice, a great majority of African-American children picked the white dolls over black dolls. The interpretation the Clarks made was that the African-American students, like other human

beings who are subjected to an obviously inferior status in the society in which they live, have been definitely harmed in the development of their identities. In the Clarks' study the definition of identity was never discussed, therefore in this discussion I must be clear as to the definition of identity, as it relates to this study.

According to Gee (2001) identity, which is an important analytic tool for understanding students and society, is "the 'kind of person' one is recognized as being, at a given time and place and can be ambiguous or unstable" (p. 99). Identity can be built through affinity groups and community and focus on experiences, social practices, and maintaining group affiliations. However, from Gee's work one can conclude that the term "identity" has taken on a wide array of meaning in the literature. In the next section, I will examine the definition of both terms together, that is "ethnic identity."

Ethnic identity has been defined in many ways in research. In my exploration of the literature there seem to be no agreed-on definition of ethnic identity. What was evident is that there are different understandings or emphases' regarding what is meant by ethnic identity.

Scholars such as Taifel (1981) defined ethnic identity as the ethnic component of social identity. Taifel (1981) stated ethnic identity as "part of the individual's self-concept which derives from his knowledge of his membership of a social group (or groups) together with the value and emotional significance attached to that membership" (p. 255). While some scholars, such as Phinney (1996), and Waters (2004), focus on self-identification, others emphasized feelings of belonging and commitment (e.g. Altschul Oyserman & Bybee, 2006; Phinney, 1996; Singh, 1977; Water, 2004; Zarate, Bhimji, and Reese, 2005). Scholars such as White and Burke (1987) examined shared values and

attitudes, while Cross (1978); Fordham and Ogbu (1986); Ogbu (1987); and Parham and Helms (1981) explored attitudes towards one's group. There were scholars (e.g. Banks, 2001; Hilliard, 1997; Martin, 2007; Nasir, 2007; Rogler, Cooney & Ortiz, 1980) whose work emphasized the cultural aspects of ethnic identity: for example language, behavior, values, and knowledge of ethnic group history. The active role of the individual in the developing an ethnic identity was suggested by several scholars (e.g. Hilliard, 1997; Nasir, 2003; Tatum, 1996; Waters, 2004) who saw it as a dynamic product that is achieved rather than simply given.

According to Isajiw (1974), an involuntary group of people who share the same culture or nationality, or descendents of such people who identify themselves and/or are identified by others as belonging to the same involuntary group, share the same ethnic identity. A similar argument is made by social psychologist Janet Phinney. She argues that the extent to which one identifies with a particular ethnic group(s) refers to one's sense of belonging to an ethnic group and the part of one's thinking, perceptions, feelings, and behaviors that is due to ethnic group membership. More specifically she suggests that there are four major components of ethnic identity. These four components are (1) Ethnic awareness (understanding of one's own and other groups); (2) Ethnic self-identification (label used for one's own group); (3) Ethnic attitudes (feelings about own and other groups); (4) Ethnic behaviors (behavior patterns specific to an ethnic group). Her work illustrates how an individual claims a heritage, which tends to define their ethnic group. Ethnic identity is separate from one's personal identity as an individual, although the two may reciprocally influence each other. Both Isajiw's (1974) and

Phinney's (1996) definitions gives a more comprehensive ideology and encompass what this study is about.

Ethnic identity formation

Weinreich (1988) states that ethnic identity is not an entity but a complex process by which people construct their ethnicity. However, Phinney (1996) reminded readers that researchers in general have not examined ethnic identity at the level of individual change, which is developmentally.

A developmental framework was provided by Erikson's (1968) theory of ego identity formation. According to Erikson, when an identity is achieved it is due to a period of exploration and experimentation that typically takes place during adolescence and that leads to a decision or a commitment in various areas such as occupation, religion, and political orientation. However, Erikson's theory did not include the importance of culture in identity (Marcia, 1980).

Formation of ethnic identity may be thought of as a process similar to ego identity formation that takes place over time, as people explore and make decisions about the role of ethnicity in their lives. Another scholar who has explored ethnic identity formation is Cross (1978). Cross' study was based on the model of Black identity formation. He used the Racial Identity Attitude Scale (RIAS), which was developed by Parhem and Helms (1981) to examine the negative, positive, or mixed attitude of Blacks toward their group and toward the White majority. Cross discussed how attitude may change as the person moves through the four proposed stages: pre-encounter, encounter, immersion, and internalization. However scholars such as Akbar (1989) questioned whether ethnic or racial identity could be assessed by an attitudinal measure such as the RIAS.

Furthermore, Cross's study only used a series of surveys, no interviews were conducted. Conducting interviews with the Black college students in the study, to hear their perspective of their attitudes, may have provided richer information.

In an examination of children's social-cognitive developmental understanding, psychologist Stephen Quintana (1998) proposed a four-level model of a child's understanding of ethnicity. Quintana's model focuses on children's understanding of 987tewa 76td ethnicity and is based on children's verbal explanation and descriptions of the role of ethnicity in their own social lives. The four developmental levels are: Integration of affective and perceptual understanding of ethnicity (level 0); literal understanding of ethnicity (level 1); social and non-literal perspective of ethnicity (level 2); and ethnic-group consciousness and ethnic identity (level 3). Quintana argues that the model shows the progression of children's ability to recognize the social and personal relevance of ethnicity across the four levels of ethnic cognition. Moreover, at each new level children become aware of a new way in which their ethnic identity has increasing relevance for their lives.

Sociologist Mary Waters (2004) have explored the identity of Caribbean immigrants living in New York City. Waters found that many of the West Indian youth in her study choose to be identified with nationality and although they are viewed by the American society as African American, to many of these immigrants, their ethnic identity was not African-American. This was particularly true, Waters said, for her Jamaican participants. Waters pointed out that the some of the second-generation Jamaican youth in her study view their ethnicity as important because it separates them from African-American Americans. They, like their parents, describe African-Americans as lazy,

lacking discipline, lacking work ethic, having bad child-rearing practices, and lacking respect for education. According to Rogers (2001), due to the negative images portrayed in the media, most Afro-Caribbean immigrants refused to be seen as Blacks or African-Americans. Waters goes on to say West Indian youth seems to adapt their parents' values, which include education, strict discipline for children, a strong work ethic, and social mobility. According to Waters, "These youth, in her study, try to impress on others that they are Jamaicans and definitely not African-American American" (p. 290), regardless of how long they have lived in the America. Another argument put forth by Waters is the fact that some Jamaicans experience downward social mobility, which may influence how their children ethnically identify themselves. The ways in which these second-generation Jamaican youth experience and react to racial discrimination influence their racial and ethnic identity formation. Waters suggested that these youngsters' ethnic identity is influence by factors such as on race, gender, and class. The socioeconomic background of their parents, the type of neighborhood they grew up in, the schools they attend, and their gender influenced how these Jamaican youngsters experienced race. She found that youth from middle-class neighborhoods that attended integrated schools were more likely to adopt a Jamaican ethnic identity. While young people from lower-class neighborhoods who grew up in inner city, and were from poor households will most likely adopt an "oppositional identity"[1]. These youth may adapt an identity that is opposite to the White mainstream American culture.

Many of these youth are faced with the negative images of blackness and are pressured from teachers, their parents, and peers to accept the mainstream White values.

[1] "Oppositional identity" according to John Ogbu (1991) is referred to the process of resistance that youth of color, include immigrant youth, develop against assimilation.

Lee (2005) argued, however, that adopting mainstream White values does not allow a person of color the status of identifying as White. Waters (2004) argues the focus of ethnic identity is an on going issue for the Jamaican youth, as the White American society assigns them an identity of Black American or African-American, which some most strongly reject.

According to Waters (2004), gender also plays a part in identity in which young Jamaican males, in her study, spoke of how they were viewed as a threat and as suspicious by some of their teachers. They were seen as discipline problems and were told that they were not Jamaicans, while young female students were seen as less threatening, more approachable, and were seen or referred to by their teachers as Jamaicans. Lopez (2003) shares similar argument in her study of Caribbean girls who were seen as 'hopeful' while the boys seen deemed as 'troubled'. Girls and boys, she argues, differ in the meaning they attach to these identities and the extent to which they see these identities as exclusive.

Jamaican Identity in America

Jamaicans who have made the journey to America for a better life have experienced painful change (Thomas, 2004). In a study done by Foner (1987) on Jamaicans living in New York and London, she discusses how the Jamaicans now living in America speak of the awareness of the color of their skin. Her participants said they did not know they were black until they came to America. These participants were made aware of the stigma of being black in American, which was not an issue for them back home. As members of this marginalized group, they were now subjected to a sort of prejudice and discrimination they had not encountered in Jamaica.

It is important to note that Black skin is also stigmatized in Jamaica. This stems from a history of enslavement of African people in Jamaica. Whites in Jamaica, like white Americans, were masters of the sugar plantations during the colonial period. Therefore, a white bias has permeated the entire society since the 18th century (Nettleford, 1972). According to Jamaican historian Rex Nettleford, the majority of the Jamaican population is Black and of a lower socio-economical status. This symbolized their low social position in the Jamaican society.

Blackness in Jamaica, however, has not been a barrier to upward mobility or to social acceptance. According to scholars such as; Bennett-Coverly, 1977; Kasinitz, (1992); Manely, 1989; Nettleford, 1972; Thomas (2004) in Jamaica; education, occupation, manners and wealth can override the importance of skin color and place a Black Jamaican in a position of privilege. Foner (1985) writes, "Black or colored Jamaicans who become doctors or lawyers, or high-level civil servants, who acquire the cultural characteristics associated with white Europeans and who maintain a 'respectable' standard of living are often thought of as if they were white" (p. 713). Black Jamaicans will never achieve this status in America.

Black Jamaicans living in America can never change how they are racially identified, but their Jamaican identity will or may afford them better treatment. Most White Americans view Black Jamaicans as different and in some cases more favorably, compared to African-Americans (Foner, 1986). This means most Black Jamaicans are quick to let White Americans know their nationality; that they are Jamaicans and not African-Americans (or Black). This moves the focus from the color of their skin and onto their ethnic identity.

In summary, it appears that researchers have shared a broad general understanding of ethnic identity, but the specific aspects that each scholar may emphasize differed widely. Researchers have also enlightened us to the fact that, as children gets older, their ability to recognize the relevance of their ethnic identity increases. Waters (2004) asserts ethnic identity is a dynamic and complex social phenomenon. Therefore, how a person's ethnic identity is shaped, its formation, and whether it hinders or helps must be explored. Foner (1986) asserts most Black Jamaicans living in America are more likely to make known their ethnic identity to differentiate themselves from Black Americans. For the purpose of this study, the definitions described by Isajiw (1974) and Phinney (1996) will be employed. That is, ethnic identity, in this study, will include people who share the same culture, nationality, ethnic behavior, ethnic awareness, and ethnic attitude

The Influence of Ethnic Identity on the Learning of Mathematics

Ethnic identity has not been researched much in the discipline of mathematics education (Martin, 2000). As mentioned before, it is usually confined to the disciplines of psychology, sociology and anthropology, and is usually a focus of counseling and the social behavior of different ethnic groups.

As previously noted, often some minority students feel that they must choose between a positive ethnic identity and a strong academic identity. Examples of this could be found in the works of Fordham and Ogbu (1986), and Ogbu (1987), which suggested that some African-American students are described as masking their ethnic self, or deemed as 'acting white' in pursuit of academic success. Although Fordham and Ogbu discuss African-American students' masking of the ethnic self, their research is more specifically focused on racial identity. For this study, racial identity differs from ethnic

identity in that racial identity does not address the complexities of race, ethnicity, and culture. In this study, ethnic identity is comprised of the intersection of the participants' identity as Black and Jamaican; it focuses on all the varied selves that compose their identity (Waters, 2004).

Most studies which explore identity in mathematics typically examine racial identity or racial ethnic identity not ethnicity (e.g. Altschul, Oyserman & Bybee, 2006). Altschul, Oyserman, and Bybee explored racial-ethnic identity (REI) as it changes in mid-adolescence and to what extent the relationship between REI and academic achievement is stable over time. Their focus was on understanding how REI relates to school success and failure. Three aspects of racial-ethnic identity were explored: (1) REI Connectedness, which is a positive sense of in-group belonging, feeling connected to a racial-ethnic group; (2) REI Awareness of racism which is awareness of others' prejudice, being aware that others may not value the in-group; (3) REI Embedded achievement, which is belief that achievement is an in-group identifier, feeling that one's in-group is characterized by academic attainment. By using this tripartite model, the researchers propose that when combined with REI connectedness, REI awareness of racism and REI embedded achievement can provide a needed buffer against negative messages about the likelihood of success for poor and minority youths by integrating school and achievement as in-group defining characteristics. The sample included African American, Native American, and Hispanic students. The results suggested students scoring high in all three areas of the model attained better math scores and had better grade point averages over the course of the study. Furthermore, students who maintain high levels of REI for all three areas were able to deflect negative messages and

behaviors, which most students indicated were present in mathematics and other science classes.

In another study of ethnic identity and mathematics, researchers Zarate, Bhimji, and Reese (2005) examine Latino (a) adolescents' ethnic identities and academic achievement. This study focuses on how high school students choose ethnic labels to describe themselves. The researchers further explore the meanings, strategies, and reasons adolescents provide in their choice of particular labels. The findings suggested more than 85% of the students selected multiple labels to describe themselves. The labels identified were Latino, Mexican, Mexican American, Hispanic, Chicano, American, Salvadoran, and Guatemalan. Twenty-eight percent of the students accepted the label American; however, on written surveys these students commented on the conflict of this identity, responding they were not "totally American" and "I feel more Mexican American." These students also were amongst those with low academic achievement. The authors discussed that the place of birth was the most frequently cited reason for accepting or rejecting an ethnic label, but the students did not necessarily invoke their U.S. born status to decide which labels applied to them. The study reveals few statistically significant correlations between ethnic labels and academic achievement. The students who selected one or more ethnic labels performed better academically. On written surveys, the students wrote about the meaning of their ethnic labels. Most of the students with strong academic performance stress their pride in their non-American ethnic heritage and some expressed awareness of their belittled ethnic status in the US. Three of the students explicitly wrote about the United States' racist history and cited discrimination experiences as a reason for rejecting the label American. According to

the authors, there was a correlation between cultural definitions and academic achievement. A bicultural identity was most frequently associated with higher measurements of academic achievement. According to the authors, the relationship between academic achievement and ethnic labels confirm that when students are allowed to select ethnic labels, some of the academic merits or problems assigned to any one particular label dissipates. Zarate, Bhimji, and Reese pointed out that the students have a solid and positive view of home culture with which to counter homogenizing of their culture and language. They have advantages that are evident in academic performance. Perhaps conducting in-depth interviews of the participants' experiences would have enriched this study. The use of surveys in studies like these tends to essentialize ethnicity.

As noted in the proceeding, ethnic identity is rarely explored by mathematics education researchers. Furthermore, for the few studies which include ethnic identity, they are usually paired with racial identity and rarely use methods that include the voiced experiences of students. However, these studies have provided researchers with the knowledge that strong ethnic-racial identities have a positive effect in academic performance.

Female and Mathematics

Many educational researchers have investigated gender differences in mathematics during the last few decades, accumulating a great amount of literature from various theoretical perspectives. Therefore, it is not easy to summarize all of the previous studies that addressed gender and ethnic identity in mathematics education. For this reason this section of the literature review will describe briefly some previous studies that support this study, by showing the complexity of gender issues in mathematics education.

This section on gender issues in mathematics education will consist of three subsections briefly describing the (1) historical background, (2) studies of gender and ethnicity in mathematics, and (3) females and the learning of mathematics.

Historical background of gender education in the United States

According to Solomon (1985), "In the United States, in the early 1900's, college was beyond the reach of most men due to the lack of social status, and of all women, by virtue of their sex" (p. 2). The differences in educational opportunities available to both male and female were clearly evident by the literacy rates of the two groups. Tyack and Hansot (1988) pointed out that in 1790 perhaps only half as many women as men were literate. There was ambivalence among many about the educational needs of girls. Many parents believed and realized that education could give independence to a daughter who remained single, but there were fears that too much education might spoil her chances of marriage. However, by the middle of the 19th century enrollment of females in elementary schools had grown, making the discrepancy in the literacy rates between both sexes gradually disappear. At the same time in many states, the norm for public schools was coeducation. However, this was not without controversy. In the second half of the nineteenth century, Tyack and Hansot (1988) described how several critics started a series of debates by asserting that "girls' attendance in mixed high schools and colleges disfigured their reproductive organs and nerves" (p. 33).

At the turn of the century, the generally better academic performance of girls and their higher retention rate at the high school level caused some concern. Some educators, despite evidence to the contrary, questioned whether girls could cope with the physical demands of secondary schooling (Brook, 1903). As the debates continued, the study of

mathematics was also an issue heavily debated. Then, as it is now, the debate on gender differences in mathematics learning were attributed to, according to some scholars, differences in innate abilities (Leder, 1992), while others pointed to differences in males' and females' interest and perceptions of the usefulness of the subject in the future (Armstrong, 1981; Dean, 1909). This led to the proposal of modifying the mathematics curriculum to take into account the interest of both sexes and to return to segregated classrooms. It also meant the studies which were done about women and girls have focused mainly on issues that affect white female students.

Between the 70's and 80's a great deal of focus was given to the issue of women's and girls' underachievement and the lack of participation in high-level mathematics classes. This prompted a plethora of research projects and intervention programs to explain why such disparities occurred. As a result, many of the analyses produced from studies mostly focusing on white females, positioning girls, according to Boaler (2007), in essentialist ways. That is, attributing anxiety and underachievement as stable characteristics of girls. It is as if the problems between girls and mathematics were caused 'by' the girls, or by something they do, or more often, by something they lack (Campbell, 1995). The following review of the literature will present an overview of research on studies on females in mathematics.

In a report done by Fennema and Hart (1994) on mathematics educational research and gender, the authors stated virtually no studies on that topic were done before 1974. Since then gender research has made some gains and earned more respect in the field of mathematics education. However, what impact has it had in this field? In the 1970s and 1980s a great deal of interest was given to the issue of girls' underachievement

in mathematics. This led to many studies, which explored the extent and nature of differences between girls and boys in achievement and reasons why disparities may exist. However, many of these studies according to Boaler (2007) produced analyses, which position girls in essentialist ways, attributing anxiety and underachievement as stable characteristics of girls. It's as if the problem between girls and mathematics was caused 'by' the girls, or by something they do, or more often, by something they lack (Campbell, 2002). An example of this was a study by Dweck (1986) where she concluded that girls, showed maladaptive motivational patterns, which includes behavior of learned helplessness, refusing to select challenges even when they were sure to succeed. Other conclusions placed girls as inadequate in the learning of mathematics, and that women preferred a rote and algorithmic approach (Walkerdine & Girls and Mathematics Unite, 1989). A well-known study by Fennema and Carpenter (1998) concluded that girls are less likely to develop conceptual understanding response to a reform-oriented curriculum. A number of studies produced around the 80's and 90's have upheld this argument. What is important to note and is connected to this study, is the fact that in none of these studies included the differences ethnicity of the girls. These studies place girls or women as inherently deficient in the learning of mathematics and perpetuate the stereotype held by many in mathematics education. Boaler (2006) proposed that researchers be careful of speculation during analysis and to consider the magnitude and consequences of research. She calls for more researchers to refocus their lens and critically explore the differences in girls' ethnicity and what shapes mathematics learning.

Integrating Gender and Ethnicity in Mathematics Education

According to Secada (1992) the literature in mathematics education that seeks to integrate gender with ethnicity, which most often includes race, is a small growing area in research. Moreover, the studies on women and girls in mathematics focus primarily on middle-class white females (Erkut, Fields, Sing & Marx, 2002) and for the few studies, which include ethnicity they usually explore achievement differences between male and female. Rarely found are studies on girls and ethnicity in the discipline of mathematics and science (Clewell & Ginorio, 2002). In a summary of research on sex and ethnic differences in mathematics and science for students in grades 4 through 8, Lockheed, Thorpe, Brook-Gunn, Casserly, and McAloon (1985) found thirty-one studies addressing gender and sixteen addressing ethnicity, but only four addressing the two factors simultaneously. However, these studies actually examine race, which researchers cloaked in ethnicity, and gender in mathematics. Moreover, these few studies are dated.

A recent study, which explored culture and mathematics, is Uttal's (1996) study. Uttal (1996), a psychologist, discussed the ethnic influences upon students' beliefs and actual performance in mathematics. Uttal based his discussion on a series of studies conducted by a group of researchers including himself (Stevenson, Lee & Stigler, 1986; Stevenson & Stigler, 1992; Uttal, Lummis & Stevenson, 1988). These studies were cross-national studies between the United States, and two Asian countries, China and Japan. The study provided information based on family ethnicity, mathematics achievement tests, intellectual ability tests, and interviews with children, their mothers, and their teachers. Uttal (1996) reported that American parents were more likely to believe that the mathematics achievement of their children depends on their innate

mathematics ability rather than their effort, while Chinese and Japanese parents were more likely to think effort is more important for mathematics achievement.

Children's expectation and satisfaction with their own mathematics performance were also consistent with those of their mothers. American parents' expectation for their children's mathematics achievement was lower than that of Asian mothers. Uttal explained that this ideology of the Chinese and Japanese parents is based on an ethnic religious belief, which emphasizes hard work and effort for self-improvement. Uttal further suggested that these kinds of ethnic influences from family might be the factors that explain the relatively lower mathematics achievement of American students.

Females and the Learning of Mathematics

Evidence exists that females tend to approach learning mathematics from a different perspective when compared to their male counter parts. To this day scholars are still debating the reasons for this difference. In a critical examination of thirty-six studies done by Fennema (1974), dating back to the early 60's, she concluded that over all there are no significant differences that consistently appear between the learning of boys and girls in grade four through nine. However according to Fennema there seems to be a trend, that suggested girls tend to perform better in tests of mathematics computation (Wozencraft, 1963 as cited in Fennema, 1974) and boys tend to perform better in tests of mathematical reasoning (see Carry, 1970; Mcleod & Kilpatrick, 1971). Additionally, she asserts that no significant differences between boys' and girls' mathematics achievement were found prior to entering elementary school.

Likewise, studies have examined gender differences, learning, and achievements in mathematics. In a study which traced the development of gender differences in

learning opportunities and achievement in mathematics, Catsambis (1994) studied data from the National Educational Longitudinal Study of 1988 for White, African-American, and Latino students while these students were in eighth and again in tenth grade. Catsambis examined the following: students' eighth and tenth grade mathematics tests scores, their mathematics grades, the students' eighth-grade class ability levels and students' enrollment in Algebra I, Algebra II, and Geometry by tenth grade. The study revealed that eighth-grade girls and boys tend to have similar scores on mathematics tests even when the girls received better mathematics grades. That is, there were no significant differences between girls' and boys' mathematics test scores found within racial-ethnic groups. However according to the author there were stronger gender differences found in learning opportunity in mathematics among racial-ethnic groups placements. The indicators for learning opportunity showed that White girls are most likely to be placed in a high ability group. These differences are important because they show that both female and White students have a great opportunity to learn and greater exposure to rigorous, demanding curricula. Catsambis (1994) also stated that there were gender differences in mathematics attitudes by race and even stronger differences in ethnicity. Additionally she questioned what were the learning differences between girls and boy in mathematics and were their learning differences found within different ethnicities? This is an area Catsambis suggested should be explored more critically.

Although Catsambis' study was very pertinent at that time because conversations in mathematics education research were centered on the idea of girls performing poorly compare to boys and white girls, her study also adds to the discourse of doing comparative studies, which tends to use deficit models. Additional this author made the

claim that based on the indicators for learning, indicators which were never disclosed, whites are most likely to be placed in a high ability group. This claim was never substantially proven and the claim, which followed, generalized all females, including African-American and Latino, as having great opportunity and exposure to rigorous curricula. The author also used the term 'Latino', which could identify any Spanish-speaking person. Catsambis also never discussed how the students' abilities were calculated.

