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ASSESSING THE MATHEMATICAL COMPETENCE
OF AFRICAN AMERICAN TENTH GRADERS
IN PREPARATION FOR A
MATHEMATICS PROFICIENCY TEST:A QUALITATIVE STUDY

DISSERTATION

Presented in Partial Fulfillment of the Requirements for
the Degree Doctor of Philosophy in the Graduate
School of The Ohio State University

By
Randy Lattimore, B.S., M.A.

*****

The Ohio State University
1996

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ABSTRACT

This research examined the experiences of African American students in one urban high school as they prepared for a mathematics proficiency test. The study investigated (a) the nature of phenomena which have the greatest influence on the mathematical performance of these students in preparation for this proficiency test, (b) the mathematics classroom of this urban high school in terms of complexity during this period of mathematical preparation, and (c) the roles these students and their teacher play in preparing for the test, whether adequately or not. One mathematics class incorporating double block period scheduling participated in the research. Six African American tenth graders from the class participated in in-depth interviews. Two bodies of literature were reviewed to gain insights and assumptions to help African American students overcome negative feelings about their ability to learn mathematics. First, the literature on constructivism was explored as a factor that contributes to African American students' understanding of mathematics. Second, the literature that summarizes John Ogbu's theory of castelike minority and Claude Steele's theory of racial invulnerability and its relevance to these African American students provides interpretive background for the study. The theoretical framework developed for this research incorporated theories put forth by Noddings concerning the political implications of constructivism within the mathematics classroom. Results indicated students are not passive recipients of teacher instruction but are active interpreters of the classroom environment.
Findings provide evidence that these students are interested in mathematics, but if they cannot make a connection between their learning and their own lives, they will not value the learning and that routine, irrelevant mathematical tasks tend to bore these students. The study suggests that this mathematics teacher's narrow conception of learning was an impediment to student engagement. Overall, the study provides encouraging evidence for the importance of appropriate use of culturally relevant pedagogy to the lives of students. The conclusion is that students inappropriate mathematics approach to preparing for the test is an impediment effecting their performance on the mathematics portion and that more research is needed to determine the ways in which these techniques hinder mathematics learning.
DEDICATION

To my Brother in Christ
Rev. Arthur C. Woodruff
Whose footsteps I traveled in completing this journey!

To my Wife
Sheree Michelle Rivers Lattimore

To my Mother
Geneva Clark Lattimore

To My Father
Robert Lee Lattimore Sr.

To My Brothers
Alvin "Lil" Lattimore
Alton "Big" Lattimore
Jeffrey "Gramp" Lattimore
Tyrone "Tysey" Lattimore
Terry "Pop" Lattimore
Steve "Shimmy" Lattimore
Kenneth "Tater" Lattimore
David "Dap" Lattimore
Jerry "Casanova" Lattimore
Robert "Boot" Lattimore

In Loving Memories of My Grandparents
Washington Clark
Dooley Lattimore
Mary Lattimore
Nettie Clark
ACKNOWLEDGMENTS

A myriad of individuals have made this endeavor possible. I am immensely grateful to my advisor, friend, and colleague, Dr. Suzanne Damarin, whose unwavering confidence and convictions were instrumental and helped me navigate my way through successful completion of the dissertation. Committee members Dr. Patricia Brosnan, and Dr. Cynthia Dillard whose invaluable guidance and insights were also instrumental; they believed in me and shaped up confusing snatches of data and reflected back always on what they heard and read about the participants in the study.

Heartfelt thanks are also extended to the Arps Education/Psychology Library staff for their undying patience, and unrelenting support particularly Erika McNeil and Martin Jamison. Many others have offered encouragement, advice, and prayers along the way. Ms. Beverly Williams whose "being there" made all the difference; Dr. Linda Tillman, Dr. Diana Erchick, and Mr. Vincent Snipes who were ready to lend a helping hand.

Sincere appreciation goes to "Snuffi", "Jasmine", "Tia", "Wanda", "Art", and "Boo" and the staff of "Hysteria" High School who took my study and research seriously and provided me full use of the resources within the school.

Finally, I wish to acknowledge my wife who with patience, humor, and toleration, listened to my daily and obsessive conversations and opportunities to tell, revise, and retell stories about this urban school, my research participants and their mathematical failures.
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CHAPTER I

INTRODUCTION

The prospect of a new beginning for mathematics education rests with the ability of teachers to provide pedagogy that builds and expands on the thinking and experiences of African American students and that focuses on preparing these students to function within our democracy (William F. Tate, 1994, p. 477).

Introduction

Recently, I overheard a high school mathematics student remark, "You know mathematics is boring when you sit in class and dream about cleaning your sink." The student went on to add that mathematics class was the most boring class of the school day. She emphasized that neither the mathematics nor the mathematics classroom related to her everyday life. Her remark led me to wonder how widespread this statement about mathematics is; or, does her remark reflect the feelings of urban high school students struggling in mathematics classes in this nation's schools. The student is a white female, and, according to her teacher, a very good mathematics student. Is her statement of mathematics shared by students of color, and more specifically by African American urban high school students?

As a Ph.D. student with a vested interest in the mathematics education of students in general, but African American students in particular, I wonder if these students' success in mathematics will be determined by their adverse relationship with the mathematics education
process. Could the absence of measured mathematical competence mean that they do not encounter "success" in the mathematics classrooms? If they are not successful