In an effort to answer how girls learn mathematics, several mathematics educators have offered studies and suggestions of the ways girls learn. Backer (1995) called girls 'connected thinkers'; that is, they prefer to use intuition, creativity, personal processes, and experiences, while boys are 'separate thinkers'; they prefer to work with subjects that are characterized by logic, rigor, absolute truth, and rationality. Header (1995) suggested that girls also prefer co-operative, supportive working environments whereas boys work well in competitive, pressurized environments. Unfortunately both Backer's and Header's descriptions of how boys prefer to learn mathematics is a clear description of how most mathematics teachers are trained and approach mathematics teaching today. Becker (1995) argued "the way mathematics is currently taught alienates many girls because is does not appreciate or validate their ways of knowing" (p. 172). Scholars such as Boykin (1983), Willis (1992), Shade (1982), and McIntye (1996) have specifically researched the ways African-American, Native American, and Mexican American girls approach learning. Their research has revealed that there are some common characteristics of how girls of the many ethnicities approach learning. They found that the students always include the influence of spirituality somehow in their learning (relying or giving credit to

a higher being-"God" or the Lord or the Creator). Other suggestions includes holistic perspectives (e.g. the connection between man and earth); strong connection with family and community (e.g. help and support of parents, siblings, church); deductive reasoning; rhythmic orientation and creativity (e.g. inclusion of music); and a unique perspective of time and work.

In summary, achieving equity in the mathematics classroom is an age-old debate that continues today. Studies in the past have explored the underachievement and/or lack of participation of girls/females in the mathematics. Some researchers have been busy examining what is the cause of such phenomenon, while others have been preoccupied with comparing the ways girls and boys learn mathematics, which at times place girls as inferior in their ability to learn mathematics.

This study proposed that researchers move away from the use of deficit models, which perpetuate the stereotypes that are fixed in the consciousness of most mathematics educators and researchers (Hilliard, 1997). As suggested by Boaler (2006), researchers need to refocus their lens. Researchers should try to identify critical lenses, such as the conceptual lens of ethnic identity, to critically analyze female experiences in learning mathematics.

Studies of Caribbean Students

An Overview of the Caribbean

The image most Americans have of the Caribbean or West Indies Islands is that of paradises or poor Third World nations filled with shanty towns. The Caribbean, or the West Indies, consists of 32 different countries and or islands stretching from the tip of Florida to the coast of South America in the body of water called the Caribbean Sea.

Each nation and/or island has a very unique history and is distinctly different with some speaking English, Spanish, or French. However, these linguistic differences are not a clear-cut reflection of colonial history. One example of this is the Island of Jamaica. Jamaica is the third largest island (land mass) with the largest population amongst the Caribbean islands. The Arawak Indians were the indigenous people before the Spaniards came, followed by the French and then English. Jamaica, a primary contributor of rum and sugar, was one of the stops in the West Indies during the slave trade. Africans were brought from the continent to work as slaves on sugar plantations. However, after the emancipation of slaves in the nineteenth century freed slaves refused to work and moved to the interior of the island to farm for themselves (Marshall, 1983). This resulted in a shortage of labor which prompted the new importation of workers, principally in the form of indentured laborers from India. The laborers consisted of Asian Indians, Chinese, and Javanese. These diverse people make up the population of Jamaicans today, which is why the coat of arms for the country is "Out of Many One People". After years of colonialism, Jamaica, with its diverse population, is a country plagued with a poor infrastructure and the lack of access to basic education. This has prompted several hundred thousand Jamaicans to leave the country for a better way of life (Foner, 1985; Palmer, 1995).

Historical Perspective of the Caribbean, and Immigration to United Kingdom, Canada, and the United States

Many Caribbean, West Indian nations have a history of post-emancipation emigration that is driven by high unemployment, inadequate economic opportunities, and lack of access to basic educational opportunities at home (Palmer, 1995). Following the

abolition of slavery in 1838, plantation owners in Jamaica, major producers of sugar for export, found it hard to employ former slaves. Consequently, Jamaicans have viewed migration as a way of sustaining livelihoods. Following World War II there was a labor shortage in Britain which prompted skilled and unskilled workers to migrate to the British "mother land". In 1962 mass migration from the Caribbean to Britain was deliberately stopped due to an immigration policy in England. Consequently, significant migrant flows to England shifted to the U. S. and for the first time to Canada, which also liberalized its immigration policies in the early 1960's.

The primary reason for Caribbean migration was then and is still "the gap between life aspirations and expectation and the means to fulfill them in the country of origin" (Portes & Rumbaut, 1996, p. 12). These Caribbean immigrants were on a quest for a better life, which included better professional jobs and higher education in the receiving country and for them the way to obtain it was through access to equal education. Palmer attributed this value for education to a history of colonialism that dictated as a vehicle for social mobility. Palmer (1995) wrote,

The need for a sound education has always been emphasized in the Caribbean. The European colonizers in the Caribbean declared education a determinant of social mobility and Blacks who took over the islands have been more emphatic. Parents too have drilled into the heads of their children the need for a sound education. It is no wonder than, that in the United States, Afro-Caribbean females have been so quick to take advantage of every educational opportunity-if not for themselves, surely for their children. (p. 6)

This value of education, economic stability, and mobility demonstrates the motivation for Caribbean people, especially Jamaicans, to leave their country and come to the U.S. Furthermore, although we know that Caribbean, particularly Jamaican, females are quick to seek educational opportunities in the U.S., we know very little about their learning experiences and/or how their ethnic identity influences their learning of mathematics in the U.S. With that in mind, there are some studies, which have explored academic achievement of Caribbean students.

Studies of Caribbean Students' Academic Achievements

Demie (2003) explored the persistent underachievement of black Caribbean students internationally in mathematics and science. Specifically, he examined the noticeable problems and challenges of underachievement by Caribbean students in London. Additionally there is a danger of policy makers accepting this underachievement as an irrefutable fact. Demie used the test scores of over one hundred students whose ages range from five to fourteen. Data from the mathematics, science, and English scores of the National Curriculum Assessment tests (national standardized test) at Key Stage one (KS1), KS2, and KS3 were utilized. These scores included students' self-identification as one of these ethnic groups: Africans, Irish, Indian, Scottish/Welsh, Vietnamese, Chinese, Caribbean, or English, and gender. The data showed the Caribbean pupils lagging way behind the other ethnic groups. Additionally, the data showed that Caribbean girls out perform certain groups (i.e. Africans, English, Scottish/Welsh, Irish, Vietnamese) consistently by small margins in mathematics only. The author argued that there is a failure of the National Curriculum to reflect adequately the needs of diverse and multi-ethnic societies which may be a contributing factor to the underachievement of this

very large multi-ethnic minority. He also found a lack of awareness of Caribbean and other African-American children's culture and historical roots in the math or science curriculum. Hunte (2004) made similar conclusions, after observations of 20 teachers in her study. Furthermore, Hunte's conclusions included teachers' low expectations and unfair treatment of the Caribbean students. Demie did confirm that there is a limited amount of literature on Caribbean students and that the teachers in the U. K. lack the knowledge to accommodate adequately these students needs. However, the author never offers any data to support this claim. There were no suggestions or explanations offered as to why the Caribbean girl, whose individual ethnic identities were never disclosed, are consistently performing slightly better than the other groups in the study. The author could have enriched his data by interviewing a few girls to identify their perspectives of this phenomenon in mathematics and possibly hear how different their experiences are in the mathematics classroom. Demie admitted to misusing the words / terms "Caribbean" and "West Indians" (p. 234) as these are general terms and do not clearly identify the participants.

Nancy Lopez' quest to understand the dynamics that contribute to race and gender disparities in urban education led to a study that focused on how race and gender intersect in the lives of the largest immigrant group in New York City - Caribbean youth. The participants in the study were Dominican, Anglophone West Indian, and Haitian immigrants. Lopez (2003) collected data through life history interviews, participant observation at high school, site visits, and conducting focus group discussions. The participants were from low income households, and their parents had never attended college.

Lopez (2003) observed that in the study young men and women had fundamentally different experiences of the intersection of race and gender processes in the school setting. She found that young girls were not disciplined as harshly as young men, because they were not seen as threatening as the young boys. Additionally, young women were more active in extracurricular activities and took more pride in their academic excellence. Lopez pointed out that both men and women were subjected to substandard education: dilapidated facilities, lack of books and inadequate resources. In other words, the conditions described by Kozol (1992) as in "Savage Inequalities" exist in most urban schools where the minority and immigrant students are being educated. However, young women resisted their oppression by actively voicing their desire to achieve academically and demanding an education. Lopez also argues that girls were also more eager to correct their teachers who referred to them as African American. Lopez further argued that educators, due to the influence of society and media, have treated all people of African descent as a priori African-Americans, regardless of their actual ethnicities.

Rhamie and Hallam (2002) investigated the factors contributing to the academic success of fourteen African-Caribbean students in the U.K. The authors pointed out that this is an important phenomenon to study because there seems to be historical underachievement among African-Caribbean students in the U.K. In this investigation, the participants were male and female, ranging from 23 to 40 years old, and had attended schools in the U. K for most of their lives. The researchers collected data by conducting interviews and the study was embedded in a phenomenological framework. The author suggested two possible models for success. The first model is a 'home-school model,'

described as a continuous positive interaction between the home and the school. This seems to foster academic excellence and success for all the participants. The second model is a 'home-community model' which suggests that the family and community together create a 'sense of belonging' and acceptance. This model not only seems to foster achievement and success but it also compensates for low expectations and resources in the school. The findings in the study never reveal if there were any differentiating factors between genders. That is, were factors of success common for both genders? The authors never discuss what 'African-Caribbean means, as the students' individual ethnic identities were never revealed. Would it suffice to ask what the ethnic identities of the participants were and were these factors common for the various ethnicities? What were the participants' socio-economic status and could that have changed the outcomes of the study?

Ferguson (2004) studied the perspective of Caribbean high school students' experiences in American sciences classrooms. Using a naturalistic qualitative design, Ferguson framed the study within sociocultural theory. Four Caribbean students were interviewed for the study. The researcher compared the experiences of students from the Caribbean to the experiences of African-American students in the science classroom. The study revealed that Caribbean students do share science experiences similar to that of American students; however, some experiences are uniquely different within the science classrooms. The author discovered that the participants relied on prior native experiences to dictate their perspective of their science experiences. The participants in the study discussed that they found the American science classrooms different from that of their native Caribbean science classrooms. In the American classrooms, the teachers tolerated

disrespectful behavior in the U.S., assessments were done differently, there was a lack of support from the teachers, and the method of communicating was different than that in the Caribbean science classroom settings. Ferguson proposed that science educators should be sensitive to the sociocultural nuances of Caribbean students. Educators, she added, should also understand and value students' individual ethnic backgrounds, cultural patterns, and identify specific influences which impinge students in science. She also suggested that further research in this area must consider differences within the main Caribbean population (i.e. Jamaicans, Haitians, Bahamians, and Trinidadians) of students in the American science classroom, as this will add credibility and weight to the overall qualitative results.

Driver (1980) investigated the recorded examination results for 2300 students in five multiracial schools for four years. Like Ferguson (2002), Driver asserts that this investigation is important because statistical data and accepted fact have depicted immigrant girls and boys as under-achievers for years in the minds of English educators. Driver disclosed that some of the data, which may contradict old perceptions, was kept away from the public for years. He states that his research will conflict with old ideas. The purpose of the study was to look at the test results of West Indian boys and girls and compare them with their English classmates.

The results from the Sixteen-Plus Examination (exam students take before leaving school) showed that West Indian girls have the highest scores. That is, in the critical subjects, which are math, science, and English, West Indian girls performed better than West Indian boys and English girls and boys. To get a more comprehensive view of the results of each of the four schools, he observed that three of the schools had the higher

scores. These three schools reported the West Indian population to be an average of 95 % Jamaicans, however the fourth demographic was never revealed. Based on that information and the results on the Sixteen-Plus Examination, Driver concluded that Jamaican female students outperformed English girls and boys and other West Indian students in the critical subjects. Driver never indicated what the population demographic was of the fourth school or whether the Jamaican students of the three schools were first or second generation and how long have they lived in the U.K. This information may have enriched this study, and also eliminating the data of the fourth school without valid reason could indicate some statistical flaws within the study results.

Driver argued that the superior performance of these Jamaican females was most likely due to their Jamaican ethnicity; however, there were no data to support his claim. He points out that in most Jamaican families children are brought up to understand that their responsibilities and their achievement will provide benefits to their families and communities. Driver also discussed that, despite the male dominance present in Jamaican society, in most homes, the mother/woman is the center of all family life and "runs the show." Driver poses the following questions: What about this particular ethnicity drives girls to succeed? Why do most researchers seem to ignore ethnicity? Do Jamaican female experiences warrant further studies?

Pilot Study

In a pilot study, Jackson and Matthews (2005) investigated the influence of ethnic identity on the learning of mathematics. Three Jamaican born, female students who are in middle schools in the U.S were interviewed. The participants' experiences were the

important component for this study as Black feminist thought (Collins, 1991) suggested ways of guiding the study.

The study was conceptually framed around Phinney's (1996) four complexities of ethnic identity and connects emerging links to mathematics learning. The findings from the study suggested the following: confidence in their ethnic self-identification carried over into confidence in their identity as mathematicians. Additional findings included: ethnic awareness built a strong foundation in mathematics and an appreciation for the discipline of mathematics as well as a need to be successful in math; ethnic behavior-called a 'no problem attitude' acted as a buffer or even a comforter to convince students to remain calm in stressful situations (found in most mathematics classroom). The authors suggested that based on the students' discussions their unique ethnic identification, which is their "Jamaicanness" provided the basis for their mathematics learning. Their Jamaican ethnic identity was an empowering tool for these students in learning mathematics. Moreover, their "Jamaicanness" seems to have helped in promoting their success in mathematics. To take this study further and to enrich the data the researcher called for more interview sessions of participants and inclusion of parents and teachers. Additionally they suggested that observations of students in the mathematics classroom be conducted to see what role the students' ethnic identity plays in the mathematics classrooms.

THEORETICAL FRAMEWORK

My epistemological beliefs or the lens in which I view the world is framed around critical theory as "reconceptualized" in Kincheloe and McLaren (2000), and embedded in Critical theory is a Black feminism theory proposed by Collins (1990). I will briefly

describe both theories; however, this study is framed around Black feminism theory, which will explain the uniqueness of the participants' experiences, and my orientation to these experiences.

Kincheloe and McLaren (2000) assert that reconceptualized critical theory (RCT) "is intensely concerned with the need to understand the various and complex ways that power operates to dominate and shape consciousness" (p. 283). Critical theory examines the current structure of society, in which the dominant socioeconomic groups exploit and oppress the subordinate groups such as ethnic minorities, working class people, and women (DeMarrais & LeCompte, 1998). Critical theorists view the current educational structures and practices as marginalizing or disqualifying certain groups of people such as women, minorities, and members of low socioeconomic classes from positions of influence in society (Apple, 1988). Willis (1992) discusses the fact that the critical theorists' perspectives have greatly contributed to researchers' understanding of gender inequity phenomena in mathematics education. Researchers, subscribing to a socially critical perspective in their studies on gender and mathematics, have often argued that mathematical knowledge and its instructional practices reflect the male-centered cultural values, resulting in social inequality between men and women. The participants in this study are females placed in a male-centered dominant environment, which may influence their consciousness. In this study, my participants spoke of how they operated in their mathematics classroom and whether their Jamaican ethnic identity gives/provides them power in learning mathematics. Furthermore, I also explored how these Jamaican females maintain their ethnicities in American mathematics classrooms, where their ethnic consciousness conflicts with the mainstream, academic (Banks, 1993), and

individualized way of thinking. These conscious conflicts are addressed in Black Feminism Theory, which adds gender to the consciousness and further leads to a multi-consciousness or double consciousness as described by Du Bois (1903/1990) in *The Souls of Black Folk*, and by Ladson-Billings (1997).

Black Feminism

Black Feminism, as discussed by Collins (1990), is "a process of self-conscious struggle, which empowers women and men to actualize a humanist vision of community" (p. 39). Men have a place in the definition because the struggle is not only confined to women but to all humankind. Collins suggested all members of the African Diaspora share common experiences of oppression, which result from colonialism, imperialism, slavery, apathy, sexism, and other systems of racial domination. Black people or people of color share common experiences of oppression (p. 307) and that may be why the "lumping" of all people of color is common, especially in the academic community. Lopez (2003) argued that educators have treated all people of African descent as a priori African-American, regardless of their actual ethnicities. However, within these common experiences are unique differences, based on each person's ethnic background, and these differences must be voiced. By giving voice to this group, which has been silenced in scholarly studies, their experiences (if similar to other Africans or other immigrants) will be documented. Afrocentric feminist epistemology provided guidance for both collection of data and analysis for the study.

This epistemology has four dimensions: concrete experiences as a criterion of meaning, the use of dialogue in assessing knowledge, the ethic of caring, and the ethic of personal accountability (Collins, 1990, pp. 310-322). Firstly, using experiences as a

criterion, Collins points out there are two types of knowing - knowledge and wisdom - that are divided by experience. Whereas knowledge is adequate for the powerful, wisdom is essential to the survival of the subordinate is wisdom. Hudson-Weems (2007) argues that one's personal experiences are valid ways of determining one's worldview. Historical conditions have produced a unique set of circumstances for Black women. This unique set of circumstances is a result of racism, sexism, and poverty. These four participants shared their experiences such as strength and the struggles of coming into a new place and coping with ethnic norms which were different from their own especially in their school settings. Secondly, in her discussion on the use of dialogue in assessing knowledge, Collins stressed connectedness as vital in the knowledge validation process and that power is gained through a connection to a community. By dialoguing (interviewing) I heard how my participants were empowered through their connection to their ethnic communities such as relationships in and out of the classroom. The third dimension, the ethic of caring, Collins suggested, states "personal expressiveness, emotions, and empathy are central to the knowledge validation process" (p. 318). When people participate in a study and feel the researcher truly cares about what they have to say and that their development as a person is important, this gives them the impression of advocacy, and that the researcher possesses this ethic of caring. Additionally I wanted to learn if an ethic of care may have manifested in their ethnicity and how crucial it was to the learning of mathematics. Finally, Collins discussed the ethic of personal accountability, where the idea given is just as important as the person giving it. When taking into account the validity of knowledge one also targets the individual's character, values, and ethics (p. 320). I believe where there is a bond between the researchers and

the participants, trust will be gained. I met with all the participants several times prior to beginning my interviewing sessions. During those times, we discussed topics ranging from teachers to relationships as well as to discuss some of our shared experiences of coming to America. Such discussions I believed opened a trusting relationship where my participants felt comfortable sharing their thoughts.

I am aware that, to examine how members of any ethnic group gain knowledge through their experiences as a subjugated group, I cannot use the techniques which the dominant positivist uses to study knowledge of the powerful. Collins (1991) asserts that subjugated groups have long had to use alternative ways to create an independent consciousness and to rearticulate it through specialists validated by the oppressed, themselves. That is why the methodological design used in this study is a multiple case study. Multiple case study captures what meanings were created by the girls' experiences of being Jamaicans in an American classroom, and the importance of caring and its impact on their learning of mathematics. I hoped that by speaking with girls born on the island of Jamaica I would capture the emotions and personal expressiveness of the participants' ethnicity, which adds authenticity and validity to the knowledge gained. This will also allow me to stay true to Collins' ethic of personal accountability. In the next section, I will discuss the methodology.

CHAPTER 3

METHODOLOGY

This chapter explains the methods used in carrying out the study, with an emphasis on the process of collecting and analyzing data. As recommended by Creswell (2003); Merriam (1998), I used an evolving methodology that only took definite shape as the study progressed. This discussion of the methodology begins with a brief exposition of the research design and the utilization of multiple case studies in this qualitative analysis. Next, is a description of the context, the data sources and the process used to select the participants. This chapter concludes with a discussion of the role of the researcher, subjectivity and analysis.

Research Design

The purpose of this study is to explore the influences of ethnic identity on the learning perspectives of four Jamaican-born females as they negotiate their mathematics schooling experiences in the United States. More specifically, the research questions were:

1. What is the nature of the participants' perceptions and attitudes towards their ethnic identity and identities as mathematics students?
2. How are the participants' actions and behaviors in the mathematics classroom informed by their ethnic identity?

These questions are the catalyst for the research design, which is a qualitative, multiple case study. The framing for this study is Collins' (1991), Black feminist thought.

According to Collins (1991) a criterion is that the individual narratives of lived experiences are vital and must be documented. Therefore, conducting in-depth interviews with various sources is one way of accessing this type of information (Merriam, 1998). This criterion is also a tenant of qualitative research studies, which enable researchers to consider experiences from the informant's perspective (Bogdan & Biklen, 2003; Denzin & Lincoln, 2000). More specifically, a qualitative multiple case study approach provides rich contextual data for studies that explore the lived experiences of individuals (Merriam, 1998; Creswell, 2007).

In this study interviews were collected, which ensured that the participants' lived experiences, were voiced in the language of the four female participants and their informants. The interviews took on two forms: structured and semi-structured individual interviews in the context of the U.S mathematics classroom. While the structured interviews were primarily standardized background and personal profile questions, the semi-structured interview questions took the form of open-ended, informal and probing questions.

The criterion of experiential data in Collins' design allows for the exploration of the participants' mathematics experiences, their descriptions of how they perceive their ethnic identity and how they make sense of these experiences as it relates to their learning of mathematics. In other words the participants' perceptions of their ethnic identity are best told by them. Additionally, Water (2004) suggests that a qualitative design is the most effective way to investigate the complexities and multiple components of ethnic identity. Furthermore, case study design has been shown to be particularly useful for

studying current educational processes and problems, which ultimately aims to affect and improve future practices.

Multiple Case Study Design

A majority of educational researchers, who seek to reach an in-depth understanding of a specific situation, individual, event or community, have used a multiple case study design. “Multiple case studies involve collecting and analyzing data from several cases and can be distinguished from a single case study” (Merriam, 1998, p. 40) and is viewed as a design that focuses on intensive description and analyses of a single unit or bounded system (Smith, 1992). Yin (1994) asserts “case study is an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident” (p. 3). This study was bounded in multiple sites that is, each participant was a member of a different U.S. mathematics classroom and data would be collected over a period of four months. There were four distinct cases in the bounded system of four Jamaican girls, their parents, and their mathematics teachers.

The Context

Over the course of four months, visits were made to participants’ homes, where I met with the girls and their parents, and meetings were held with the teachers at local coffee shops. These visits were made at varying times to accommodate each participant and their informants.

The four student participants are Ashley, Denisha, Akila and Marsha. Ashley’s informants were her parents and her mathematics teacher, Mr. H (or Coach H). Denisha’s informants were her mother and her mathematics teacher, Mr. P (who is

Jamaican). Akila only had a single informant (her mother) because her mathematics teacher declined to be interviewed for the study. Lastly, Marsha had both her parents and her mathematics teacher, Ms. H for informants.

Ashley and Denisha attend Goway High School (pseudonym) and Akila attends Cooly High School, both in metropolitan Early County, Georgia. Marsha is a student at Manhit High School (pseudonym) in rural Net County, Georgia. The Early County School System (ECSS) is one of the most culturally diverse counties in the nation and has a student enrollment of more than 102,000 students in 143 schools and centers. The ECSS student body is 3% Asian, 76% Black, 10% White, 8% Hispanic and 2% multiethnic. The Net County School System is significantly smaller than ECSS with only 12,145 students enrolled is composed of: 74% White (non-Hispanic), 19% Black and 3% Hispanic. The demographic data report does not break down the different ethnic groups within the Black, and non-Hispanic student population. Now that the context of the study has been discussed, the participation selection process will be described in the following section.

Participant Selection

I utilized "snowballing" sampling in order to select the participants. This sampling technique was selected because the criteria were very specific; hence participants who fit the criteria were likely to make recommendations of other girls who exemplify the criteria of interest in this investigation.

According to Merriam (1998), using a small sample size gives attention to in-depth understanding of the phenomenon. In this investigation a total of four cases allowed for an in-depth, comprehensive cross-case comparison during the analysis

process; illuminating the variation of the participants' experiences and how they make meaning of their situations. The multiple criteria for participating in the study for each participant was set forth: (1) Jamaican-born female (first generation), (2) some schooling in Jamaica, and (3) between the ages of ten and sixteen years. By including these criteria the participants could relate their Jamaican experiences, speak from the perspective of adolescents, and were able to make meaning of their experiences in their various mathematics settings.

To initiate the search, I visited several Jamaican community organizations and churches, including but not limited to: the Jamaica Atlanta Association, Jamaica Sports Club, H. C. Church and H. P. Church (pseudonyms). I spoke with people in these organizations, informing them I was doing a study on Jamaican girls' experiences, and I outlined the criteria for participation. I was given the names and contact information of two possibly viable participants, and I spoke with the young women's parents by telephone. During these conversations, I outlined the parameters of the study and set an appointment to meet at their respective homes.

During one of these initial meetings, Ashley's parents gave me the name and contact information of another student with whom they had spoken, and indicated that the student and her parents were willing to participate in the study. I contacted the family and they told me of another student who might fit the criteria. Final selections yielded these four girls in the study: Ashley 16, Denisha 14, Akalia, 14 and Marsha, 15. All four girls were born in Jamaica, left at varying ages, and are now living in the United States. The participants' parents (biological) are Jamaican-born, but their mathematics teachers, with the exception of one, were not Jamaican-born. After participants were recruited,

pseudonyms were used throughout the study in reference to people and places. The four cases in the study were named after the primary participants.

Since the participants are minors, a parental consent form and minor's consent form were required for the interview. Beyond that, both the parents and the mathematics teachers were required to sign a consent form for their interview sessions.

Data Sources

In order to gain a better understanding of the experiences of these four Jamaican girls in mathematics, I conducted four structured and semi-structured open-ended individual interviews with each participant and then a final focus group interview with all participants. Additionally, two individual interviews were conducted with each participant's parent(s) and mathematics teacher. The purpose for conducting interviews with the participants' parent(s) was to solicit their perspectives on the participants' ethnic behaviors and the parents' approach to maintaining their Jamaican ethnicity. These interviews were held in their homes. The two interviews with each of the participants' mathematics teachers were conducted at various local coffee shops, and were specifically focused on hearing their perspectives, based on their observations in the mathematics classroom, of students' ethnicity (students being studied), how this ethnicity manifested in the classroom, and how they believe the students utilized this identity.

Three additional interviews were needed with the participants for verification and clarification of previous data; additionally I conducted two interviews by telephone. All interview sessions were held at various times and dates according to participants' convenience. By conducting face-to-face verbal conversations, my participants responded to open-ended questions, which allowed them to reconstruct their experiences from their

perspectives and express their feelings, beliefs, values, actions, and reactions to these experiences in their own words. In the structured interview sessions the participants responded to standardized questions about their backgrounds and personal profiles. Additionally, conversations with the participants during our data analysis sessions were entered as data per their approval.

All individual interviews with the participants, parents and teachers were approximately 45-60 minutes in length while the small group discussion was 90 minutes. All interviews were audiotaped and transcribed for analysis. After each audiotaped interview, participants were asked to go through the field notes to make sure their viewpoints were captured in their own words. The review of the literature, the research questions, and findings from the pilot study guided the creation of the initial interview questions. (See Appendix A for sample questions from the interviews).

Researcher's Role and Subjectivity

Many qualitative researchers acknowledge their research is affected by their own political standpoint: research is never free from researchers' biases, which are deeply embedded in their consciousness (Creswell, 2003). As a qualitative researcher, I share the same concern for situating myself in my research. For me, my ethnicity, my political beliefs, the communities that I belong to and what experiences I have had all impact what, how and why I do research. It is suggested by some scholars (i.e. Denzin & Lincoln, 2000; Creswell, 2003; Merriam, 1998) that in qualitative inquiry researchers be forthcoming with their biases, values and personal interests about researching a topic. Accordingly, I will outline my own preconceptions about this topic.

I have always been interested in conducting research in issues which affect girls and women; research that gives "voice" to women and girls' experiences that challenge the existing perceptions of women of color as an oppressed, powerless group. Growing up on the island of Jamaica, a sexist, colonial society, I was constantly reminded of my low social position as a "female." The general belief in Jamaican society was that math in primary school was a very important subject and only people who were "smart" passed. It was not a subject that was considered important for girls. As a mathematics teacher, I have seen the same scenario where some teachers have made negative comments about Black girls and their inability to learn mathematics. As a parent, I have heard stories from my daughters of how some teachers comment on the ability of the female students as weak and not logical enough to do math.

I believe ethnic identity has a place in the teaching and learning of all subjects and especially mathematics. My reasoning is that mathematics has always been and still holds a very powerful and privileged position (Skovsmose, 2005). Furthermore, research in this discipline has suspiciously placed girls and/or students of diverse ethnicity in a deficit or underachieving position (Boaler, 1997, 2007; Hilliard, 2003; Gutierrez, 2007; Lubienski, 2007; Roger & Kaiser, 1995. Thus, I see a conflict between research and what has been taking place in my classroom, which led me to conclude that we still hold mathematics to this elitist status.

I acknowledge that my subjectivities played a critical role, not only in the selection of my topic, but also in discussing my theoretical frameworks for this investigation. The theoretical background of this study, I believe, plays two roles at once: it helps to build my own understanding of the phenomenon under investigation, and

it provides a foundation on which I can argue that my suggested inquiry is necessary and imperative. I further believe that it is the theoretical framework, which helped mediate, my personal desire to understand a particular social phenomenon, and to also understand the authority of academic discourses historically and socially constructed in society. In choosing a theoretical lens, a researcher depends on her own subjectivity, values, and belief systems (Weis and Fine, 2000). Therefore, value-free research cannot exist in any disciplinary area, including qualitative educational research.

One of my primary concerns in this study is the general validity issues about qualitative research. I have been open in expressing my perspective, including the theoretical framework and paradigm used for this study. Therefore, there is a possibility that the entire process of this study has been influenced by my subjective point of view. My prejudices, prejudgment and "native" status may have prevented me from reaching a deeper understanding of the phenomena under exploration. However, this may also be strength of qualitative research, as it is fundamentally interpretive and based upon the researcher's subjectivity (Creswell, 2003). Still, as a precaution, I set some research strategies to help me to be more reflective on and critical of my own research process so that the quality of the investigation was maintained (Creswell, 2003).

The first strategy was to evaluate my own subjectivity as I began this study. This helped me to be aware of my biases and prejudices, which were in effect when I investigated phenomena through my participants' accounts. In the pilot investigation, I collected data through interviewing three participants, constantly compared the participants' interviews and clarified my interpretations with my participants. This strategy was also applied in this investigation, as well as including artifacts such as report

cards and award letters as data. The second strategy I employed was the use of various sources of data collection. Not only did I interview the students, but also their parents, and teachers. The third strategy was the use of triangulation. This gave a deeper understanding of the phenomena when checking with participants, along with the constant contrast and comparison of the data. By checking with the participants, I was able to verify my interpretation and understanding of the participants' voices. This strategy, known as member-checking, was helpful for the quality assurance of this study. Finally, I sought the guidance of critical friends on the ways I analyzed and interpreted the data. I must also clarify that my way of exploring gender issues in mathematics is mostly influenced by a re-conceptualization of critical theory (RCT) which is a wider view of a Black feminist theory. Through my experiences as a student, woman, mother and teacher of Black urban children, I have come to believe that these theories are the most powerful in explaining various aspects of social inequality, including inequity and unequal access to students who are not considered members of the mainstream society.

Lastly, I must acknowledge another possible problem I faced, which is the presumption of a "native" perspective (Bank, 1993; Ladson-Billings, 1995) as I study the influence of ethnic identity (Jamaican) on the learning of mathematics. My history as a native Jamaican, may be problematic (Mirza, 1998) in that my investigation may be perceived as biased or, at the least, skewed because of my stakes in the Jamaican community. Therefore, the use of a theoretical framework (Black feminist thought) which acknowledges my viewpoint and simultaneously forces me to problematize bias if found, has been most helpful.

Data Analysis

In this qualitative case study, the suggestions of Bogdan and Biklen (2003) to use memo writings and observer's written comments were very effective in the data analysis stages. I believe these items helped me to focus on the process and the research questions. It was also a way for me to converge my thoughts and reflections and record descriptions of certain observable moments. Important to this study is the fact that the participants were a vital part of the data analysis process.

This data analysis section of the study was divided in three stages, coding for general theme; division of the main themes and cross-case analysis; and integrating perceived ethnic identity and mathematics. The first stage of this study is the with-in case analysis. This stage began with open coding; however, I did give consideration to the focuses of the study, which are ethnic identity and mathematics experiences. Because research is recursive in the qualitative paradigm, data analysis is emergent and is best conducted simultaneously with data collection (Merriam, 1988). Analysis of the data collected began immediately following the first case, Ashley's interview. Transcribing, translating, and reading of tape-recorded interviews began immediately after the first session and after each succeeding session. The next section will address the analysis processes for each stage.

Stage One of Analysis: Coding for General Themes

Once the transcription from each interview within each case was completed, it was read and analyzed by coding in isolation. Following that, the data was compared with previously gathered data, applying a constant comparison method (Strauss & Corbin, 1990). This method involved reviewing the data (such as the interviews) and comparing

them with other interviews, first within case and then across each case. As themes emerged, they were noted and data was reviewed again. In doing so, I was looking for both similarities and differences to identify tentative patterns, which can then be compared to each other. I wrote memos, recorded my thoughts of specific categories, observer's comments as well as noting areas throughout the data where the participants described and discussed their values, beliefs, feelings and behaviors as it relates to their ethnic identity and their learning of mathematics.

At the onset of the data analysis I asked my participants individually to examine their transcribed interviews, a process known as member-checking. The reason for this was to have the participants affirm or refute my interpretation of their words and for them to see the codes. Once I started grouping the data according to patterns, each participant was again consulted, and asked to help in grouping similar patterns from their transcribed interview. Before the second set of interviews began, the participants and I met informally as a group (this was not a focus group session) to discuss the grouping of the data and identify similarities across each case. Using the transcripts of the individual interviews, I asked participants to identify all words, phrases and categories which were similar, and then place each of the words, phrases and categories under two specified themes: mathematics learning and perceptions of Jamaican identity. This process was repeated with my participants after the second and third interviews were transcribed and coded. Data reduction charts were constructed to further consolidate similar codes into themes.

Stage Two: Division of Two Main Themes and Cross-case Analysis

The second stage of the analysis involves deeper examination of data under the two main themes: mathematics learning and Jamaican identity. More specifically, the aim at this stage of the analysis was to find specific answers to the research questions. From the constructed chart, I narrowed the data under each theme even further into four themes. These four themes were named using the language of the participants during the interviews. Additionally, my research questions, the literature review, and the pilot study helped in guiding these themes. Furthermore, my participants were consulted on these themes and they helped to guide my thoughts on how to better name and make meaning of these themes.

It was at this stage that more intense cross-case analysis was conducted where I utilized the constant comparative method to identify any similar themes across cases. In doing so, I closely examined all the interviews of each case under the two main themes for similarities, contradictions and or conflicts of words or phrases. If any contradictions and or conflicts were identified I noted them through memo writing in my research notebook and reflected on them.

Stage Three: Integrating Perceived Ethnic Identity and Mathematics

The final stage of the process allowed me to bridge mathematics learning from the perspective of the participants to their Jamaican ethnic identity. This stage was most critical to this study, because it was at this period where extensive interpretation and reflection occurred through memo writing and analysis. This was also the time that I conducted the focus group session, so the participants were instrumental to bridge the two areas. Their input helped me to refine how the two main themes would be merged.

I believe it is important to stay true to my participants' perspective, so all transcribed field notes and ideas on themes and categories were discussed with the participants. I further believe my interest on the influence of ethnic identity in the learning of mathematics, my research questions, scholarly contributions on ethnic identity and Black feminist epistemology ultimately helped in analyzing and interpreting the data.

Managing the Data

For data management, planning and organization I utilized some recommendations from Bogdan and Biklen (2003). Electronic files were stored on a computer (Microsoft Word). Hard copies were stored in a file cabinet and arranged chronologically (collection dates) by participants' names (pseudonyms) in separate file drawers. The types of data (interviews, and official documents) I categorized by case name (participants' name) and gave each a file cabinet drawer. The original transcriptions, audiotapes, and all other documents were stored in a secure location.

Summary

In this chapter, I outline how I used a qualitative multiple case study design to frame the data collection and analysis of this study. Guided by Black feminist thought, I, as the researcher, made it an important part of the study to include, not only myself, but the participants' voices which echoed throughout the analysis. This qualitative multiple case study design incorporated the use of interviews from the four Jamaican girls, their parents and their mathematics teachers to understand how these four Jamaican girls' ethnic identity influenced their learning of mathematics. In the following chapter, I will outline my findings and discussions of the study.

CHAPTER 4

FINDINGS AND DISCUSSIONS

The purpose of this study was to explore the influences of ethnic identity on the learning perspectives of four Jamaican-born females as they negotiate their mathematics schooling experiences in the United States. More specifically, the research questions were (1) What is the nature of the participants' perceptions and attitudes towards their ethnic identity and identities as mathematics students, and (2) how are the participants' actions and behaviors in the mathematics classroom informed by their ethnic identity?

The chapter is divided into four sections. In the first section I present introductory vignettes of each participant (See Appendix X for participants' profile matrix). The second section focuses on the nature of the participants' Jamaican identity and their identity as mathematics students. Section three addresses the participants' descriptions of their actions and behaviors in mathematics classrooms as well as examples of how their actions and behaviors were informed by their ethnic identity. The fourth and concluding section is a cumulative or summative of this chapter.

The study's participants revealed that their attitudes and feelings seemed to intertwine and connect with a strong ethnic identity. The participants provided examples of the nature of their Jamaican ethnic identity and the nuance of their perceptions and attitudes towards their ethnic identity, particularly in the context of the mathematics classroom. The attitudes these participants ascribed to shaped, motivated and encouraged them to be active agents of their mathematics learning. The participants further provided

examples of their experiences, actions, and behaviors in their various mathematics classes and examples of how these actions and behaviors were informed by their ethnic identity. These actions included attentiveness and participation in the mathematics classroom; conversations to understand mathematics; and practicing mathematics for understanding. Furthermore, the data from the participants' interviews highlights four Jamaican girls' beliefs about the connections between their ethnic identity and learning of mathematics.

Introductory Vignettes

Ashley's Introduction

Ashley was born in Harbor View, Jamaica. At the start of this study, she was 16 years old and resided with both her parents and her brother. Ashley left Jamaica at the age of 8 after completing the fourth grade; she had lived in the United States for seven years. Ashley, her brother, and her parents lived in a middle class neighborhood. Her father worked as a cable installer, her mother was a hair stylist, and her brother attended middle school.

Ashley attended Goway High School, which is a large suburban public high school located in a residential working class community with over 1,500 predominantly African American students. Her overall GPA was 3.6, and she was a member of the track team. Ashley was also a member of the media ministry and operated the sound control board at her church. Ashley looked forward to going to college and expressed that, upon completion, she would go to physical therapy school to become a Physical Therapist, a career she became interested in after shadowing a Physical Therapist the previous year. During all of our interview sessions, Ashley spoke of mathematics as if it were her only subject. I asked Ashley about her favorite subject, and she replied, "I am very passionate

about certain things and math is one and I am driven to do well in it." She enjoys mathematics and considers herself a good mathematics student.

Denisha's Introduction

Denisha is a 15-year-old girl who was born in St. Catherine, Jamaica. She migrated from Jamaica to the United States a year before the case study began. While living in Jamaica, Denisha attended primary school followed by high school. At the time of the interviews, she was a tenth grade high school student, and she had a 3.8 GPA. Both she and Ashley attended the same high school, Goway High School.

Denisha was an only child who lived with her mother and stepfather in a mobile home in northeast Georgia in a working class community. After completing high school, Denisha aspired to go to the Air Force and study something computer related. She believed that the Air Force could provide benefits while she completed her studies in computers. She made it very clear that she did not want to participate in combat. Denisha had the strongest Jamaican accent of all four girls, and she rarely, if ever, tried to change her dialect. Denisha was of medium build and was five feet, one-inch in height.

"I am a Black Jamaican-Chinese," Danisha said proudly. "I am smart, intelligent, and attractive, but can be miserable at times," she asserted when I asked her to identify herself. I asked her to explain how she derived her ethnic identity, and she replied, "My biological father is Jamaican-Chinese and my mother is Black Jamaican so that makes me Black Jamaican mixed with Chinese." During our interviews, Denisha described herself as liking challenges and trying new things; in addition, she said she was a hard worker who did not believe in giving up. She liked to help people, and she liked to be active. She also expressed that "math, at first, was one of my favorite subjects, but it's not now

because it is getting harder." She added, "I like challenges and I am up for it." During her spare time, Denisha enjoyed watching comedy shows, such as *Fresh Prince* and the *Cosby Show*. She also enjoyed writing poetry and dancing. After a little coaxing, Denisha shared two of her poems with me during the interviews.

Akilia's Introduction

Akilia was born in Pembrook Hall St Andrews, Jamaica. She left Jamaica at age 12 and had lived in the United States for two years at the time of the interviews. Akilia stated that she missed Jamaica very much and, if given the opportunity, would go back home immediately. Akilia lived with her mother in a two-bedroom apartment, and occasionally her grandmother visited from Jamaica and stayed with them for an extended period of time. The apartment was located in a working-class community in Northeast Atlanta.

Akilia stood approximately five-feet two-inches, had a medium build, and an infectious smile. She attended elementary school in Jamaica where she passed the Common Entrance Examination, which allowed her entry to the prestigious all girls St. Hugh's High School. However, soon after passing this very difficult examination, Akilia and her family migrated to the United States.

At the start of the study, Akilia was 15 years old and in the tenth grade at Cooly High School. Cooly High had a population of over 1,500 predominantly African American and Hispanic students. The school is one of the Early County public schools, and, in fact, is the same school system that serves both Ashley and Denisha.

Akilia was a B plus student who enjoyed playing basketball, dancing, and singing. She was a co-captain on the basketball team while in middle school and was a lead singer

in her church choir at the time of the study. I had the opportunity to hear her lead the praise and worship session at her church one Sunday and she was excellent in her performance. She stated that mathematics was her favorite subject and that her love of mathematics started in Jamaica because her teachers simplified it so that she was able to grasp and understand it. Akilia was enrolled in Algebra II and planned to take more mathematics classes in the future. Akilia shared with me that she really enjoyed listening to reggae music, loved Jamaican food, dancing and, most of all, getting great grades.

Her long-term aspiration was to become a lawyer, but prior to that she would like to own and manage a nail salon. Akilia's plan was to save enough money through her nail business in order to pay for law school. She expressed that she would like to attend Harvard law school.

Marsha's Introduction

Marsha was the quietest of my four participants. Marsha had just turned 15 at the start of the study and, compared to the other participants, she left Jamaica at an early age; she was four years old when she, her two sisters, and parents left Spanish Town in St. Catherine to move to Mount Vernon, New York. She had lived in the United States for eleven years at the start of the interviews. Marsha was the youngest child of three girls. Two years ago the family moved to a middle-working class rural northeast Georgia neighborhood; her older sister, who was married, stayed in New York City. Marsha's parents worked long hours outside the home: her father worked at the local supermarket chain and her mother worked as a health care provider for mentally-disabled children. Marsha was usually left at home with her older sister, who was in college.

Marsha attended kindergarten in Jamaica and middle school in New York. At the time of the interviews, she was a tenth grader at Manhit High School, which was about ten minutes from her home. Marsha was enrolled in Geometry and was a member of the dance step team. She had B plus average. She was also a member of the Gospel Praise Dance team at her church. Marsha said, "I am easy to get along with and at school I am the person most people come to when they need problems solved." Marsha said that because of her (Marsha's) "helping nature and her ability to get along with people" she aspired to be a psychologist or a social worker.

Participants' Perception of Jamaican Identity and Identity as Mathematics Students

Concerning the nature of their "Jamaicanness," Ashley, Akilia, Denisha and Marsha spoke more specifically to their perceptions and attitudes about their ethnic identity and characteristics as mathematics students. The conversations with the participants regarding their perceptions of "Jamaicanness" were comprised of the ways in which they self-identified and their discussions of perceived attitudes towards their identities as mathematics students.

The Nature of the Participants' Ethnic Identity: Their "Jamaicanness"

The girls believed Jamaicans really do not have any other distinguishing physical features other than a Jamaican accent, which is why they are often grouped with African Americans. Despite the lack of distinguishing features, the participants believed that specific attitudes and perceptions they had developed seemed to stem from their ethnic identity. In conversations with these participants about their attitudes, beliefs, viewpoints, self-identity and perceptions, which seemed to stem from their ethnic

identity, I categorized/identified the characteristics they primarily focused on as their perceptions of "Jamaicanness."

Overall, Ashley, Denisha, Akilia and Marsha identified themselves using the common identity of Jamaicans. The participants constructed their own personal, multifaceted ideas about their identity; however, their perceptions concerning their ethnic group membership is at the root of their identity. While Marsha only used the label Jamaican, Ashley, Akilia and Denisha also made specific distinctions using gender and other ethnicities.

For Marsha, her perception about her perceived Jamaican identity was central even though other Jamaicans often ostracized her due to her lack of Jamaican dialect. She was the only participant who had a perceived internal Jamaican identity and felt she was Jamaican regardless of how she sounded and how long she had lived in America.

> "I am Jamaican, but people at my church say I'm "Ja'Fakecan,"…I really hate that…it makes me mad, because I am still Jamaican. Jamaica is in my heart and soul because I still remember certain times when I was younger, how the place used to look where I used to live, certain good memories. So it's still there. No matter what people say it's still there." (Marsha, #1; 10/07)

Ashley and Akilia distinguished themselves differently. Unlike Denisha and Marsha, they saw the need to include their gender and race as part of their self-identification.

> "I am Jamaican; Black Jamaican Female...Most people don't know I am Jamaican … Because I don't sound Jamaican it does not stop me from letting people know that I am Jamaican; I share my Jamaican heritage and show my 'Jamaican mark'." (Ashley, #1; 10/07)

The "Jamaican mark" she referred to was a raised spot on her left upper arm where most Jamaicans received their immunization. Similar to Ashley, Akilia not only reported Jamaican, but also added her gender and race. However, her perceived identity

was different in that she called herself 'Jamaican' first. This could be due to the fact that Akilia had only lived in the United States for three years at the time of the study, and Ashley had lived in the U.S for a longer period of time.

> "I'm Jamaican Black female, very loving person, respects others, likes to laugh, and is energetic. Black does not make me Jamaican…black is the color people call me…I am Jamaican first…black secondly, yuh see... Because there are Jamaicans who are black, white, yellow, all different colors…So I really should call myself Jamaican Black female." (Akilia, #1; 10/07)

Denisha's perceived ethnic identity was distinctly different. Denisha, similar to Ashley and Akilia, included her race; however, she added her father's ethnicity as well.

> "I am a Black Jamaican-Chinese," she said proudly. "I am smart, intelligent, and attractive, but can be miserable at times….My biological father is Jamaican-Chinese and my mother is Black Jamaican so that makes me Black Jamaican mixed with Chinese. (Denisha, #1; 10/07)

The four participants shared very strong ethnic labeling by calling themselves Jamaicans; however, their individual self-identities were distinctly different. Marsha identified herself as just Jamaican and suggested internal feelings rather than time that played a part in her identity. Denisha spoke of both race and her parents' ethnicity that connected to her identity. Ashley and Akilia not only used their nationality, but also included their gender and race. However, a comparison of the two identities showed that race in Ashley's case and nationality in Akilia's case were positioned differently, which suggested that time spent outside of the country of birth may affect perceptions of self-identity.

Their "Jamaicanness" in the Mathematics Classroom

This strong perception of Jamaican identity was also detected as they spoke of their perceptions as mathematics students in the context of their various mathematics classrooms. In this segment of the chapter I will illustrate a connection between their perceptions of Jamaican identity and their mathematics identity. Specifically, I listened for descriptive statements when they made reference to their Jamaicanness in relation to their mathematics ability, their motivation to obtain mathematics knowledge, as well as opportunities to participate in mathematics learning. Connections were made in a conversation with Akilia when she commented about what kind of mathematics student she was. She explained, "Well I think I'm pretty good at math…I do like math...it is my favorite subject...I liked it from in Jamaica…I must be a math geek or something" (Akilia, #1; 10/07). Akilia's description of herself as "pretty good at math" shows her confidence in her mathematics ability. She went on to say that she started liking mathematics in Jamaica. Akilia's comments reveal that her mathematics ability was established while in Jamaica. For her, this strong bond was very difficult to break, because it was somehow connected to her being Jamaican. That foundation in mathematics, which was established in Jamaica, led to a "pretty good" mathematics ability. Therefore, she was prepared to push herself and determined to be successful in this subject.

Similarly Ashley spoke of herself as "a very good mathematics student." This connection with her perceptions of Jamaican identity surfaced in the mathematics classroom when she was presented with opportunities to participate in her mathematics learning. In her mathematics classes, Ashley expressed that she continued to exhibit an

action and a strategy, which seemed to be imprinted in her mind from a teacher in Jamaica. "To this day," said Ashley, "once I enter my math class I sit to the front and all my attention is on Coach H…He ask us to get in the math zone….focusing time…it not only looking at what he is doing at the board. It kina like you have to listen, think and anticipate what would come next and what the answers looked like." (Ashley # 1, 10/07) She went on to say that her fourth grade teacher in Jamaica taught this to her a long time ago. Ashley's opportunity to participate in her learning meant listening, thinking, and sitting in the front of the class as well as using a strategy of anticipating her mathematics answers. By taking these actions, she was involved in her mathematics learning process. When I asked her mathematics teacher if he had ever observed these behaviors he responded,

> "I do remember her sometimes asking if that answer could be predicted ahead of time...and how….Wow !… that is a great strategy….I wish all my students would use it." (Mr. H, mathematics teacher).

Ashley's involvement to make use of opportunities to be a part of her learning of mathematics, a subject she said she was passionate about, seems to stem from a teacher in Jamaica. Additionally, Ashley's comments in the final analysis session give an indication that she believes that as a Jamaican she must be a part of her mathematics learning process because other Jamaicans, who are good in math, have done that and achieved scholarships to schools such as Cambridge. Ashley said, "I don't know…I think as a Jamaican we know math as important…I think that's why my teachers in JA push it so much and that's why I do what I need to do to make sure I understand…we smart people and we good in math… we have people who go…what that schools name in London?.. I think is something in us…yeah Jamaicans." (Ashley, analysis session, 01/08)

This statement further indicated that she believed there was a correlation between her Jamaicanness, her perceptions of her ethnic identity, and mathematics. In that her perception of her ethnic identity in the mathematics classroom when utilized could motivate her to seek her own understanding of mathematics because she comes from a country of people who are good in mathematics, understand the importance of mathematics, and continuing that heritage has an important place for her as a Jamaican. For Ashley, recognizing the idea of giving power to the understanding of mathematics seems just as important as who she is as a Jamaican in proving that Jamaicans are "smart people and good in math." She also implied that staying connected to her "Jamaican heritage" appears to be through actively participating in her mathematics learning in the classroom and using mathematics strategies taught to her by her Jamaican teachers who have also pushed that the importance of mathematics understanding is a part of being Jamaican.

Denisha, unlike Ashley and Akilia, had a more direct connection to her Jamaican identity. Denisha's mathematics teacher was Jamaican and because of that he sometimes spoke to Denisha using the Jamaican Pat-wah. She explained that his (Mr. P) use of Jamaican not only allowed her to focus on the mathematical reasoning, but also, according to her, it made her feel like she was back home. She explained, "Well it really jus mak ie feel like mi back ome yuh nuh. Like mi nuh different….mi really nuh afi tink bout wha mi a say or ow mi sound wit mi Jamaican… mi pat-wah and all… yuh nuh …mi jus tink about wha mi say bout the problem…cause mi just understand wha im ais say bout de problem (Denisha #3; 12/07).

Denisha went on to explain how Mr. P responded, which was one-on-one at times and at other times the class was invited to hear how they communicated using Pat-wah.

> "Sometimes when im explain de problems to de class and if mi ave more questions im talk to mi in Jamaican pat-wah and sometime im will talk ou loud so de whole class can ear and oter times im an mi will jus talk in Jamaican Pat-wah" (Denisha #3; 12/07).

This use of Denisha's native Pat-wah appears to have motivated her desire to learn mathematics. It was as if the need to understand mathematics concepts was stimulated by a strong reaction of being back home in Jamaica whenever she heard Pat-wah used in her mathematics classroom. Denisha stated that her strong reactions to challenges, which mathematics was for her, motivated her to work harder and sustained her persistence.

In comparison to Ashley, Akilia and Denisha, Marsha did not speak of any connection during the formal interview sessions. This could be because of Marsha's departure from Jamaica at a very young age, which could mean that memories of some of her early mathematics experiences had not been fully evoked. Marsha, however, did share her view of a connection with her perceptions of Jamaicanness during the final analysis session.

> "Because I am passionate about learning… math, a subject which does not come easy for me…is one that I do not mind working hard in…You know…I don't give up. I think is that determination...it help, that drive, in making sure that I strengthen my mathematics ability…you see… that drive… and determination comes from me being Jamaican and my parents and sisters are the same way. " (Marsha, analysis session, 01/08)

While she did not speak as the other participants did, Marsha did speak of an internal motivator: "I think is that determination...it help, that drive…that comes from being Jamaican." This statement correlates with her internal perceptions of Jamaican

identity, as she spoke of her being Jamaican "is in my heart and soul." Her comments also indicated that she believed the drive and determined attitude was evident in her family members and it was because of their Jamaican connection. To her, there was an internal or external connection with her perceptions of Jamaican identity and it did play a part in her mathematics learning.

Perceptions of their Ethnic Identity Attitudes in the Mathematics Classroom

As the four participants discussed and described their perceptions of their ethnic identity, there were some common threads underlining their attitudes, views and beliefs. They spoke of themselves as hard workers, go-getters, persistent, compassionate, and laid back, which they believed stemmed from their Jamaican upbringing. These descriptors, as used by Ashley, Denisha, Akilia and Marsha, were how they described themselves and other Jamaicans (e.g. family members and friends). After examination of these words and phrases, as well as consulting with the participants, it was evident that they were describing the nature of their attitudes towards their perceptions of ethnic identity. Additionally, the participants spoke of the benefits of these attitudes and how they applied them, particularly in the ways they approached the learning of mathematics in their classroom. During the third analysis session Akilia commented that "Being Jamaican won't show yuh how to do maths…but it help yuh to know how to approach math and wah fi do when in maths class." The participants in this study agreed that for them what they did in their individual mathematics classroom was different and in some cases the same and was done maybe because of the attitudes they cultivated due to where they were all born. These attitudes, which revealed aspects of perceptions of 'Jamaicanness,' included determination, caring, and relaxed concentration. These

attitudes could also be viewed as elements of their perceptions of Jamaicanness. I will further elucidate these attitudinal themes using Ashley's, Denisha's, Marsha's and Akilia's words.

Attitude of Determination

As my participants spoke candidly about their perceptions of Jamaicanness, they also used words and phrases such as working hard, go-getters, pushing myself, driven, persistent, and strong feelings (which was also called passionate) in their descriptions of determination. The girls believed that this characteristic was the essence of their perceptions of Jamaican identity. During the focus group session, I asked the group to provide some examples of characteristics that they believed were unique to Jamaicans. The participants agreed with Ashley, who said, "They are go-getters, driven, persistent, they'll make a way out of no way… it's like they have to win, that's what Ja-can is bout...it's like an attitude about." The implied suggestion here is that my participants believed that determination may govern a large aspect of the actions and behaviors to which they ascribed.

According to the participants, this attitude of determination acted as a motivator to remind the girls not to give up and to work hard in order to get good grades, specifically in mathematics. The participants spoke of their determination and the ways they applied it in their mathematics classrooms or in their learning of mathematics. For Akilia, she believed this attitude pushed her to work harder and attempt more difficult mathematics problems repeatedly until she got them correct. She said, "….I just don't give up on learning math and sometimes I just feel like…cause it's hard…some of the hard problems in the book I will try and get them all wrong but I keep doing it

cause…one I know I will get right...it just funny sometimes" (Akilia, #1; 01/08). Her comment seems to indicate that she was aware and needed this internal motivator to help her along so she would not give up. Similarly, Marsha spoke of the difficulty she faced with mathematics and the need for an internal motivator. She had no idea where this motivation came from, but said it just had to be something Jamaican because her immediate family was the same way. "Math is very hard for me…but when I am doing work… especially math something in me just said go on…go no…No I don't know if it is a voice…(Laughing) but my mother and sisters… is the same way for them too…I just know…it has to be Jamaican" (Marsha, group session; 01/08). Marsha's reflective comments suggested an internal consciousness that motivated her in a challenging subject such as mathematics. She went on to suggest that her mother and sisters, not her father because his work does not require him to help others, had this same internal consciousness. Marsha seemed to believe their attitudes and behaviors stemmed from them being Jamaican as well, that it must be something connected to her perception of her Jamaican identity. In comparing Denisha to the other participants, Denisha implied that her attitude of determination motivated her to push herself and work harder. This suggestion is no different from those made by Ashley, Akilia or Marsha. This was an internal motivator that led Denisha to face her challenges in mathematics. Similar to Marsha, mathematics became challenging for her (Denisha) because of its level of difficulty. In challenging situations like these, she implied that passion and drive, which she believes were notions of the determined attitude, were her internal motivators. This meant she would keep trying to find ways and strategies to do well in mathematics. She stated that her passionate attitude towards challenges inspired her to attempt more

difficult problems, which could only enhance her mathematics skills and heighten her confidence in her mathematics ability.

An Attitude of Caring

> "That is how yuh get your blessing by being kind and helping." (Ashley, #2; 11/07)

During our discussions, the participants shared stories of how helping or receiving help had impacted their lives. Ashley, Akilia, Denisha and Marsha described that helping others was the way they were brought up, and they witnessed this compassionate behavior from other family members and people in their Jamaican communities. While they could not identify reasons for their caring attitude, Marsha offered two suggestions as reasons why she believed Jamaicans are "kind and compassionate." She suggested that the poor economic conditions on the island could be the root for practicing kindness and compassion as a means of survival. She also believed the compassionate ways of her fellow Jamaicans could be due to the country's major religion, Christianity. The four participants shared that having a similar compassionate attitude was beneficial for them as students in that it built confidence for some and provided a sense of satisfaction for others. Helping, for Alikia, provided satisfaction and enhanced her confidence in her mathematics ability. Akilia revealed that she often went around her mathematics classroom helping classmates, sometimes at the risk of not completing her own assignments, because it was something she wanted to do. She also said her mathematics teacher usually called on her to help other students. Akilia's description of caring indicated the internal satisfaction she gained from helping her mathematics classmates. Akilia's statements also indicated that she was willing to risk not completing her work to

help her classmates understand mathematical concepts. This could be due to her belief that mathematics was important and understanding was a priority in order to "reason things out." Here was her response to what she believed is mathematics: "Math…is a way or really a process of solving problems…big, small…kinna like we need it to work and reason out things." Akilia also revealed that the mathematics teacher had confidence in her (Akilia's) mathematics ability, which in turn heightened her confidence in her own mathematics ability. This heightened confidence in her own mathematics ability could motivate her to consider taking advanced mathematics classes, later she said in college. While Akilia spoke of an internal satisfaction, Denisha discussed helping others in a slightly different way. She gained internal motivation whenever she offered her help to others. Denisha expressed that she saw examples of people helping one another in her neighborhood in Jamaica. This statement proposed the notion that Denisha believed that other Jamaicans exercised this same attitude. Denisha had this to say about helping her classmates in mathematics: "when mi help people in class, mi just wan if go do moe of the problems ina de book…. dey need elp mos of de time an mi want dem fi get good grades." She went on to say, "Mi believe everybody wan fi get good grades and if all mi can do is elp dem fi get de grades…dat's good." (Denisha, # 2; 11/07) This commentary provided an insight as to how Denisha applied this attitude of caring in her mathematics classroom. For Denisha, helping motivated her to do more problems from the book. Additionally, by helping her classmates to get good grades, a condition she viewed as important, Denisha exemplified a deeper sense of caring and nurturing in her mathematics classroom.

Marsha expressed her caring attitude similarly. She spoke of caring through the action of paying attention not only for herself, but also for her classmates. Her commentary, which was similar to Denisha's, implied that nurturing had a place in the mathematics classroom and that thinking of her classmates while she was learning could be beneficial.

> "I always keep in my mind that I have to pay attention for myself and my friends…because most times someone will call and say did you understand what she did in class today and I want to be able to help." (Marsha, # 2; 11/07)

Ashley's description of the application of a caring attitude in mathematical learning had some similarities and some differences. Ashley also suggested that helping provided some benefit of building confidence in mathematics ability. She differed in her belief because, for her, helping was a collaborative process, and the practice of helping was beneficial to her classmates and her in that it built her confidence. In our analysis session Ashley made a statement I believe should be noted here:

> "Well… sometimes they will point out some of the things I did wrong…and sometimes when I start helping one of my classmates and it might be on a problem that is hard and as I help them most times…I kinda learn how to do the problem while I tell them how to do it…so it help me too…I find like I know how to do the problem…so it help me …what's the word… confidence in doing the problems." (Ashley #2; 11/07)

Ashley's comments indicated that peer collaboration was vital for her in mathematics learning. Ashley discussed with me once before the interview started that mathematics was a subject that presented some challenges, and if confidence in a student's ability was not built continuously, most people would not want to try or continue to do math. She said she believed that confidence could be developed from helping classmates because, for some reason, teachers just could not see the need to build the students' confidence in mathematics.

An Attitude of Relaxed Concentration

In their explanation of an attitude of relaxed concentration, the study participants used words and phrases such as "laid-back," "just chill," "relaxing," "easy going," "no problem attitude," "calm down," "focusing on what is important," "not allowing anything to cloud your mind," and "keep focusing." A positive, relaxed and concentrated attitude was something they viewed as an asset of their perception of Jamaican identity. The participants discussed that this "laid-back" characteristic they seem to possess also surfaced during the pilot study. According to the participants, this laid-back attitude contributed to their ability to focus in their various mathematics classes. A relaxed, yet concentrated attitude enabled my participants to be actively involved in the mathematics class but alert enough to identify and react positively to distracters. One such example was found with Akilia. According to Akilia, her mathematics teacher taught in a confusing manner, so Akilia said she did not stop her involvement in the class or disassociate from the teacher. Instead, she discussed that she was able to re-focus her attention and find an alternate source: she made the textbook her main source of knowledge. In our conversations, the girls described various ways of applying this attitude and its benefits in their mathematics classrooms.

For Akilia, this attitude helped her to learn. She said, "I can just observe what is going on…and it help me to not let too many stuff get in my way of learning especially in math class…there are lot of things going on in that class" (Akilia, #2 11/07). Her self-reflexive commentary indicated that she recognized a direct correlation between this attitude and her ability to learn. Similar to Akilia, Marsha believed that being laid-back contributed to her being focused and staying attentive in class. In her description of laid-

back she said, “it is kinda like you can close out what’s going on around you and really focus on what you are doing…it really help me to think of why I am in a certain class.” (Marsha, #2; 11/07) When I asked Marsha what it was about this attitude that allowed a person to stay focused she answered, “I really do not know maybe… laid-back is a calming spirit inside you that is helping not to get stressed and know what needs to be important.” (Marsha, #2; 11/07) The applied benefit of this attitude was different for Ashley. Ashley seemed to think this attitude allowed her to remove the focus off her inability to understand something in mathematics. Instead, it allowed her to take the focus off herself and direct the attention to the strategy for solving the problem. She said, “in some classes like math, I don’t always get things the first time…during times like that … when I don’t get stuff the first time…it’s when I don’t understand…I try and calm down and just focus more on what I am trying to do or get…yeah it really help me to focus I think…but once I understand or get it I am ok.” (Ashley, #3; 11/07)

Ashley’s, Marsha’s and Denisha’s parents seemed also to agree that their daughters were laid back. Akilia’s mother and Denisha’s mathematics teacher, however, perceived this term or attitude as “lazy” and “non-attentive.” Also, Ashley and Marsha’s mothers did not think of themselves as laid-back. Overall, the four participants described with detailed examples of their perceptions of “Jamaicanness” as grounded in some commonality by their attitudes and the different ways those attitudes were beneficial and applied in their various mathematics classrooms.

Participants’ Actions and Behaviors in the Mathematics Classroom

In this section I will address the participants’ perspectives of their individual actions and behaviors in their mathematics classes. The participants described and

explained some strategies they believed to be helpful to their studies in order to better their understanding and ultimately achieve success in mathematics. The actions and behaviors exhibited by the participants were important because they explained their posture, approach to learning mathematics, and how they were actively engaged in the mathematics classroom. These actions and behaviors according to the participants were informed by perceptions of their ethnic identity. The themes in this section were guided by the research questions and were refined based on the participants' discussions. These themes are attentiveness and participation in the mathematics classroom; conversations to understand mathematics; and practicing some mathematics for understanding. Detailed explanations of each theme from the perspective of each participant are discussed below.

Attentive and Participating in Their Learning

The action of attentiveness and participation spotlighted the participants' posture in the mathematics classroom and how involved they were in their mathematics classroom. They individually discussed some of the strategies they applied, their reasons for being attentive, and how they participated in their different mathematics classes. They further explained what led to these actions and behaviors in the context of the mathematics classroom and how these actions and behaviors were informed by their perceptions of Jamaican identity. While the four participants similarly viewed attentiveness as being focused and as a very important behavior needed in learning mathematics, they had varying ways of showing how they used these behaviors to achieve their individual success in mathematics.

Similar comments made by Ashley, Denisha and Marsha described focus as paying attention, being attentive to their teacher by listening, watching, and writing notes.

Marsha described the action of paying attention as taking notes and asking questions due to the difficulty of mathematics. Furthermore, her reflective comment at the end of her statement indicated a need to understand mathematics, which goes back to her comments of being passionate about learning.

> "I always pay attention to what's going on in class…in math class I have to pay attention… I take note answer and ask questions when I need to…because it is not that easy for me…. I really want to learn math" (Marsha # 2; 11/07)

She also expressed her belief that she was attentive in class not only because mathematics was difficult, but also because of determination and a caring attitude, which was part of who she was as a Jamaican. Because of Marsha's caring and nurturing attitude, the actions and behaviors of her attentiveness and participation were ignited in her mathematics classroom. These particular actions and behaviors exhibited in her classroom were not only for her understanding of math; it was done because she knew if asked by classmates to help she could clearly articulate mathematics concepts for their understanding. Marsha pointed out during our analysis session that "Because I am passionate about learning… math, a subject which does not come easy for me…is one that I do not mind working hard in." Marsha said her Jamaicanness, "the determine attitude, has been most instrumental, in making sure that I strengthen my mathematics ability for me and people I can help."

Like Marsha, Ashley viewed focusing as important. Ashley's view of focus included looking at what the teacher did at the board, listening, thinking and anticipating what would come next and what the answers looked like.

> "Once I enter my math class I sit to the front and all my attention is on Coach H…He ask us to get in the math zone." And for me when I hear get into the math zone it means it is time to get serious and time to pay attention… focusing time it not only looking at what he is doing at the board. It kina like you have to listen,

> think and anticipate what would come next and what the answers looked like." (Ashley # 1, 10/07)

This view was slightly different than Marsha's in that her view included where she positioned herself in the classroom and the strategy of anticipating or predicting answers. For Ashley, the action of anticipating answers was taught to her from a teacher in Jamaica and seemed to connect with her perceptions of Jamaicanness. She also said that the attitude of determination, which links with her perception of ethnic identity, significantly motivated her actions and behaviors in her mathematics classroom. Her internal motivator reminded her where to sit, what to do while in class and, most importantly, how to predict solutions to the problems. In the above discussion Ashley's and Marsha's statements indicated that they were not passive learners; rather, they were students engaged in the process at all times instead of just sitting in the class and allowing the "banking concept" (Freire, 1990) to take place. Marsha showed her engagement in her mathematics class by actively paying attention, providing answers, and asking questions when needed. Likewise, Ashley said that for problems that were a lot harder to predict she usually wrote lots and lots of notes and would even ask the teacher how she could predict answers for problems. Mr. H, the math teacher, confirmed this behavior: "I do tell them to get in the math zone and the purpose is to get them to focus, so she is right." He continued with his response, "I do remember her sometimes asking if that answer could be predicted ahead of time...wow… that is a great strategy….I wish all my students would use it." (Mr. P; mathematics teacher)

Both Denisha and Ashley explained that the action of paying attention included the actions of listening, looking, and writing notes, but Denisha said, for her, the biggest part of focus was asking questions.

> "Mi always ave questions an when mi pay attention mi know the kina questions fi ask…like… why yuh do dat like dat." (Denisha, #2; 11/07)

> "Cause…yuh get borded…sittin and watchin…so writin ….de questions elp mi fi kina stay awake…some questions mi ask Mr. P … im may talk bout it already but him said fi ask im again…most times im answer de question a different way nd sometimes de same way… Im also show we de common mistakes student do…nd mi ask im fi do some of de ard problems from de book... Yuh nuh de ones dat are like number 55 de last set of problems." (Denisha, #2; 11/07)

Similar to Ashley, Denisha said that she believed focusing was important because it helped her to hear from her teacher some of the common mistakes students made when doing certain problems and that information would never be found in the text books. Denisha's statement also seemed to imply her desire to gain a deeper understanding in mathematics. For her, this could be done by having difficult problems (like number 55 the last set of problems) demonstrated to her, which helped her to know when to avoid "common mistakes" made in solving mathematics problems. Both girls stated that by paying attention to their mathematics teachers' presentations, they were able to receive valuable information that they may not find in their textbooks. Furthermore, in both cases according to the participants their perceptions of their ethnic identity were an internal motivator, which seem to have stimulated the actions of sitting in their mathematics classrooms and asking carefully constructed questions to ensure a better understanding of steps used to solve specific problems.

Akilia provided contrasting comments. She described the mathematics textbook as her resource for gaining mathematics information and focusing on ways to best utilize the textbook. She believed such actions were important for her success in mathematics. Here, Akilia described how her teacher, whom she had hoped to be her source of

mathematical knowledge, was not as helpful as she expected. Her decision was to find an alternate source, and in a moment of personal empowerment she made that choice.

> "One of the first days Ms. X was doing a problem on the board and I was getting so confuse…over a problem I knew how to do and so I just stop listening to her and started looking through the book." (Akilia # 2; 11/07)

Akilia had also recognized that her mathematical knowledge was vital to her survival and she had to be enterprising and independent. This enterprising, independent behavior could be an example of what Ashley spoke of as "Ja-can they will make a way out of no way," which Ashley also attributed to an attitude of determination. Akilia expressed that she thought her attitude of determination and her attitude of relaxed concentration, which she believed stemmed from her ethnic identity, were integral in this approach to learning mathematics. She believed both characteristics of her perceptions of ethnic identity, attitudes of determination and of relaxed concentration, seem to be internal indicators to make wise decisions in the mathematics classroom. Akilia said,

> "I am very focused in math class but my focus is on the textbook…I look through my book for help if I have problems when completing assignments." (Akilia # 2; 11/07)

Akilia's comments explained her awareness of her mathematics textbook as another important resource of knowledge. Akilia's mother said, "I have told Akilia many times she must pay attention to her teacher because the book will not tell her everything." She continued, "but she must be doing something right because some of her friends call and ask her to help and no teacher have called me to complain about her not paying attention…This is how I see it…if Akilia is doing good…. Well does it really matters if she focuses on the teacher or not?" (Akilia's mother)

Interestingly, the four participants recognized that the action of being attentive was not enough on its own to succeed in the mathematics classroom. They believed interaction and collaboration with fellow students, which is discussed in the next section, aided in their learning.

Conversations to Understand Mathematics "Chattin' bout Maths"

According to the four participants, conversations in the mathematics classroom were vital to each of them and helped them improve their mathematics skills. In this section the participants described their actions of "chattin' bout maths," an aspects of communication and building relationships, which enhanced their mathematical abilities. My participants described how they actively participated in conversations with their peers and teachers for the purpose of gaining knowledge and to get a deeper understanding of mathematics.

Denisha described conversation as a very essential part of her learning because it helped in her learning. She spoke of the relationships with her teacher and her classmates as equally important and that those relationships with the teacher and classmates both served the purpose of helping her learn.

> "Chattin' bout maths is always good …wedda its wid Mr. P or wid one of de people in mi class…it's good…to mi… cause is more dan ima chat bout maths…sometimes im a encourage…push yuh." (Denisha, group session; 01/08)

Ashley, Akilia and Marsha did not think their Jamaican accent presented an issue in their mathematics class conversations. Conversely, Denisha did discuss some concerns. In two interview sessions, Denisha revealed the magnitude and the advantage of using her native language, often in Mr. P's mathematics class. She explained that, occasionally, Mr. P would give explanations to mathematics problems in the Jamaican

dialect, "Pat-wah." She explained that this cut back on the challenges she faced when communicating with her other teachers. Furthermore, because her mathematics teacher was Jamaican and "they could understand each other," she did not have to "worry about how she sounds." (Denisha # 3; 11/07) Instead, she could focus on the mathematical reasoning offered by Mr. P. Denisha's comments also suggested that her teacher recognized the importance of including Denisha's language whenever possible in the learning of mathematics and that action was a motivating factor for Denisha. To understand the complexity, I have included larger portions of her sections of our dialogue.

> "Sometimes when im explain de problems to de class and if mi ave more questions im talk to mi in Jamaican pat-wah and sometime im will talk ou loud so de whole class can ear and oter times im an mi will jus talk in Jamaican pat-wah."
>
> "Yeah…sometimes im will correct mi English and tell mi fi speak properly …mi really don't like dat…well cause mi spend time tinkin if mi saying de words right and if mi a say wha mi wan fi say…yuh see."

Denisha commented that hearing Pat-wah in the class gave her a feeling of being back home in Jamaica. She also said that hearing Mr. P explain mathematics problems in Pat-wah kept her focused on the understanding of the mathematical concept and not the translation of words.

> "Well it really jus mak mi feel like mi back ome yuh nuh. Like mi nuh different….mi really nuh afi tink bout wha mi a say or ow mi sound wit mi Jamaican… mi pat-wah and all… yuh nuh …mi jus tink about wha mi say bout the problem…cause mi just understand wha im ais say bout de problem. Like in oter classes mi just like ave to repeat myself or tink of how fi say it so dat de teachers can understand mi. Yuh nuh. Cause Mr. P and mi speak de same language…it's kina like im understands mi. Cause-a-dat mi jus don't speak or ask questions in other classes as much."
>
> "Yeah…it makes it easier for me…cause mi don't afi try an tink bout wha im means by dis or dat…mi tink it really elp me almost like it push mi fi keep tryin." (portions of Denisha #3; 12/07)

Here, as Denisha discussed her connectedness with Mr. P, it was not only pertaining to the usage of a common language. By speaking in Pat-wah, Mr. P was encouraging and helped her as she negotiated her capacity in his mathematics classroom. Further, the use of the language allowed the students in the classroom to feel comfortable when hearing Denisha speak. Applying the use of Pat-wah within Denisha's mathematics learning environment seemed to build Denisha's enhanced understanding of mathematics. This application of an essential part of Denisha's identity, her Jamaican dialect, was an example of her perceptions of Jamaican identity informing her learning of mathematics.

Another aspect of interaction discussed by Denisha was the action of communication with classmates, which she suggested was usually confined to the classroom. Denisha also explained that the group approach, which was practiced in Mr. P's mathematics classroom, was very helpful and productive. She described that group discussions often yielded many different strategies and methods for approaching different problems, and she believed the group's high measure of productivity was because the members were all girls.

She explained, "Mi mostly speak to de people in mi group and sometimes mi afi help someone in de class." When I asked Denisha about group work, she said, "I do like workin ina group in math class. Mi really tink dat it is very elpful." Denisha continued, "It always seems dat once mi group start doin our work … somebody always can show yuh anoter way fi do de same problem and we really elp each oter like dat yuh se…. an we get nuff problems done…Mi ting is cause is nuting but girls ina mi group." (Denisha # 2; 11/07)

Denisha said she believed the reason why her group was so productive was because the group consisted of all girls. When it came to communicating with group members in mathematics class she shared this:

> "dat the girls in mi group are startin fi understand mi Jamaican accent; how mi sound…dey don't ask me fi say someting again. But mi try fi speak proper English when mi work ina group... dem say mi soun sweet." (Denisha #3; 12/07)

In my conversation with Mr. P, I asked him about his interactions with Denisha and he said, "I think making a student feel comfortable in my class with the way they sound is very important and so if I can help I believe that is part of my job." Mr. P suggested that "when Denisha is working in her group she seems to get a lot out of it…In that they seem to bounce ideas off each other and are willing to try new strategies." Mr. P went on to say, "Interactions help Denisha in two ways with her communication which is forcing her to speak properly and in strengthening her math skills, where she must why and how she solve math problems " (Mr. P; mathematics teacher)

Similar to Denisha, Ashley discussed the fact that conversations with both her mathematics teacher and peers were helpful in her learning mathematics. Ashley pointed out that she valued conversations with her friends, as these conversations helped her identify errors on problems and helped her heighten her confidence in her mathematics ability. This action of "chattin bout math," according to Ashley, was stimulated by her willingness to help, which was an aspect of her caring attitude and her attitude of determination. She explained, "When you talk about math it help you to do good in it." In Ashley's description of how conversations in mathematics would be beneficial she expressed this:

> "Them help and other times I end up helping people…but all in all it was helpful because sometimes I was not able to see why I am getting something wrong….It

> is like when I start talking to my friends I find out I did something wrong that was so simple…like just multiplying or adding incorrectly." (Ashley, #3; 10/07)

The implication was that this benefit seemed to work both ways. While Ashley would tutor her peers in math, and in return they would help her to identify errors she made, helping contributed to building her confidence in mathematics.

> "Well… sometimes they will point out some of the things I did wrong…. and sometimes when I start helping one of my classmates and it might be on a problem that is hard and as I help them most times…I kinda learn how to do the problem while I tell them how to do it…so it help me too…I find like I know how to do the problem…so it help my …what's the word… confidence in doing the problems." (Ashley #3; 11/07)

Ashley's parents confirmed that they had heard Ashley discussing mathematics on the phone quite a few times. Ashley's mother jokingly commented that she wondered if Ashley would ever get tired of mathematics. Mr. H, the mathematics teacher, said he always encouraged his students to talk about mathematics, whether it was with him or amongst one another. Mr. H said he knew that Ashley was definitely one of his students who engaged in discussing math both in the class and outside the classroom with others. Mr. H went on to say discussions like those outside the classroom setting were very helpful, especially as the students moved into the more advanced courses. (Mr. H, mathematics teacher)

Like Denisha and Ashley, Akilia said she believed talking about math had been very helpful and particularly rewarding. In our discussion, she said her teacher also encouraged conversations in class. Akilia explained that her math teacher told the class that they had to ask two people before they called her for help, and because of this, students always discussed math in her class. Akilia discussed how conversations with her classmates helped build her confidence, self-worth, and encouraged her to make an effort

to attempt the more difficult problems in the book. Furthermore, these interactions, in Akilia's perspective, strengthened her mathematics skills and made her a better mathematics student.

> "I must be a geek or something because I really do enjoy talking about math so when people ask me I gladly start talking…I believe that Jamaicans are sociable people so any opportunity we get to talk we go for it…I just like talking bout math…plus I really like helping people." (Akilia, # 2; 11/07)

The above comment indicated Akilia's enjoyment of mathematics, and additionally points to the connection Akilia felt about talking about mathematics and helping. Her willingness to help her classmates in mathematics by talking, in her mind, seemed to correlate with being Jamaican. Furthermore, Akilia, like Ashley, believed that there were also benefits. In Akilia's case it seemed to be internal satisfaction and confidence in mathematical ability.

> "Well I find when I talk about how to do a problem especially when I learn how to do it from the book and I am able to explain it to a kid…I feel good…and to be honest with you it just really let me know that I really do understand what I am doing…. Cause sometimes you are just not sure." (Akilia, # 2; 11/07)

During the focus group session, Akilia said, "Sum a wat make mi Jamaican," Alikia said, "nuh show yuh how fi do maths yuh si…it may just sa dat yuh afi math an yuh fi do it good." (American translation: some of what makes me a Jamaican may not show her how to do math…it may just say that you have to do math and do it well). Akilia's insights indicated to me that it was the way she approached mathematics, a subject she was passionate about, and that her perception of her perceptions of Jamaican identity should not be viewed as what makes her do anything. Instead, it served to focus her feelings and thoughts, and motivated her actions and behaviors by guiding her on how she should strategically approach what she did in her mathematics classroom.

In contrast to other participants, Marsha admitted to not talking much in class. She said, "I really don't talk too much in class…but I do ask for help if I need it, and I ask questions and I do help some people who don't understand..." (Marsha # 2; 11/07) With a closer examination of what she expressed, Marsha did talk in class. In fact, she said she asked questions and helped peers. Akilia and Ashley expressed this same action of helping peers as being beneficial to them. In other discussions with Marsha, she was very clear on recognizing how the action of talking in mathematics class had helped her. Like Ashley, Marsha described how help from classmates reminded her to insert mathematics symbols in the correct places, something she took for granted, as well as put ideas together to solve problems. She made the following statements,

> "Well one way of improving math skills is to talk about what you did and how to do the problems." (Marsha, #1; 11/07)

When I asked her in what way did it improve mathematics skills she provided this example:

> "it mean….it improve skills that you really take for granted…like I always forget to put decimal points in or leave off the negative sign when I am doing integers and one of the people in my group always say to me don't forget to put the negative sign…now it is a joke with us." (Marsha, #1; 11/07)

Marsha's earlier statement of not talking much in class seems to indicate that perhaps Marsha was the type of student who thought too much talking in mathematics class was distracting. Her comments may even give the impression that she was not engaged much; however, the rest of her statement, "I ask for help if I need it," seems to indicate she only spoke after careful consideration. As to whether she believed this action of talking only after careful consideration, and helping and gaining help from peers was informed by her Jamaicanness, Marsha said, "I'm not sure… but my passion to get

math push me all the time in math…it's that go-getter, caring spirit…yeah is kina like it motivate me." This reflective commentary indicates her uncertainty, as well as her certainty, that whatever it was it had motivated her actions and behaviors in her mathematics classroom.

Confirming Marsha's behavior, her parents implied that Marsha was not a big talker, but she had helped out friends in math over the phone. In her discussion with me Marsha's mathematics teacher confirmed that group work for her was a big part of her routine. According to Ms. B, "It really helps the students when they can work together to solve the problem, talking about mathematics is a concept which has worked very well in all my classes." She said, "It is like two heads is better than one, it is very beneficial to most students." She went on to say, "Marsha seemed to work very well with her partners and they both seem to help each other equally."

Summary: An Overview of Conversations in the Mathematics Classroom: "Chattin' bout Maths"

While there were some similarities under the theme of conversations in the mathematics class, there were also some differences in the benefits of engaging in mathematics conversations in the classroom. The four participants perceived the importance of mathematics discussions in their individual mathematics classroom as helpful. Ashley and Akilia made similar comments about how mathematics dialogue helped build their confidence in their mathematics abilities. Akilia contributed that the action of talking about math encouraged her to attempt more difficult mathematics problems, while Ashley and Marsha said conversations with other classmates alerted them to errors, which may have gone unnoticed or undetected. Akilia also revealed in her

discussion that Jamaicans were sociable people and that this might be a reason why she liked talking about math, a subject she had strong feelings about. A topic that Denisha presented, but was never discussed by any other participant, was the issue of speaking with an accent. Denisha's mathematics teacher, Mr. P., made her feel comfortable about her Jamaican dialect because he used Pat-wah in the classroom, which she asserted helped her focus on content during the discussion, rather than her dialect or annunciation. Mr. P. echoed Denisha's sentiments in his interview. Both the ability to focus and a willingness to interact with classmates led inherently into the practicing of the subject, which is discussed in the next section.

Practicing Some Mathematics for Understanding

> "De ting wit maths is dat sometimes yuh afi jus stop doin it, even tough yuh may like it or yuh can get so sick of it…yuh nuh…it can really let yuh ate it… yeah dat's true dat can be anyting but for math it is lik yuh afi practice it some fi understand it." (Denisha, analysis #2; 12/07)

Denisha made this statement at one of the analysis sessions, which gave rise to the theme of doing some mathematics. The discussions in this theme highlight the participants' descriptions of how they practiced mathematics, as well as other strategies that were helpful for them while they practiced mathematics. What become evident are the ideas that not only were Ashley, Akilia, Denisha and Marsha developing mathematical knowledge through conversations, but they were also taking on the responsibility of making sure they practiced and studied for mathematics tests.

In this study 'practicing some mathematics' meant working through textbook exercises in school or discussing and using mathematics ideas in and outside the classroom. I was also interested in any strategies they used when practicing mathematics,

which included strategies they learned in the past while attending schools in Jamaica and were utilizing in their U.S mathematics classes. As a common consensus, these four participants believed that practicing mathematics was important, although they seemed to not do much more beyond what was assigned for class work or independent practice. This gave name to this theme practicing 'some' mathematics, which obviously placed emphasis on the word 'some.' As the girls spoke of practicing mathematics, their views as to why they believed they should do some mathematics were discussed. The responses also showed that only Denisha and Akilia went beyond what was assigned at times and perhaps attempted more difficult problems. In the comments, two participants, Ashley and Denisha, questioned the necessity of teachers giving way too many homework practice problems.

> "I don't want you to think that practicing is not important because it is always good to see if you understand what the teacher just showed you. But why is it necessary to do 30 to 40 problems a night…I don't I have to do lots of problems for me to know if I get it. Most times for the test I just make sure I understand and remembers the steps for the problems." (Ashley, #2; 11/07)

The above statement points to her belief that practicing was important and it could confirm if a student understood what was taught. However, the implication here is that these participants did not believe practicing volumes of mathematics problems were beneficial and perhaps a smaller amount could be just as beneficial. Denisha raised similar concerns:

> "Who mi do some maths in class and when mi get ome if mi have maths homework mi do it…but dat is it…We get bout 10 to 20…Dats not a lot …but by de time mi get to number five mi nuh what miha do…so mi nuh see why we get fi do so much. (Denisha, #1; 10/07)

As the participants discussed their practice time and study habits, two participants, Ashley and Marsha, made comments that seemed to contradict the nuance

they used to describe their attitude of determination. Ashley spoke of committing to memory the steps needed for problems on the test. She said, "Most times for the test I just make sure I understand and remembers the steps for the problems…so I do some problems." (Ashley, #2; 11/07) Marsha's statement suggested she did mathematics only if homework was given and did not study for tests: "Typically, I just do what I need to get good grades… like getting ready for a test I don't really do anything… if I don't get home work I don't do any more math…I think they [teachers] give us the work to make sure we understand what's done in class." (Marsha, 2; 11/07) These statements did not portray students who were hard workers. In fact, Ashley's and Marsha's descriptions showed how little time they spent doing mathematics outside the mathematics classroom and that they rarely would go beyond practicing mathematics problems that were not given for homework or tests. This was particularly surprising to me because they all had over 'B' averages in mathematics. However, during an analysis session Akilia suggested that being determined, to her, "don't mean I just do things like math problem…you nuh…I do work hard on problems…because …I think I have to think how I am …and what it will do to me." It seems Ashley was describing a 'choice' regulator or an internal regulator, which served to alert her to think of how doing more or less problems would help her to understand mathematics better. While Ashley viewed her attitude of determination as a 'choice' regulator or an internal regulator, which was useful, Marsha's view was different. Marsha stated that focusing on what was important and knowing

how to balance time helped her "practice the real important stuff in math" and, therefore, her attitude of relaxed concentration was what informed that action of knowing what and how to practice math. This statement made by Marsha indicated that the relaxed

concentration attitude served as a type of regulator, a reminder to her as to what and how to prioritize.

Different in their approach to practicing mathematics for understanding, Denisha and Akilia spoke of studying for tests by attempting more difficult problems even if they were not assigned. Denisha stated that although she did not do much practicing for tests, she did attempt the more difficult problems even when they were not assigned.

> Mi don't do much home work but fe test mi do what im give fe dat test and sometimes mi may do som tuff dat im nuh give…jus fe see if mi can do dem and cause me like de challenge of doing de maths ..dat work best fe mi" (Denisha, #1; 10/07)

Unlike Ashley and Marsha, Denisha seemed to recognize that some practice time may be helpful for tests. She appeared to recognize the advantage of attempting more difficult problems, although she said it was due to her like of challenges. Denisha admitted to me during the analysis session that it was not that she wanted to do extra problems, instead it was her sense of determination. That element of her perception of Jamaicanness, which served to remind her of and motivate her to do well, was more important because it was her goal in this difficult subject. She said, "mi no wan do dem… but fe mi..mi hafe say mi need fe do it dem..mi hafe push myself." Akilia, similar to Denisha, did go beyond what was assigned by the teacher.

> "I do practice math…really to make sure I understand the problems… to prepare for tests...it's just to know what to do… To be honest with you sometimes I do more math problems than what she give us…but I have to be in the mode…and those are usually more…more difficult ones that were assigned …yeah I will try them… well, because I really enjoyed doing mathematics… and mova it make me better at math. We always get math class work and homework during class time…usually I start it but sometime I don't get to finish in class… so once I get home I always start with my math homework….so practicing math to me is important….I like to do math wit a little reggae music." (Akilia, # 2; 11/07)

Akilia's comments implied that she had to be in a specific "mode " to do the difficult mathematics problem. When I asked her what was this mode and where does it come from she replied, "the mode that calm me…the mode…it push me…but I not sure where it come from but it help me… get in the mode to do them hard problems." I am not sure if this is the same mode that Marsha described as her laid back attitude, "a calming spirit inside…that help you not get stress." Both Denisha and Marsha spoke of an internal motivator that, when applied, forced them to do more difficult mathematics problems. Perhaps it refocused their thoughts from how challenging the problems were to the reasons for doing these problems.

As my participants were doing mathematics, they also utilized specific strategies, some of which they learned from schooling in Jamaica. During our conversations, Akilia shared in her Jamaican accent that her fifth grade teacher stressed the idea of knowing more than one method or plan to solve a problem. Marsha said a strategy that was pushed by her mathematics teacher was that two heads are better than one, and to ask classmates for help. Denisha reported that her Jamaican teachers had her memorize so many simple mathematics facts that it saved her a lot of time when doing problems. A strategy that Ashley said she learned from her fourth grade teacher in Jamaica was to try and predict the answers to problems before solving for an answer.

> "Well uhh…say for instance you get a problem like 14 is what percentage of 25…. So, what I would do before they start working on the problem…. I would say to myself… half of 25 is about 12.5 and so that is 50%.... so 14 parts of 25 is a little over a 50%... so I know my answer is round or close to 55%...so I kinda have some idea what to look for." (Ashley, #3, 11/07)

I asked Ashley about this specific strategy, and she stated that she remembered some others but this one she used most often. She added that this strategy was obtained

from one of her best mathematics teachers. It could be that Ashley's usage of this strategy was not only because it was most helpful in the mathematics she currently did, but also that it somehow connected her or reminded her of her perceived Jamaican identity. She indicated that each time she used this strategy she called on elements of her Jamaicanness. Ashley's mathematics teacher, Mr. H, discussed his observation of this action and his desire to have other students use it.

> "I do remember her sometimes asking if that answer could be predicted ahead of time...wow… that is a great strategy….I wish all my students would use it." (Mr. H, Mathematics teacher, 12/07)

Similar to Ashley's strategy, Akilia spoke of knowing many methods or ways to solve one problem, which her teacher in Jamaica taught her.

> "In JA….Well during maths time we did some of the things I am doing in algebra now…but we never called it algebra we jus call it maths…I mean I jus tink it was math for exams yuh nuh. I just didn't think it had a special name. Let mi see…we did things like knowing patterns, adding multiplying negative and positive numbers and all that, ole-heep of word problem…we always start the day with word problems. We had to share 2 to 3 ways of home work each problem…because she always said one way is not enough…and we had to talk about it….Sometimes …the method didn't work for another problem… men…I hated that…ahmm… we had to try each new method with other problems too. And talk about our methods." (Akilia, #2; 11/07)

In contrast, Marsha could not think of any lessons taught to her by her teacher in Jamaica. Instead, she described a strategy stressed by present mathematics, the strategy of "two heads is better than one."

> "I always try and finish all my work in class so that I don't understand I can get help then…. My teacher always say ask for help…So If I need help at home I ask my sister...she is ok… two heads is better than one that's what Ms. B say…yeah we will both figure it out." (Marsha, #2; 12/07)

Unlike Marsha, Denisha could not remember any one strategy to share. She did, however, speak of the multiplication and addition facts tables, which she knew from back

in Jamaican and was proud of the fact that she was able to answer questions on computation faster than students in her class.

> "Mi can't tink of any…I learn so much…but mi know yuh see time tables and some multiplication and addition facts we hafe memorize dem in Jamaican….yuh memba that…and dat help …cause many times when we a do some problems…dem a pull out calculator and mi already nuh de answers…so mi quick ponde draw…hahahh [laughing]." (Denisha, group session, 01/08)

Based on the discussion, Ashley, Denisha and Akilia used different strategies taught to them by Jamaican teachers they had while attending school in Jamaica. These strategies mentioned by Ashley, Denisha and Akilia were just as applicable to the level of mathematics they were doing. They may have applied these particular strategies they learned in Jamaica because of their connection with their perceived Jamaican identity. It seems as if their choice to use these strategies was informed by their perceptions of their ethnic identity. Unlike the other three participants, the strategy Marsha described as a relevant strategy was not taught to her by a teacher in Jamaica. However, the "two heads is better than one" concept she depicted perhaps could be associated with perceptions of her attitude of caring described by Ashley. Ashley's description indicated that a notion of the attitude of caring included collaboration, which seems to have enhanced mathematics confidence. Therefore, the strategy used by Marsha could also be based on the attitude of caring and would explain why this strategy was cited by Marsha as beneficial to her learning mathematics. It could further elucidate Marsha's choice of this "two heads is better than one" strategy; the decision to use it could have been informed by her ethnic identity.

Conclusion

This chapter explored and investigated how Marsha, Ashley, Akilia and Denisha's perceptions of their Jamaicanness may have shaped or informed their learning of mathematics. As discussed above, many of the statements the participants made came directly from interviews and two phone conversations while few statements were made during the final analysis session. There were some consistencies and similarities as well as differences in statements made by the participants of their perceptions on how the nature of their Jamaican ethnic identity shaped their learning of mathematics. Additionally, based on observations and their perceptions, their parents and teachers confirmed many of these statements.

The participants' belief of their Jamaicanness, which included their deep-likes, their behaviors, their self-identity, their actions, and reactions as well as their attitudes, did in some way shape how they approached learning mathematics. The four young ladies agreed that persistence, an element of the attitude of determination, drove them to continuously attempt challenging mathematics problems. Also their caring attitude that they attributed to their ethnic identity gave them an extra willingness to interact with others in the mathematics classroom, which they believed provide them with self-confidence in their own math ability.

The findings of this research show how the actions and behaviors of the participants were informed by their perceptions of ethnic identity and provided them with many informative actions and critical strategies. These actions and behaviors included attentiveness and participation in mathematics classes, which enabled them to become actively engaged in the learning process by staying focused, taking notes methodically,

knowing where to sit in the classroom, listening attentively for critical directions and asking relevant questions. These specific actions performed in their mathematics classrooms, they believed, were informed by elements of their perceptions of Jamaicanness, enlightening them on how to solve mathematics problems.

Another illustration of actions and behaviors cited by participants was the conversations that aided their understanding of mathematics. “Chattin’ bout Maths” was referred to as actively conversing about mathematics: talking about mathematics with peers, collaborating to obtain a deeper understanding of problem solving, and developing critical reasoning of mathematics problems using native language whenever possible. The behavior of “chattin bout maths” was informed by elements of their perceptions of Jamaicanness, which included the attitudes of caring, of determination and of relaxed concentration, and had heightened their confidence in their mathematics ability.

Another action and behavior of practicing mathematics for understanding consisted of how and when the participants practiced mathematics, and the mathematical strategies they used in solving problems. More specifically, this action and behavior included practicing mathematics to check for understanding of taught objectives, attempting more challenging problems for deeper understanding especially for tests, and solving problems to prepare for tests. Additionally, mathematical strategies they used in solving problems consisted of critically (mentally) thinking through problems by predicting answers, learning more than one strategy or method to solve a problem, willingness to get help if and when needed, and the use of simple multiplication and addition facts instead of calculations. Notions of their Jamaican identity, which informed

this action and behavior, included attitudes of determination and caring that appeared to enhance their mathematics capability.

The research confirmed that these students' confidence in their mathematics ability must be continuously built and was best achieved collaboratively with friends and classmates who helped them face various mathematical challenges. These young ladies agreed that an attitude of caring—manifested through helping—was a characteristic that was very beneficial because it allowed for collaborative behavior, and the action of conversation in the mathematics classroom helped build confidence in their mathematics abilities. While an attitude of determination was the force or the motivator that pushed each participant, it was also a source of empowerment to keep facing challenges in mathematics, which appeared to be demonstrated in their high grades, exemplifying their hard work.

Based on the data provided, my four participants were primary agents of their mathematics learning. The nature of these participants' perceptions of Jamaican ethnic identity was a source of motivation and empowerment as they negotiated their individual mathematics classrooms. To negotiate their individual mathematics classroom, participants had to overcome various barriers. For example, they found alternate sources of knowledge when the teacher was not sufficient, as well as found opportunities to converse in their native language (Pat-wah) as a way of uncovering clearer explanations. For my participants, the nature of their ethnic identity forced them to act on their caring attitude, which then resulted in them negotiating the mathematics classroom by receiving help while giving help to classmates. As discussed above, these participants appeared to

have negotiated their mathematics learning by ascribing to specific actions and behaviors that were motivated by the nature of their perceptions of Jamaicanness.

In this chapter, I presented an analysis of the data gathered from the following sources: interviews with participants, parents, teachers, focus group discussions and conversations during analysis sessions. All the data were analyzed to answer the research questions. In the following chapter I will present a general focus on the research questions in an overview that will connect these findings with current research in ethnic identity, mathematics education of female and Black female Jamaica students.

CHAPTER 5

SUMMARIES, CONCLUSIONS AND RECOMMENDATIONS

Students' perceptions of ethnic identity in the mathematics classroom when used by mathematics teachers can foster students' confidence in their mathematic ability. Additionally, mathematics teachers' use of ethnic identity can inform actions and behaviors that promote and build collaboration in the mathematics classroom that leads to better students' understanding of mathematical concepts.

The purpose of this study was to explore the influences of ethnic identity on the learning perspectives of four Jamaican-born females as they negotiated their mathematics schooling experiences in the United States. This chapter is comprised of an overview of the study, which includes a brief summary of the primary objectives, methodology and research findings. Also discussed are suggestions for future research and recommendations for educators, followed by conclusions.

Statement of the Problem

The changing educational landscape in classrooms around the world as well as in the United States is due in part to a large influx of people from various geographic locations, including Caribbean island nations such as Jamaica. It has been stated that over 25 percent of individuals of Jamaican decent living in the U.S. are youth under the age of sixteen, more than half of which are female who attend public schools (Pickoff-White, 2003; Waters, 2004). There is a paucity of data in the scholarly literature that examines the impact of ethnic identity on the educational experiences of Jamaican-born girls in the

field of mathematics. In a relatively recent article, Stritikus and Nguyen (2007) posited that the way immigrant students define gender identity and ethnic identity influences their academic identity, which further illustrates the complex educational challenges many immigrant students face. The authors also suggest that these factors may also play an important role in academic achievement as well as student adaptation and that further research is needed. This study specifically explores ethnic identity influences in mathematics learning because mathematics educators rarely explored ethnic identity and mathematics (Martin, 2007). The current study specifically investigates the influence of ethnic identity on four Jamaican-born female students as they learn mathematics in the United States. The specific objectives of this study are to determine (1) What is the nature of the participants' perceptions and attitudes towards their ethnic identity and identities as mathematics students, and (2) how are the participants' actions and behaviors in the mathematics classroom informed by their ethnic identity?

Review of the Methodology

This study was conducted using a multiple case study design as well as Black feminist thought. Three individual interviews and one focus group interview were conducted with the participants, as well as two interviews with their mathematics teacher and two interviews with their parent(s). Extensive reflective memos were written after each interview session, during interview transcriptions and during the analysis process. These memos were used to further interpret the patterns and themes in the data (Bogden and Biklen, 2003), which allowed me to elaborate on the girls' experiences and their discussions of ethnic identity and learning mathematics.

Immediately following each interview session, the interviews were independently transcribed, analyzed and coded. In this study the participants were vital to the analysis process. They were consulted not only for member checking, but also to help in interpretation, clarification and analysis. The data analysis process was divided into three stages—coding for general theme, division of the main themes and cross-case analysis and connecting the themes. During the initial analysis, open coding was used; however, consideration was given to the focus of the study, which was ethnic identity and mathematics learning. The current data was compared with previously gathered data, applying a constant comparison method (Strauss & Corbin, 1990) within each case. The aim of the second stage was primarily answering the research questions, as well as comparing the codes across each case by looking for similarities and differences.

Summary of the Findings

The purpose of this study was to explore the influences of ethnic identity on the learning perspectives of four Jamaican-born females as they negotiated their mathematics schooling experiences in the United States. More specifically, the research questions were (1) What is the nature of the participants' perceptions and attitudes towards their ethnic identity and identities as mathematics students and (2) how are the participants' actions and behaviors in the mathematics classroom informed by their ethnic identity?

(1) The nature of the participants' perceptions and attitudes towards their ethnic identity revealed what they called attitude of determination, attitude of caring, and attitude of relaxed concentration. These perceived attitudes could also be viewed as elements of their Jamaicanness.

The four participants expressed a very strong sense of ethnic identity; however, there were distinct differences in individual perceptions of their self-identities. While Jamaican was always a part of their self-labeling, three participants integrated race, two included gender with race, and in one case parental ethnicity was included. The findings suggested that strong individual perceptions of their self-identification were constructed based on ethnic group membership. Additionally, these constructed identities did include race, gender and parental ethnicity. In this study the participants' strong Jamaican identity was an element of their Jamaicanness. In the context of their various mathematics classrooms, perceptions of their Jamaican identity were detected as they described some of their experiences as mathematics students. As the participants spoke of their experiences within the context of the mathematics classrooms, connections were made between their Jamaicanness and their mathematics ability, their motivation to obtain mathematical knowledge and opportunities to participate in their mathematics learning. A strong bond was noticed between Jamaican identity and mathematics ability. Two participants expressed confidence in their mathematics ability, which indicated that they were good mathematics students and that they were passionate about math. They expressed that their passion for math was established in Jamaica, the root of their self–identity and that a strong foundation was established in Jamaica. Another association was detected between Jamaican identity and opportunity to participate in mathematics learning in that the participants were actively involved in their mathematics learning process. Their involvement included specific actions and strategies to use, which were imprinted from teachers in Jamaica. The idea of participating in the mathematics learning process appeared to have initiated in Jamaica. By using these actions and strategies

established in Jamaica, the participants were staying connected to their perceptions of Jamaican identity. One participant indicated that the use of Pat-wah, her native language, in the mathematics classroom gave her the feeling of being home in her native Jamaica. This nostalgic feeling of being home appears to have stimulated her desire to understand mathematics more clearly by asking questions in class, thus linking her perceptions of her Jamaicanness through the use of her language to further her mathematics knowledge.

As the four participants discussed and described their perceptions of their ethnic identity, there were some common threads underlining their perceived attitudes, views and beliefs. The participants spoke of the benefits of these attitudes and how they applied them, particularly in the ways they approached the learning of mathematics. These attitudes, which revealed aspects of their perceptions of Jamaicanness, included determination, caring, and relaxed concentration. These perceived attitudes could also be viewed as elements of their Jamaicanness. The attitude of determination, for the participants, was perceived as an internal motivator to remind the girls not to give up, work hard and be persistent in order to get good grades, specifically in mathematics. The perceived attitude of caring, as it was applied by these participants in their mathematics classrooms, had specific benefits. The participants spoke of how exercising care helped build confidence in their mathematics ability, provided a sense of self-satisfaction, allowed for peer collaboration, and motivated one participant to attempt challenging math problems as a way of strengthening her skills. Although the participants could not articulate reasons for this attitude of caring, they believed it was beneficial in that it strengthened their mathematics abilities and an aspect of their perceptions of Jamaicanness. Another element of their perceptions of their Jamaicanness was the

attitude of relaxed concentration. The application of this element seemed to enable the participants to focus on activities in their math classrooms that were germane to their mathematics learning. This suggests a correlation between this perceived positive attitude and increased understanding and learning in mathematics.

(2) The participants' actions and behaviors in the mathematics classroom, which were influenced by their perceptions of ethnic identity, motivated, encouraged and empowered confidence building and peer collaboration in the mathematics classroom.

The actions and behaviors of the participants were influenced by their perceptions of ethnic identity, which also had an impact on their actions and critical thinking in mathematics. These actions and behaviors included participation in mathematics classes, conversing about mathematics ("Chattin' bout maths"), and practicing mathematics.

Being more attentive and participating in mathematics classes enabled the students to become actively engaged in the learning process by allowing them to stay focused on the topics, take better notes in class, listen more intently and ask relevant questions. The participants perceived that these specific actions performed in their mathematics classes were influenced by elements of their perceptions of Jamaicanness, which improved their problem solving skills in mathematics.

Engaging in conversations to understand mathematics also illustrated another aspect of their particular actions and behaviors. "Chattin' bout maths" was referred to as actively conversing about mathematics: talking about mathematics with peers, collaborating to obtain deeper understanding of problem solving, and developing critical reasoning of mathematics problems using native language whenever possible. The action and behavior of "chattin bout maths" was informed by elements of their Jamaicanness,

which included the attitudes of caring, of determination and of relaxed concentration, and had heightened their confidence in their mathematics ability.

Another action and behavior of practicing mathematics for understanding consisted of how and when the participants practiced mathematics, and the mathematical strategies they used in solving problems. More specifically, this action and behavior included practicing mathematics to obtain a better understanding of principles and objectives, as well as attempting challenging problems for deeper understanding and test preparation. Additionally, the mathematical strategies they used in solving problems consisted of critically (mentally) thinking through problems by predicting answers, learning more than one strategy or method to solve a problem, willingness to seek help if and when needed, and the use of simple multiplication and addition facts instead of calculators. Notions of their Jamaican identity, which informed this action and behavior, included attitudes of relaxed concentration, determination and caring; thereby, enhancing their mathematics capability.

In this section I will connect my study to black feminism in addition to presenting a critique of black feminism as my theoretical lens. As I listened to the participants describe their current experiences in the U.S mathematics classrooms, their stories were sociological experiences. I found it difficult, however, to use a social constructive or sociological framework, which did not completely resonate with my study of individuals' experiences. As such, there were aspects of Black feminism that were applicable to this study and will be discussed in this section.

All four dimensions of Black feminist thought, as presented by Collins (1991), were present to some extent in this investigation. Collins' four dimensions—the ethic of

personal accountability, concrete experience as a criterion of meaning, use of dialogue to assess knowledge claims and the ethic of caring—were not the only way Black feminist thought appeared in this research. As Black Jamaican females, the participants and I naturally apply black feminist thought on a daily basis. I am not claiming that all experiences of Black Jamaican females can be explained in a general form through Black feminisms or that this defines all Black Jamaican females. The concept behind Black feminist thought is that we have a unique standpoint based on the common experiences of being Black, female and in this case Jamaican (foreign) in a White male-dominated American society. We do not have the option of choosing to be Black or female. We are simultaneously members of three marginalized groups making our unique experiences similar. Additionally, two of my participants did believe that their gender (female-ness) was significant to them because they included 'female' as a part of their specific ethnic identity.

Conclusions and Implications

The nature of students' ethnic identity encompasses their feelings, beliefs, attitudes, values and therefore may influence how students identify as mathematics students. This study revealed that the nature of students' perceptions of their ethnic identity may influence how they approach their mathematics learning. Similarly, students' actions and behaviors exhibited in the mathematics classroom may be informed by their perceptions of ethnic identity. In the mathematics classroom student's attitudes and perceptions of ethnic identity could be detected as a motivator (influencing actions such as pushing students to attempt more challenging math problems and actively participating in their math learning); an encourager (engaging collaborative behaviors in

the math classroom, which build confidence and strengthen math skills); an empower (allowing behaviors that will counteract challenging or negative situations found in the math classroom).

In examining the influence of ethnic identity on the learning of mathematics, the issues are complex. As the participants discussed the pride they felt in their perceptions of Jamaican identity, which was an element of their "Jamaicanness," they were very specific about how they chose to be labeled and their own self-identification. In this study the participants exhibited a strong connection with their perceptions of their ethnic identity. They wanted to be called Jamaicans. It was important for these participants to include their nationality or birthplace with their identity, making Jamaica a part of how they chose to be identified. Phinney (1991) pointed out that ethnic group core labeling is mostly associated with national and regional origins of the group members; however, individual members within each ethnic group may choose even more specific self-labeling. Similar to Phinney's point, three of the four participants were more specific in their self labeling by using their gander identity and parental ethnic identity. As in Water's (2004) study of Black identity amongst West Indian immigrants, she found that most Jamaicans possessed a strong self-identification with their parents' national origins. Gee (2003) pointed out that students' involved in constructing multifaceted personal core identities also acknowledged that their core identity is influenced by their ethnic group membership. In this study the participants indicated that their ethnic group membership was at the root of their idea of identity. Specifically for these participants, their perceived ethnic identity was essential to their learning of mathematics. Just as these participants, who were born in Jamaica, have thought and were able to articulate their choice of their

specific identity, as in Akilia's comments to place her nationality first or Marsha's internal connection of the heart, schools must allow and respect students' identity and seek ways to incorporate it into the learning process. While this study agrees with Zarate, Bhimji, and Reese's (2005) study that suggested a correlation exists between ethnic labels and academic achievement, and those students who were allowed to select ethnic labels were most frequently associated with higher measurements of academic achievement, Zarate, Bhimji, and Reese's study never suggested how ethnic labeling could be beneficial to teaching.

When teachers allow and respect the choices of students' specific ethnic identity they are highlighting what are essential components of student learning. Given this information, teachers may be able to tap into these essential components and utilize them as motivators to stimulate mathematics learning in the classroom; therefore, it is incumbent that mathematics teachers note and seek knowledge from their students of specific perceived ethnic identity. Because perceptions of student specific ethnic identity could be beneficial to the student's mathematics learning process, these perceptions may also inform student actions and behaviors in their mathematics classroom as well as how they may approach their learning of mathematics.

In most mathematics classrooms, the ethnic identities of students are not viewed as important. In this study, the students wanted their identity to be acknowledged and indicated that, for them, their nationality was part of who they were. These participants were proud of who they were and exhibited a positive sense of self through their identity. For these girls, this translated into a positive self-image and heart-felt pride in their nationality. Altschul, Oyserman & Bybee (2006) had a similar conclusion. They stated

that students with a high degree of connectedness, awareness of the self embedded in ethnic-racial identity, achieved higher math scores and were able to deflect negative messages and behaviors found in most mathematics classrooms. As was evident in my study, the four participants have mathematics scores of B or better and were able to negotiate challenges they encountered in their individual mathematics classrooms. These four girls believed it was the nature of their perceptions and attitudes towards their ethnic identity in their mathematics classrooms which allowed them to develop a positive self image and utilize strategies informed by the perceived ethnic identity. Students with positive self-images and pride in their ethnic identities develop a strong awareness of their contributions to their learning in mathematics; thereby, enable themselves to develop strategies to overcome barriers they may encounter in some mathematics classrooms. This study adds to Altschul, Oyserman & Bybee's findings; thus, it offers empowerment strategies to encounter negative behaviors in mathematics classrooms and build confidence in mathematics ability. These strategies may include students' determination in identifying alternate sources of mathematics knowledge, not relying on the classroom teacher as the only source, interacting and collaborating with students to better their understanding of mathematics concepts, and, when opportunities are offered, engaging in their learning of mathematics. These strategies, according to these participants, correlate with their attitudes and perceptions of their ethnic identity and could be beneficial to mathematics teaching.

In this study, the focus included mathematics achievement in association with ethnic identity, which is an area rarely studied according to Martin (2007). Martin posited that development of mathematics identity and ethnic identity may be intertwined. As the

participants discussed their various mathematics experiences, insights were gained on their mathematics socialization, which is a description of the process and experiences that shape an individual's mathematics identity (Martin, 2000). An individual's mathematics identity encompasses beliefs about mathematics abilities and its purpose. Motivation to obtain mathematics knowledge and their opportunity to participate in mathematics also contributes to mathematics identity, which was sensed along with its connections to their ethnic identity. In the current study, Ashley and Akilia perceived themselves to be "pretty good" mathematics students and revealed that this confidence was based on caring teachers and mathematical strategies learned in Jamaica. They further commented on the possibility of taking more mathematics classes even though it was not needed for their future career goals. Marsha and Denisha were not as confident in their mathematics ability. Instead, mathematics identity was exhibited through their motivation to gain more mathematics knowledge only when opportunities were presented to them. Thus, they collaborated with classmates and used Pat-wah when necessary. Additionally, they associated participating in their mathematics classes as being determined and caring, which they also associated with their perceptions of Jamaican identity.

Findings from this study revealed that these participants' actions and behaviors in their mathematics classrooms were influenced by perceptions of their ethnic identity. Psychologist Uttal (1996) examined the influence of ethnicity on actions and behaviors of students from the United States, China and Japan. Uttal indicated that ethnicity and religious beliefs positively affected the actions and behavior of the Asian students. However, ethnicity and religious beliefs of the U.S. did not affect their actions. Contrary to Uttal's work, the participants in this study believed and described how their actions

and behaviors were informed by their Jamaican identity. Two of the participants explained that the attitude of a relaxed concentration enabled them to focus and be attentive in class. In Boaler's, (2007) article "*Gender and Learning Environment"* she argues that some educators have a tendency to view female students in the mathematics classroom as passive learners. The girls explained that they were not passive learners; rather, they were students engaged in the process at all times instead of just sitting in the class and allowing the "banking concept" (Freire, 1990) to take place. These participants described their actions in the math class as actively listening, taking notes, asking questions and predicting answers. Furthermore, one participant revealed that this attitude of relaxed concentration served to help her remove the focus off of her inability to understand mathematics concepts and directed the attention to a strategy to solve mathematics problems.

Students' perceptions and attitudes that stem from their ethnic identity could foster collaboration, thereby allowing the development of students' mathematics reasoning and mathematical skills. The participants commented on how aspects of communication built relationships through collaboration and enhanced their mathematical abilities. According to Malloy (1997) and Shade (1998), Black students, in particular, learn holistically, relationally, and intuitively through direct contact with teachers and peers. Thompson (2006) pointed out that, in her study, conversations in her mathematics classroom were vitally important because it allowed students to rationalize and verbalize their individual mathematical thinking. Similarly to the Malloy, Shade and Thompson arguments, the girls in this study actively participated in conversations with their peers and teachers for the purpose of gaining knowledge. According to the four participants,

conversations in their mathematics classrooms were vital to each of them and helped them improve their mathematics skills, conversations such as how and why a mathematics problem was done a specific way and requesting teachers to do more difficult problems. According to the study participants, this action of interacting was stimulated by a willingness to help others and a sense of compassion, which was derived from their caring and determined attitude. One participant with a strong Jamaican accent spoke of how the use of her Jamaican dialect by her teacher encouraged the student to learn and allowed her to focus on the mathematics reasoning instead of the translation and meaning of words. Banks (2001) argued that languages and dialects are important components of ethnic identity and, when possible need, to be utilized to enhance learning.

Implication for Practice

Although this study was investigative in nature, there are two implications that could be drawn that may help teachers of mathematics who wish to connect ethnic identity with mathematics learning. The first one is a student's perceptions of ethnic identity can facilitate mathematics ability by building confidence and, secondly, ethnic identity can promote and build mathematics collaboration.

Perceptions of Ethnic Identity Can Facilitate Mathematics Ability

Mathematics teachers should utilize and acknowledge students' perceptions of ethnic identity in their mathematics classrooms because it can facilitate mathematics ability. The relationship between ethnic identity and learning has important consequences in educating specific groups of students. The findings from this study suggested that the female participants entered their various mathematics classes with strong perceptions of ethnic identity. These perceptions of their ethnic identity have shaped and informed their

actions, behaviors and reactions to challenges. Hert and Allexsaht-Snider (1996) argue that if educators do not value students' unique ethnicity in learning, students will lose any sense of belonging with which they may have entered the classroom. Scholars such as Hilliard (1997) and Martin (2007) have argued that ethnic identification plays a key role in mathematics education, among other subjects, in that it promotes confidence in students' ability and the willingness to try new ideas. As the participants negotiated their mathematics classes, their strong perceptions of ethnic identity motivated them to become confident in their mathematics ability. This suggests that an imprinted confidence in their mathematics ability allowed these students to adapt to challenges they faced in the discipline of mathematics.

When teachers acknowledge a student's perception of ethnic identity as valuable to teaching and students' learning all students will be viewed as valued contributors to the learning process and as willing to try new ideas. Teachers of ethnically diverse classrooms should encourage students to use mathematical practice, which may be connected to their ethnic identity. These mathematical practices may include strategies for "doing" mathematical problems differently—finding many different ways to solve a given problem, and adapting the tactic of predicting answers to problems. Another example of how this could apply to mathematics teaching and learning would be teachers asking students to speak of why and how they choose their specific ethnic identity. Teachers could then ask students in the classroom to identify the essential components of ethnically diverse students. This activity will allow for lively conversations and examples of what is meant by essential components. The teacher could use this example of how this same knowledge could be transferred to identifying essential components in word

problems or the idea of identifying essential components when doing proofs in geometry. Teachers could further utilize these same strategies in the daily teaching or demonstration of problem solving. Mathematics classrooms where this behavior is encouraged by the teachers would offer all students the idea that they are contributors to mathematics learning and that their ideas, which are linked to their ethnic identities, are valuable in the mathematics learning process. Classroom teachers using these strategies will be able to empower ethnically diverse students to become more comfortable when trying new ways of 'doing' mathematics; hence, building confidence in their mathematics ability. Martin (2007) suggests mathematics ability, which is one component of mathematics identity, is formed as students become meaningful participants in mathematics and becoming doers of mathematics in school and non-school contexts. Therefore, if teachers are able to help foreign-born students build confidence in mathematics at a young age through the use of ethnic identity, then these students may be able to overcome challenges they may face in more advanced mathematics settings and thus develop competence in mathematics.

It is incumbent on mathematics teachers to seek ways to foster and build confidence in their students' mathematics ability. One suggestion, as indicated by this study, is for teachers to allow and encourage students to do more in and out of class collaboration. Discussing and 'doing' mathematics in both formal (in the mathematics classroom) and informal (outside the mathematics classroom) settings allow students to develop their mathematical language and adapt the mindset that mathematics is not reserved exclusively for their mathematics classrooms.

Additionally, teacher educators must be aware of students' mathematics identity and its connection to their ethnic identity. In doing this, teacher educators could better help students identify the importance of mathematics to their daily and future lives.

Unlike previous studies on ethnic identity and mathematics, this study specifically examined the perceived ethnic identity of Jamaican female students who are attending schools in the U.S. These participants in this study identified themselves as Black Jamaican girls and openly discussed their experiences in their various mathematics classrooms. This study provides mathematics educators with an intimate understanding of the mathematics experience of students from an ethnically diverse background; an area Boaler (2007) argued is rarely explored. By documenting the experiences of these Jamaicans girls (a population which is consistently increasing in the U.S), curriculum designers of teachers' education programs can now get a better sense of how students with ethnically diverse backgrounds make meaning of their mathematics experiences and make adjustments to programs specifically in multicultural education.

Ethnic Identity Promotes and Builds Mathematics Collaboration

Teachers of mathematics should include students' perceptions of ethnic identity in their teaching because it can promote and build mathematics collaboration between all students and encourages active engagement of all students. The students in the study were able to link mathematics knowledge of the past, particularly those correlated with their perceived ethnic identity. The present study revealed that the participants maintained their ethnic identity by utilizing past mathematical knowledge, specifically those that are connected to their perceived identity, while they adapt to their mathematics classrooms. The study findings also suggest that foreign-born students may improve their

mathematical learning by interactions with other students and collaborating with their peers in their classroom and, thereby, becoming members of the mathematics community. This is an area where most schools fall short as most students have insufficient collaboration with the community of "doers of mathematics." Schools, therefore, must aim to build more collaboration in the mathematics classroom amongst all students. Developing mathematics knowledge is an ongoing process: as students are engaged particularly through talking about the concepts of mathematics, students become aware of mathematics meaning and learning (Boaler 2006).

According to Ames (1992), ignoring ethnic identity is dangerous because it leads to students' disengagement and detachment from learning mathematics. When mathematics meaning is attained students envision themselves as members of the community of mathematics learning and are willing to be "doers of mathematics;" thereby, they actively partake in the process of learning (Nasir, 2007). That process includes connecting knowledge of the past to new concepts.

Another area of concern is the isolation of foreign-born students from the rest of the student body. In the book *Having Our Say*, Elizabeth Delany said, "We can't be isolated all the time…People learn about each other when they interact with other people." I argue that interactions in schools between the main student body and foreign-born students must be a part of the daily routine for schools with a diverse student population because this can be beneficial for all. In most schools in the U.S the tendency is to isolate all immigrant students (referring to students as ESOL) to one area of the school building where all immigrant students take classes and eat lunch together (see Stritikus and Nguyen, (2007). Rarely are these students allowed to engage with the rest of

the student body. Schools should create more opportunities for immigrant students to have more meaningful participation with the main student body in order to prevent further experiences of marginalization. Thereby, schools could move to embrace and incorporate racial, ethnic and linguistic diversity into school community.

This study reiterates the considerable influence that educators in general have on the educational pursuit of all their students. Educators should learn to value and understand the individual needs of all their students in order to encourage participation and initiate active engagement in the mathematics classrooms. The study challenges professional development programs to include efforts to raise awareness of mathematics teachers' knowledge and skills in dealing with students of ethnically diverse backgrounds. Teachers education programs must model and encourage new teachers to use more creative collaborative activities in the mathematics classroom.

It is incumbent on educators to create an environment that is ethnically sensitive to the learning needs of all their students within their mathematics classrooms. One example might be to have a student explain how to solve mathematics problems in her/his native language to the class. Furthermore, teacher preparation programs and professional development programs must include cultural competency education modules so teachers can explore their own biases. This self-evaluation is needed to enhance an environment of objective teaching for 'all' students despite a student's ethnic background, which the teacher may be unfamiliar with or even have a negative bias against. One way of addressing bias is to utilize teacher led open discussions on stereotypes—about specific ethnic groups and mathematics abilities—that teachers and students bring to the mathematics classroom.

Educators of ethnically diverse mathematics classrooms should continue to incorporate an effective group work environment. As demonstrated in this study this concept would be beneficial for both students born in and outside of the U.S. Furthermore, this kind of partnership can develop communication skills and build a sense of caring for one another's learning.

Limitations of the Study

The present study aims to promote the significance and influence of ethnic identity on the learning of mathematics and brings to light the mathematics experiences as well as the perspectives of four Jamaican born girls as they negotiated their U.S. mathematics classrooms. The findings from this study reveal that there was a connection between students' perceptions of ethnic identity and their learning of mathematics. Furthermore, revealed in this study is the notion that mathematics teachers should utilize and acknowledge students' perceptions of ethnic identity in their teaching because it could develop confidence in mathematics ability and build mathematics collaboration. Findings also suggested that perceptions of students' Jamaican identity could inform specific actions and behaviors in the mathematics classroom by motivating, empowering and encouraging. While this study did, for the most part, accomplish its goal, it is not without limitations to this research investigation.

This study was framed in Black feminist thought (BFT); however, little data emerged during analysis on how the intersection of my participants' gender identity and ethnic identity may have led to any form of oppression in the mathematics classroom. The selection of these female participants was in itself representative of certain aspects of BFT because this was their distinctive standpoint on ethnic identity. Hence, I believe

these female participants did speak from the perspective of females, thus making their perceptions of ethnic identity valued. Perhaps deeper examination is needed of whether these participants held stereotypes on gender (female-ness) and whether these beliefs may have influenced the decisions they made in their mathematics classrooms, or if their gender (female-ness) had any effect on their attitudes and perceptions of their ethnic identity. As mention above, I believe my participants did view their gender identity as essential because two participants included "female" as part of their ethnic identity. I further believe my participants, who were very descriptive and thoughtful of their experiences, were better able to articulate that it was their ethnic identity and not so much their gender identity where they felt most marginalized. Perhaps these girls believed that their Jamaicanness was that portion of their identity that made them different in their mathematics classrooms.

As I reflect on obstacles I encountered while doing this study, I would be remiss if I did not address the selection of these particular participants. The young ladies in this study were excellent mathematics students and commended excellences of themselves. I decided to select these four young ladies for several reasons, the main reason being availability. These Jamaicans were four out of the six who agreed to be interviewed and their parents were willing to help me complete this study. Some Jamaicans parents I met did not object to having their children interviewed but objected to me interviewing them because some said they did not want me "diggin into their business." Secondly, I selected these participants because I had decided that a criterion for participation was students with grade of 'C' or better in mathematics. I did this primarily to not speak to the underachievement of Black students because there are already in existence studies that

speak to this issue. I further believed that to address this issue of underachievement of Black students in mathematics again I would be defending the deficiency model, which is a topic in mathematics education I find problematic. However, I must admit that because these students were excellent mathematics students this study only presents a one-sided view of the influence of ethnic identity on mathematics learning. Perhaps future research including students (if available and willing) with lower mathematics grades would provide a more robust view of ethnic identity and mathematics.

In qualitative research, the main concern is not to eliminate reactivity, but to understand how the researcher's value can influence the conduct and conclusions of the study (Maxwell, 1996). Understanding and using the biases productively has been the goal of qualitative studies. Therefore, this concept, my biases of being a Jamaican female interviewing other Jamaican females, may have narrowed my focus as well as helped to focus the study more due to my first hand knowledge of what it means to be a Jamaican female and my schooling experiences in the U.S. My own experiences and the experiences of my participants may have had some parallels. If time permitted I would have liked to explore these possible parallels between my personal experiences and those of my participants.

Implications for Future Research

This study provides an opportunity on which future areas of research can be initiated. A follow up study would track these same participants and re-examine their attitudes and perceptions of their ethnic identity to identify if it has changed over time or remained consistent. Continuous examination of their ethnic identity and its connection to mathematics identity is needed. Also, another possibility is to add observations of the

students in the mathematics classroom. I would also like to collect more data on aspects of their gender identity in their mathematics classrooms. Along the same line, I would like to explore my own mathematics experiences and those of my participants using phenomenological analysis or heuristic inquiry.

This study also brings to light the issue of the role of socio-economic status on their ethnic identity and what, if any, influence it has on mathematics learning. Incidentally, this study did not include the influence of parents and siblings as role models. It would be interesting to explore the influence of this type of intimate role model on their mathematics learning. Future studies could provide additional opportunities to examine how teachers' pedagogical practices influenced the perception of ethnic identity regarding the students' mathematics experiences.

Another area to examine in future research is the influence of peers. During the interviews, the participants suggested their peers did influence them. It would be of value to conduct a study with peer responses.

Concluding Thoughts

The use of an ethnographic multiple case study design was, to me, the strength of this study because it allowed the readers to hear first hand accounts of the participants' personal experiences in the mathematics classrooms told by the participants' in their language, Pat-wah. The current study gives insights of some actions and behaviors of ethnically diverse students, which are beneficial to students' learning. This study also offered mathematics teachers reasons for the use of ethnic identity in mathematics, as well as concrete examples of how to use concepts of ethnic identity in their learning of mathematics.

The ethnic identity of any student is extremely important because it gives them a sense of who they are and where they belong. This study is significant because it adds to the body of limited research of ethnic identity in the context of mathematics education. This examination of the influences of ethnic identity on the learning of mathematics has provided some information on how to better help teachers understand the importance of a strong ethnic identity and its benefit in the mathematics classroom.

Reference

Akbar, N. (1989). Nigrecence and identity: Some limitations. *The Counseling Psychologist, 17*, 258.

Alba, R. (1985). *Ethnicity and race in the U.S.A*. London: Routledge & Kegan Paul.

Altschul, I., Oyserman, D., & Bybee, D. (2006). Racial-ethnic identity in mid-adolescence: Content and change as predictors of academic achievement. *Child Development, 77*(5), 1155-1169.

American Association of University Woman, (1995). How schools shortchange girls: A study of major findings on girls and education. Washington, DC: American of University Women Educational Foundation.

Atkinson, D., Morten, G., & Sue, D. (1983). *Counseling American minorities*. Dubuque, IA: Wm. c Brown.

Apple. M.W. (1988). Social crisis and curriculum accords. *Educational Theory, 38*(2), 191-203.

Armstrong, J. M. (1981). Achievement and participation of women in mathematics: results of two surveys. *Journal of Research in Mathematics Education, 12*, 356.

Banks. (1993). The canon debate: Knowledge construction and multicultural education. *Educational Researcher, 22*, 4 -14.

Banks, J. (2001). *Cultural diversity and education: Foundations, curriculum and teaching*. Needham Heights, MA: Allyn and Bacon

Beaton, A. E., Mullis, I.V., Martin, M.O., Gonzalez, E. J., Kelly, D. L., & Smith, T.A. (1996). Mathematics achievement in the middle school years: IEA's Third International Mathematics and Science Study (TIMSS). Boston, MA: Center for the Study of testing Evaluation, and Educational Policy, Boston College.

Becker, J. (1995). Women's way of knowing in mathematics. In R. Roger, & Kariser, G (Ed.), Equity in Mathematics Education: Influences of Feminism and Culture. London: Falmer Press.

Bennett, L. (1966). Jamaica labrish. Sangster's Book. Jamaica

Boaler, J. (1997). Reclaiming school mathematics: The girls fight back. Gender and Education, 9(3), 285-306.

Boaler, J., & Greeno, G. (2000). Identity, Agency and Knowing in Mathematics worlds. In J. Boaler (Ed.), Multiple Perspective on Mathematics Teaching and Learning. Westport, CT: Ablex, Publishing.

Boaler, J. (2007). Paying the price for 'sugar and spice': Shifting the analytical lens in equity research. In P. Cobb & N. S. Nasir (Ed.), Improving Access to mathematics: Diversity and Equity in the Classroom. New York, NY: Teachers College Press.

Bogdan, R., & Biklen, S. K. (2003). Research for Education. Boston: Allyn & Bacon.

Boykin, A. W. (1983). Task Variability and the Performance of Black and White Children: Vervistic Exploration. Journal of Black Studies, 12(4), 469-485.

Brooks, S. (1903). Causes of withdrawal form school. Educational Review, 362.

Campbell, P. (2002). Whet the Vision confronts reality: Implementing reform in elementary school mathematics in urban school district. In (Ed.), Challenges in the Mathematics Education of African American Children. 45.

Catsambis, S. (1994). The path to math: Gender and racial-ethnic differences in mathematics participation from middle school to high school. Sociology of Education, 67(3), 199.

Crosswhite, F., Dossey, J. A., Swafford, J.O., McKnight, C., Cooney, T., Downs, F., Grouws, D., & Weinzweig, A. I. (1986). Second International Mathematics Study (SIMS) detailed report for the United States. Campaign, IL: Stipes.

Creswell, J. W. (2003). Research Design: Qualitative, Quantitative, and Mix Method Approach. Thousand Oak. CA: SAGE Publications.

Cross, W. (1978). The Thomas and cross models of psychological nigrescence: A literature review. Journal of Black Psychology, 4(13-31).

Cummings, A., Lee, M., & London, C. (1983). Children of the Caribbean: A study of diversity. Journal of Black Studies, 13(4), 489- 495.

Clewell, B., & Ginorio, A. (2002). Examining women's progress in the sciences from the perspective of diversity. In The Jossey-Bass Reader on Gender in Education. San Francisco, CA: Jossey-Bass.

Clark, K., & Clark, M. (1947). Racial Identification and preference in Negro children. In T. Newcomb, & Hartley, E (Ed.), Readings in Social Psychology. New York. NY: Holt.

Dean, P. (1909). A few algebra methods. The Mathematics Teacher, 2(41).

DeMarrais, K., & LeCompte, M. (1998). The way schools work: sociological analysis of Education (3rd ed.). New York: Longman.

Denzin, N., & Lincoln, Y (Ed.). (2000). Introduction: The discipline and practice of qualitative research. Thousand Oak: Sage Publications.

Demie. (2003). Raising the achievement of Caribbean pupils in British Schools: unacknowledged problem and challenges for policy makers. London Review of Education, 1(3), 229.

Driver, G. (1980). How West Indians do better at school: especially the girls. New Society, 51(902), 111.

DuBois, W. E. B. (1990). The souls of Black folk. New York: Literary Classics of the United States, Inc (Original work published in1903).

Dweck, C. (1986). Motivational processes affecting learning (Special issue: Psychological science and Education) American Psychologist, 41.

Eccles, J. S., Adler, T. F., Futterman, R., Goff, S. B., Kaczala, C.M., Meece, J. L., & Midgley C. (1983). Expectancies, values and academic behaviors. In J.T. Spence (Ed.) Achievement and achievement motions (75-146). San Francisco: Freeman.

Education, D. o. (2001). No Child Left Behind Act. Retrieved 4/24/2007. From http://www.ed.gov/policy/elsec02/pg1.html#sec101.

Erikson, E. (1968). Identity: Youth and crisis. New York: Norton.

Erkut, S., Fields,J., Sing, R., & Marx, F (2002). Diversity in girls experiences: Feeling good about who you are. In S. M. Bailey (Ed.), The Jossey-Bass Reader on Gender in Education San Franciso, CA: Jossey Bass.

Ferguson, R. L. (2004). The science experiences of Caribbean students in an American high school. Unpublished dissertation. Georgia State University.

Fennema, E. (1974). Mathematics learning and the sexes: A review. Journal for Research in Mathematics Education, 5(3), 126-139.

Fennema, E., Sherman, J., (1977).Sex-related differences in mathematics achievement spatial visualization and affective factors. American Education Research Journal. 14(1), 51-71.

Fennema, E., & Hart, L. (1994). Gender and JRME. Journal for Research in Mathematics Education, 26(6), 648-659.

Fennema, E., & Carpenter, T. (1998). New perspectives on gender differences in mathematics. Educational Researcher, 27(5).

Fordham, S. & Ogbu, J. (1986). Black students' school success: Coping with the burden of "acting white". Urban Review, 13(3), 54-84.

Foner, N. (1987). The Jamaicans: Race and Ethnicity among migrants in New York City. In N. Foner (Ed.), New Immigrants in New York. New York: Columbia University Press.

Foner, N. (1985). Race and color: Jamaican migrants in London and New York City. International Migration Review, 19(2), 708-727.

Gee, J. P. (2001). Identity as an Analytic lens for research in education. Review of Research in Education, 25(1), 99-125.

Gutierrez, R. (2007). (Re) Defining equity: The importance of s critical perspective. In P. Cobb & N. S. Nasir (Ed.), Improving Access to mathematics: Diversity and equity in the classroom. New York: Teacher College press.

Halpern, D.F.(1986). Sex differences in cognitive abilities. Hillsdale, NJ: Lawrence

Hansen, J. F. (1979). Sociocultural perspectives on human learning: An introduction to educational anthropology. Englewood Cliffs, NJ: Prentice Hall. Erlbaum

Hatch, J. A. (2002). Doing Qualitative Research in Education Setting. New York: SUNY Press.

Head, J. (1995). Gender Identity and cognitive style. Paper presented at the UNESCO/ULIE Colloquium is There a Pedagogy for Girls?

Helms, J. (1990). Black and white racial identity: Theory, research, and practice. New York: England Greenwood Press.

Hill Collins, P. (2000). Black sexual Politics: African American, gender and the new racism. New York, NY: Routledge.

Hill Collins, P. (1991). Black Feminist Thought. New York: Routledge & Kegan Paul.

Hill Collins, P. (1990). "The social construction of black feminist thought." Chicago: University of Chicago, Press.

Hilliard III, A. (1997). Using Cultural strengths to plan meaningful intervention empowering psychological and psychiatric professionals. Paper presented at the Chicago School of Professional Psychology, Chicago.

Hilliard, A. (2003). No mystery: Closing the achievement gap between Africans and excellence. In T. Perry, C. Steele, & A. Hilliard (Eds.), Young gifted and Black: Promoting high achievement among African American students. Boston, MA: Beacon Press.

hooks, B., & Mesa-Bains, A. (2006). Homegrown: Engaged cultural criticism. Cambridge, MA: South End Press.

Hrabowski, F. A., Maton, K., Greene, M. L., & Greif, G. L. (2002). Overcoming the odds: Raising academically successful African American young women. New York, NY: Oxford University Press.

Hunte, C. (2004). Inequality, achievement and African-Caribbean pupils. Aiming High: Race Equality Teaching.

Isajiw, W. W. (1974). Definitions of ethnicity. Ethnicity, 1, 111-124

Jacobs, J. E., Becker, J. R., & Gilmer, G. F (Eds). (2001). Changing the face of mathematics: Perspectives on gender Reston, VA: National Council of Teachers of Mathematics.

Jackson, S. V., & Matthews, L. (2005). A study of Jamaican girls': Ethnic identity influence on learning mathematics. Unpublished pilot research project Georgia State University, College of Education.

Kirkwood, T., F. (2002). Jamaican students of color in the American classroom: problems and possibilities in education. Intercultural Education, 13(3), 305-313.

Kincheloe, J. L. McLaren, P. (2000). Rethinking critical and qualitative research. In N. K. Denzin & Y. S. Lincoln (Ed.), Handbook of Qualitative Research. Thousand Oaks: Sage Publications, Inc.

Kingston, M. (1976). The woman warrior. South Yarmouth, MA.

Kozol, J. (1992). Savage inequalities: Children in America's school s. New York, NY: Harper Perennial.

Kusow, A. (2003). Beyond Indigenous authenticity: Reflections on the insider/outsider debate in immigration research. Symbolic Interaction, 26(4), 591.

Laosa, L. (1084). Social policies toward children of diverse ethnic, racial and language groups in the U. S.A. In H. Stevenson, & Siegel (Ed.), Child development research and social policy. Chicago: University Chicago Press.

Ladson-Billings, G. (1995). Making mathematics meaningful in cultural contexts. In E. F. W. G. Secada, & L. B. Adajian (Ed.), New Direction for Equity in Mathematics Education. Cambridge, U.K.: Cambridge University Press.

Leder, G. C. (1992). Mathematics and gender: Changing perspectives. In D. A. Grouws (Ed.), Handbook of research on mathematics teaching and learning. New York: Simon & Schuster Macmillan.

Lincoln, Y., & Guba, E. (1985). Naturalistic Inquiry. Beverly Hills: SAGE Publication.

Lubienski, S. (2007). Research, reform and equity in U.S. mathematics education. In P. Cobb & N. S. Nasir (Ed.), Improving Access to mathematics: Diversity and equity in the classroom. New York, NY: Teach College Press.

Lockheed. M.E., Thorpe, M., Brook-Gunn, J., Casserly, P., & McAloon, A. (1995). Sex & ethnic differences in middle school mathematics, science and computer science: What do we know? (report submitted to the Ford Foundation). Princeton, NJ: Educational Testing Service.

Lopez, N. (2003). Hopeful girls, troubled boys: race and gender disparity in urban education. New York: Routledge.

Malcolm, X. (1965). Autobiography of Malcolm X. New, York, NY: Golden Press.

Malloy, C. E., & Malloy. W. W. (1998). Issues of cultures in mathematics teaching and learning. The Urban Review, 30(3), 245.

Matthews, L. (2003). Babies overboard! The complexities of incorporating culturally relevant teaching into mathematics instruction. Education Studies in Mathematics, 53, 61-82.

Marcia, J. (1980). Identity in adolescence. In J. Adelson (Ed.), Handbook of adolescent psychology. New York, NY: Wiley.

Martin, D. (2007). Mathematics learning and participation in the African American Context: The Co-construction of identity in two Intersecting Realms of Experiences. In P. Cobb & N. S. Nasir (Ed.), Improving Access to Mathematics: Diversity and Equity in the Classroom. New York, NY: Teachers College Press.

Martin, D. (2000). Mathematics success and failure among African-American youth: The role of Sociohistorical Context, Community forces, school influence and individual agency. Mahwah, NJ: Lawrence Erlbaum Assoc., Inc.

Marshall, S. (1983). Sex Differences in mathematical errors: An analysis of detractors choices. Journal of Research in Mathematics Education, 14, 355.

Maxwell. (1996a). Qualitative research design: An interactive approach. Thousand Oaks, CA: SAGE.

McIntye, T. (1996). Does the way we teach create behavior disorders in culturally different students. Education and Treatment of Children, 19(3), 354-370.

Mcleod, G., K., & Kilpatrick, J. (1971). Patterns of mathematics achievement in grade 10: Y population. In J. W. Wilson, Cahen, L., & Begel, E (Ed.), NLSMA Reports. Stanford, CA: School Mathematics Study Group.

Meece, J., Wigfield, A., & Eccles, J. S. (1990). Predictors of math anxiety and its Influences on young adolescents' course enrollment intentions and performance in mathematics. Journal of Educational Psychology, 82, 60-70.

Merriam, S. (1998). Qualitative research and case study applications in Education: Revised and expanded from case study research in education. San Francisco: Jossey-Bass Publishers.

Meyer, M. R. (1991). Equity: The missing element in recent agendas in mathematics reform. Peabody Journal of Education, 66(2), 6-21.

Miles, M., & Huberman, A. (1994). Qualitative Data Analysis: An Expanded Sourcebook. Thousand Oaks, CA: SAGE Publication.

Mirza, M. (1998). Same voices, same lives? Revisiting black feminist standpoint epistemology. In P. Connolly & B. Troyna (Eds.), Researching racism in education: Politics, theory and practice (pp. 79-94). Philadelphia: Open University Press.

Nasir, N. S. (2007). Identity, goals and learning: The case of basketball mathematics. In N. S. Nasir, & Cobb, P (Ed.), Improving Access to Mathematics: Diversity and Equity in the Classroom. New York: Teachers College Press.

National Council of Teachers of Mathematics (2000). Retrieved April 24, 2007 from the World Wide Webhttp://my.nctm.org/standards/documentchapter 2/equity.htm

Ogbu, J. U. (1988). Class stratification, racial stratification, and schooling. In L. Weis (Ed.), Class, Race, & Gender: American Education. Albany, NY: States University of New York Press.

Palmer, A. (1983). Afro-Caribbean women in the United States: Images and reality. Paper presented at the RIIES Occasional Papers # 1. from ERIC Doc Reproduction Service No. ED240180.

Parham, T., & Helms, J. (1981). The influences of Black student's racial identity attitudes preferences for counselor's race. Journal of Counseling Psychology, 28.

Parham, T. (1989). Cycles of Psychological nigrescence. The Counseling Psychologist, 17.

Patton, M. Q. (1990). Qualitative evaluation and research methods. Newbury Park, CA: SAGE Publication.

Phinney, J., & Tarver, S. (1988). Ethnic identity search and commitment in black and White eight graders. Journal of Early Adolescence, 8, 265.

Phinney, J. (1990). The multi-group ethnic identity measure: A new scale for use with adolescents and adults from diverse groups. Journal of Early Adolescence, 9.

Phinney, J. (1996). Understanding ethnic diversity: The role of ethnic identity. American Behavioral Scientist, 40, 143-152.

Phinney, J. (1996). When we talk About American ethnic groups, what do we mean? American Psychologist, 51(9), 918.

Portes, A., & Rumbaut, R.G. (1996). Immigrant American: A portrait. Berkeley, CA University of California Press.

Quintana, S. (1998). Children's developmental understanding of ethnicity and race. In Applied & Preventive Psychology: Cambridge University Press.

Rhamie, J., & Hallam, S. (2002). An investigation into African-Caribbean academic success in the UK. Race Ethnicity and Education, 5(2), 151.

Rogler, L., Cooney, R., & Ortiz, V. (1980). Intergenerational change in ethnic identity in the Puerto Rican family. International Migration review, 14.

Shade, B. R. (1982). Afro-American cognitive style: A variable in school success? Review of Educational Research, 52, 219-244.

Shade, B. R. (1997). Culture Style, and the educative process: making school work for racially diverse students. Springfield, IL: Charles Thomas Publisher, LTD.

Secada, W. G., (1992). Race, ethnicity, social class, language and achievement in mathematics. In D. Grouws (Ed.) Handbook of Research on Mathematics Teaching and learning. Pp623-660. New York: Macmillan.

Secada, W. G., Fennema, E., & Adajian, L. B. (1995). New Directions for equity in mathematics education. In. New York: Cambridge University Press.

Stritikus, T., & Nguyen, D. (2007). Strategic transformation: Cultural and gender identity negotiation in first-generation Vietnamese youth. American Educational Research Journal 44(4), 853-895.

Strutchens, M. E., Johnson, M. L., & Tate, W. F., (Eds). (2000). Changing the faces of mathematics: Perspectives on African Americans. Reston, VA: National Council of Teachers of Mathematics.

Singh, V. (1977). Some theoretical and methodological problems in the study of ethnic identity: A cross-cultural perspective. New York Academy of Sciences, Annals, 32.

Singh Kaeley, G. (1995). Culture, gender and mathematics. In P. Roger,& G. Kaiser (Ed.), Equity in Mathematics Education: Influences of Feminism and Culture London: Falmer Press.

Smith, L. M. (1992). Ethnography. In M. C. Alkin (Ed.), Encyclopedia of Educational Research 2.

Solomon, B. (1985). In the company of educated women. New Haven, CT: Yale University Press.

Strauss, A., & Corbin, J (1990). Basics of Qualitative research: Grounded Theory Procedures and Techniques. Newbury Park: SAGE Publications.

Suarez-Orozco, C. & Qin.-Hilliard, D. (2001). The cultural psychology of academic engagement: immigrant boys' experiences in U.S. Schools. In N. Way., &. J. Chu (Ed.), Adolescent Boys in Context. New York: New York University Press.

Tajfel, H. (1978). The social psychology of minorities. New York: Minority Rights Group

Tajfel, H. (1981). Human groups and social categories. Cambridge, England: Cambridge University Press.

Thompson, L. E. (2006). Girl's participation in math and science: A program evaluation of expanding your horizons. Humboldt State University.

Tyacks, D., & Hansot, E. (1988). Silence and policy talk: Historical puzzles about gender and education. Educational Researcher, 17(3), 33.

Uttal, D. H. (1996). Beliefs, motivation and achievement in mathematics: A cross-national perspective. In M. Carr (Ed.), Motivation in mathematics. Cresskill, NJ: Hampton.

U. S. Census Bureau. (2001). Profiles of general demographic characteristics: 2000 Census of population and housing. Retrieved 12/03/2005, http://www.census.gov/prod/cen2000/dp1/2khus.pdf.

U. S. Census Bureau. (2003). Profiles of general demographic characteristics: 2000 Census of population and housing. Retrieved 05/10/2006, http://www.census.gov/prod/cen2000/dp1/2khus.pdf

Walkerdine, V., & Girls & Mathematics Unit (Eds). (1989). Counting girls out. London: Virago.

Waters, M. (2004). Black identities: West Indian immigrant dreams and American realities. Harvard, CT: Russell Sage Foundation. Harvard University Press.

Weinreich, P. (1988). The operationalization of ethnic identity. In J. Berry, & Annis, J (Ed.), Ethnic Psychology: Research and practices with immigrants, refugees, native people, ethnic groups and sojourners. Amsterdam: Swets & Zeitlinger.

Wiest, L. R. (2002). Multicultural Mathematics Instruction. Teaching Children Mathematics, 9(1), 49-55.

Willis, M. G. (1992). Learning Styles of African American Children: A Review of the Literature and Interventions. Newbury, CA: SAGE Publications, Inc

White, C., & Burke, P. (1987). Ethnic role identity among Black and White college students: An interaction approach. Sociological Perspectives, 30, 310.

Wozencraft, M. (1963). Are boys better than girls in arithmetic? Arithmetic Teacher, 10, 486.

Yin, R. K. (1994). Case Study Research Design Methods. Thousand Oak, CA: SAGE Publications

Zarate, M. E., Bhimji, F., & Reese, L. (2005). Ethnic identity and academic achievement among Latino/a adolescents. Journal of Latinos and Education, 4(2), 95-114.

Zinn, M. (2000). Gender and ethnic identity among Chicanos. Frontiers, 5.

Appendix

See next page

APPENDIX A

Participants Profile

Name	**Age**	**Place of birth in Jamaica**	**Years in the U.S**	**Age left Jamaica**	**Years of Jamaican Schooling**	**Informants' Information**
Ashley	16	Harbor View	7 yrs	8	6 yrs	! Mother Occupation: Hair dresser ! Father: Cable-man ! Teacher: Coach (Mr.) H (American)
Akilia	14	Pembrook Hall	3 yrs	12	10 yrs	! Mother Occupation: Air line attendant
Denisha	15	St. Catherine	2 yrs	14	11 yrs	! Mother Occupation: Care-taker ! Teacher: Mr. P (Jamaican)
Marsha	15	Spanish Town	11 yrs	4	1½ yrs	! Mother Occupation: Health care provider ! Father: Supermarket worker ! Teacher: Ms. B (American)

Participants' Interview Questions

Background Questions

- Who do you live with?
- How long have you lived in America?
- Where in Jamaica did you live? And where were you born?
- What grade are you in?
- What school do you attend?
- How old were you when you came to America?
- What were you first thought? Or what did you thing of America?
- Do you like living in America? Why?
- What are some of the thing you do during your spare time?
- What are your favorite subject(s)?
- Tell me about your favorite teacher(s) what about her/him that caused you to like him/her? Is that teacher here in the U.S or Jamaica?
- What do you like about living in America?
- How do you identify yourself?
- What would you like to when you leave school?
- What are some of your short-term and long-term goals?
- Do you intend to go to college if so which school are you interested in?
- Who do you see as a role model?
- Why did your family move to America?
- What age did you start school in Jamaica?
- What student are you? What are your grades like?
- What grade do you have in mathematics at this time?

Ethnic Identity Questions

- How do you identify yourself?
- Do you know what is ethnic identity?
- How do you racially identify yourself?
- If you saw a group of people would you be able to tell if there are any Jamaicans standing in the group?
- Name one Jamaican who you truly admire?
- What about him/her that you like?

- I friend of mine said Jamaicans are different. What do you think about that statement?
- Draw a picture of yourself and around it put all the things that are important to you
- Do you think Jamaicans are difference?
- What are so different about Jamaicans?
- Do you think Jamaicans are unique?
- What are some characteristics?
- Can you give me some words, which describe these characteristics?
- Have you ever being called an African American?
- Do you correct people when they call you African American or Black America? Explain?
- Some people identify themselves differently according to whom they are speaking with. How do you identify yourself when you are speaking with other Caribbean Americans?
- Does Jamaicans have a negative image in the media?
- Have you ever identity your self has an African American? When? Where?
- Have you ever being identified with being from another country other than Jamaica? If so Where?
- How important is school to do?
- Do you think being Jamaican have anything to do with doing or knowing to do math?

Mathematics Questions

- What Mathematics are you taking now?
- What do you think mathematics is?
- Tell me about your mathematics teachers? What kind of teacher is he/she?
- How does he/she encourage you to study mathematics?
- What are some of the routine in your mathematics classroom?
- Is mathematics your favorite subject? Why?
- Does math have anything to do with who you are? Or who you will become?
- What section/topics of math do you like doing the most? Why? Provide examples?
- What other mathematics classes are you required to take in high school?
- Do you see your self-taking more advance math classes? When and where and Which?

- Do you talk about mathematics outside the mathematics classroom?
- Do you help classmates in and outside of the math class? How?
- Do you use mathematics outside the mathematics classroom? How and when and where?
- Do you think the different type of mathematics have any benefits? Explain?
- How do you study and prepare for mathematics tests and quizzes? What are some of the things you do?
- How do you know when you have learned something in mathematics?
- Do you remember how mathematics was taught to you in Jamaica? Was it different can you provide some examples?
- What type of mathematics did you do in Jamaica?
- If you can remember from any of your mathematics classes (teachers) in Jamaica what were some strategies you used in mathematics in the U.S that you learned from Jamaica?

Parents' Interview Questions

Background and Ethnic Identity

- How long have you being living in the U.S.?
- What were your reasons for coming to the U.S?
- What type of work do you do?
- If you do not mind sharing a little about yourself…where did you go to school in Jamaica and what is the highest level of education you (both) have?
- How do you (both) identify yourself?
- Some people identify themselves differently according to who they are speaking with. How do you identify yourself when you are speaking with other Caribbean Americans?
- In terms of identity how do you think our people see you? Provide examples?
- What is ethnic identity? Can it be changed, lost it?
- Do you think racial and ethnic identity is different or the same?
- How would you like your daughter to identify her-self?
- What if she calls her self an African American?
- Do you believe Jamaicans have distinct characteristics? What are they? And how can a person identify them? Is that true for male and female?
- What type of student is your daughter?
- Is there sure a thing as Jamaican identity? Explain

- Is it important for you to maintain you Jamaican identity? How do you do that? Provide examples?
- What do you do to ensure that your daughter's (family) ethnic Identity is maintained?
- Do you see a strong sense of that ethnic identity in you daughter? Is it the same for all your child (ren)?
- What is the role of female in the Jamaican society?
- What was your favorite subject in school?
- How important is it to you for your daughter to go the college? Do you stress the idea of going to college?
- Do you think schooling in Jamaica was easier, harder or about the same as in the U.S.?

Mathematics

- What is her favorite subject?
- What is mathematics? and How important is mathematics to you?
- Would you say she is a good math student?
- Do you help your daughter in mathematics if she has problem(s)?
- What are some of things you have observed your daughter doing when she is studying mathematics?
- What are some of her study habits?
- What are some of the something you hear your daughter saying about school? And mathematics?

Teacher's Interview Questions

- How long have you been teaching?
- What is your educational background?
- Where do you think is (student's name) from?
- Did you think she was African American?
- What do you know about (student's name) ethnic background?
- Do you have any other students that share the same ethnic background as (student's name) in your classes?
- What area of math does (student's name) seems to do well in?
- How long have you known (student's name)?
- What type of math student is (student's name)?
- What are some strategy (ies) that (student's name) used in your class that is most helpful and that you would like other students to use in math class?

- What are some of the unique characteristics of (student's name) that you have observed in your class of this student?
- Does (student's name) participant in class? How, provide examples?
- Do they volunteer to help in class, classmates? How, Explain or give examples?

INSTITUTIONAL REVIEW BOARD

Mail: P.O. Box 3999
Atlanta, Georgia 30302-3999
Phone: 404/413-3500
Fax: 404/413-3504

In Person: Alumni Hall
30 Courtland St, Suite 217

November 19, 2007

Principal Investigator: Matthews, Lou E

Student PI: Sandra A Vernon-Jackson

Protocol Department: Middle Sec Educ & Instruc Tech

Protocol Title: Jamaican Girls' ethnic identity and mathematics classroom: An ethnographic case study

Submission Type: Protocol H08119

Review Type: Expedited Review

Approval Date: November 16, 2007

Expiration Date: November 15, 2008

The Georgia State University Institutional Review Board (IRB) reviewed and approved the above referenced study and enclosed Informed Consent Document(s) in accordance with the Department of Health and Human Services. The approval period is listed above.

Federal regulations require researchers to follow specific procedures in a timely manner. For the protection of all concerned, the IRB calls your attention to the following obligations that you have as Principal Investigator of this study.

1. When the study is completed, a Study Closure Report must be submitted to the IRB.

2. For any research that is conducted beyond the one-year approval period, you must submit a Renewal Application 30 days prior to the approval period expiration. As a courtesy, an email reminder is sent to the Principal Investigator approximately two months prior to the expiration of the study. However, failure to receive an email reminder does not negate your responsibility to submit a Renewal Application. In addition, failure to return

the Renewal Application by its due date must result in an automatic termination of this study. Reinstatement can only be granted following resubmission of the study to the IRB.

3. Any adverse event or problem occurring as a result of participation in this study must be reported immediately to the IRB using the Adverse Event Form.

4. Principal investigators are responsible for ensuring that informed consent is obtained and that no human subject will be involved in the research prior to obtaining informed consent. Ensure that each person giving consent is provided with a copy of the Informed Consent Form (ICF). The ICF used must be the one reviewed and approved by the IRB; the approval dates of the IRB review are stamped on each page of the ICF. Copy and use the stamped ICF for the coming year. Maintain a single copy of the approved ICF in your files for this study. However, a waiver to obtain informed consent may be granted by the IRB as outlined in 45CFR46.116(d).

All of the above referenced forms are available online at https://irbwise.gsu.edu. Please do not hesitate to contact Susan Vogtner in the Office of Research Integrity (404-413-3500) if you have any questions or concerns.

Sincerely,

Ann C. Kruger, IRB Chair

Federal Wide Assurance Number: 00000129

Georgia State University
Department of Middle / Secondary Education and Instructional Technology Department

Parental Consent Form

Title: **JAMAICAN GIRLS' ETHNIC IDENTITY AND THE MATHEMATICS CLASSROOM: AN ETHNOGRAPHIC CASE STUDY**

Principal Investigator: Dr Lou Matthews
Student Principal Investigator: Sandra Vernon-Jackson

Purpose:

Your daughter is being asked to volunteer for a study to understand the experiences of Jamaican born female students in U.S. mathematics classrooms.
The purpose of this study is to explore how their ethnic identity influences the learning of mathematics. The study will include 4 to 5 girls who were born in Jamaica and are now attending schools in the U.S.

Procedures:

In order to be in the research study, your child will participate in 13 interview sessions. There will be 10 individual interview sessions with the researcher lasting no longer than one hour. The other 3 sessions will be in small group settings and last about 1½ hours. The small group sessions will be made up of 4 to 5 Jamaican born girls and the researcher. The individual interview sessions will take place at your homes. I am asking parents to volunteer to host one of the small group sessions. (You are not obligated to volunteer.) Once I have a list of parent volunteers, I will randomly pick three hosts. All sessions will be at a time, which is best for you and your daughter. You are responsible for transporting your daughter to and from the small group sessions. Additionally, I would like an opportunity to interview you as well as your daughter's teachers. These interview sessions will be conducted with you and the researcher (me). There will be 3 interview sessions lasting no more than 45 minutes each, to be held at your home at a time convenient for you. The interviews with the teacher will be held at the school during the teacher's planning time or at a time convenient for the teacher. All interview sessions will be audiotape recorded. The audiotapes will be used to transcribe the interviews. Once the tapes have been transcribed, they will be kept for one year and then destroyed.

I would also like permission to observe your daughter in her mathematics classroom. There will be three different observations and they will last for the entire class session. I will arrange the time and date with the mathematics teacher once I have received permission from the teacher. I would also like permission to review your daughter's report cards or any awards she may have received for mathematics.

Risks:

There are no known risks for participating in this study, and there is no reason to believe that the interviews or observation will cause any discomfort for your daughter, if she chooses to participate.

Benefits:

There are no direct benefits to your daughter for participating in the interview sessions. However, the researcher anticipates the information will help educators gain a unique knowledge on Jamaicans' ethnicity.

Voluntary Participation and Withdrawal:

Participation in this research study is voluntary. You have the right of refusal for your daughter's involvement in this study. If you decide to let your daughter participate in the study and then change your mind, you have the right to remove her from the study at any time. Your daughter can choose not to answer any questions. If she chooses to stop an interview, no further questions will be asked. Your daughter should inform me if she does not want to include the information she has already provided. Whatever you and your daughter may decide about your daughter taking part in this study, your daughter will not lose any benefits, which would otherwise be presented to her.

Confidentiality:

I will keep all your records private to the extent allowed by law. Your daughter's name will not appear on the written record of the interview. In fact, your daughter will be asked to select a pseudonym to be used at all times during the entire study. That pseudonym will also be used to identify you and her teacher. All tapes, transcribed data, and other written records will be kept in a locked cabinet or secured in my personal computer. No other individual has access to my locked cabinet or computer. Her name and any other facts, which might identify her, will not appear when we present this study or publish its results. No one will be identified.

Contact Persons:

If you have, any questions about this study please feel free to contact me, Sandra Vernon-Jackson at 904-477-4444 or my professor Dr. Lou Matthews at 404-413-8060. If you have questions or concerns about your rights in this study, you may contact Susan Vogtner. The number to the IRB is 404-413-3513

Copy of Consent Form to Subject:

You will be given a copy of this consent form to keep

If you are willing to allow your daughter to participate in this study please sign below.

Parent(s) Signature	Date
Researcher Signature	Date
Please print your child's name	Date

If you are willing to host a small group interview session at your house, please sign below

Parent(s) Signature	Date

If you are giving, permission for me to observe your daughter in her mathematics class and interview her teacher.

Parent(s) Signature	Date
Researcher Signature	Date

Georgia State University
Department of Middle / Secondary Education and Instructional Technology Department

Minor Assent Form

Title: **JAMAICAN GIRLS' ETHNIC IDENTITY AND THE MATHEMATICS CLASSROOM: AN ETHNOGRAPHIC CASE STUDY**

Principal Investigator: Dr Lou Matthews
Student Principal Investigator: Sandra Vernon-Jackson

Purpose:

You are invited to take part in a research project called "Jamaican girls' ethnic identity and the mathematics classroom." The reason I am doing this study is to get a better understanding of how your Jamaican ethnicity influences your experiences in the mathematics classroom.

Procedures:

I am Sandra Vernon- Jackson, the researcher who is doing this study. I will like to know if I could interview you and visit your classroom for this research study I am doing. I will interview you to find out your thoughts about your Jamaican ethnicity. I also would like to hear about your experiences in the mathematics class.

All together, there will be 13 interview sessions. Ten of the interview sessions will be only you and me. These will take place at your home at a time, which is best for you. The other three interviews will be with a small group of students and me. This may be at your home or the home of someone else in the small group session. I will ask parents of the participants to volunteer to host a small group meeting in their home. I will place in a hat the names of all the parents who agree to host a session. The first three names chosen will host a small group session. I would like to tape record our interviews.
I will also be interviewing your parents three times to hear their stories of Jamaican ethnicity.

I would also like to come to your school and visit your mathematics class three times. I would like to interview your mathematics teacher. The reason for interviewing your teacher is to hear her/his stories of how you use your Jamaican ethnicity in the mathematics class. When I visit your mathematics class, I will not ask or answer any questions. Your classmates will not know the reason for my visits. I also ask that you not tell them. All interviews with you, your parents and teacher will be audio taped. I will keep the taped interviews for one year then I will destroy them.

Risks:

I do not see any risks for taking part in this research. In fact, I hope you will enjoy the interviews.

Benefits:

There are no direct benefits to you taking part in this study. The information you give me will help educators gain some knowledge on Jamaican's ethnicity. It will also help teachers of mathematics.

Voluntary Participation and Withdrawal:

Participation in this research study is voluntary. You can refuse to be in this study if you like. No one will force you to participate. If you do decide to be a part of the study, you can stop anytime you like. You can also choose not to answer questions that you do not want to answer. You can also choose not to have me visit your mathematics class.

Confidentiality:

To protect your privacy I will not use your real name. At the first interview session, I will ask you to select a name. That name will be used to identify you, your parents and your teacher for the entire study. No one from your school (like your teachers or principal) will know what you have said in the interviews. If you choose not to be a part of the study, your school experience will not be affected in anyway

Contact Persons:

If you have any questions, you may ask me, Sandra Vernon-Jackson or you may ask me later at 904-477-4444. You can also call my advisor Dr. Lou Matthews at 404-413-8060. If you have questions or concerns about this study, you may call Susan Vogtner at the IRB office. The number to the IRB is 404-413-3513

Copy of Consent Form to Subject:

If you would like to be in the research project and agree to let me, tape record our interview as well as visit your mathematics class, please sign below. You will get a copy of this form to keep and the researcher will keep one copy as well.

_____ _____

Student Signature Date

_____ _____

Student Printed Name Date

_____ _____

Researcher Signature Date

Consent Form Approved by Georgia State University IRB November 19, 2007 - November 15, 2008

Georgia State University
Department of Middle / Secondary Education and Instructional Technology Department

Teacher Consent Form

Title: **JAMAICAN GIRLS' ETHNIC IDENTITY AND THE MATHEMATICS CLASSROOM: AN ETHNOGRAPHIC CASE STUDY**

Principal Investigator: Dr Lou Matthews
Student Principal Investigator: Sandra Vernon-Jackson

Purpose:
My name is Sandra Jackson; I am a PhD student at Georgia State University and I am conducting a study, which seeks to understand the experiences of Jamaican born female students in the U.S. mathematics classrooms. One of your students (student's name) _____ has volunteered to participate in this study.

Procedures:
I am also asking you to volunteer to participate in this study. If you agree to be in the study you will be interviewed three times. The interview sessions will be with the researcher (me), lasting no longer, than 45 minutes. The interview sessions will be held during your planning time or any other time convenient to you. The interview sessions will be audio tape-recorded and later transcribed. All interviews will take place at the school.
Additionally, I would like permission to visit your mathematics classroom, of which _____ (student's name) is a member of. The observation sessions will last for the entire class period and I will be visiting the class for three sessions. During these observation sessions, I will be writing field notes and I will come in before the class has started as not to call any additional attention to my visit. I will be as inconspicuous as possible. I will not be observing any other students during my visit. I have already received permission from the student's parents to observe her during your class sessions.

Risks:
There are no known risks for participating in this study, and there is no reason to believe that the interviews or observations will cause any discomfort for you, should you choose to participate.

Benefits:

There are no direct benefits to you for participating in the interview sessions and observations. However, the researcher hopes that the information will help educators gain a unique knowledge on Jamaicans' ethnicity and contributes to multicultural studies in mathematics.

Voluntary Participation and Withdrawal:

Participation in this research study is voluntary. You have the right to refuse to be involved in this study. If you decide to participate in the study and then change your mind, you have the right to remove yourself from the study at any time. You can choose not to answer any questions. If you choose to stop an interview or an observation, no further questions will be asked. You have the right to ask me to remove any information you have already given me or ask me to leave your classroom at any time during observations. Whatever you decide about taking part in this study, you will not lose any benefit, which would otherwise be given to you.

Confidentiality:

I will keep all records private to the extent allowed by law. Your real name or the school's name will not appear on any data collected. In fact, the student has been asked to select a pseudonym to be used at all times during the entire study. You therefore will be called the student's (selected pseudonym) teacher. That pseudonym will be used to identify you at all times during the study. All tapes, transcribed data, and other written records will be kept in a locked cabinet or saved in my computer at my home. Your name and other facts that might identify you or the student will not appear when I present this study or publish its results. No one will be identified.

Contact Persons:

If you have, any questions about this study please feel free to contact me, Sandra Vernon-Jackson at 904-477-4444 or my professor Dr. Lou Matthews at 404-413-8060. If you have questions or concerns about your rights in this study, you may contact Susan Vogtner. The number to the IRB is 404-413-3513

Copy of Consent Form to Subject:

You will be given a copy of this consent form to keep

If you are willing to participate in this study please sign below.

_____ _____

Teacher Signature Date

_____ _____

Researcher Signature Date

To give me permission to observe (student's name) _____ in your mathematics class please sign below

_____ _____

Teacher Signature Date

_____ _____

Researcher Signature Date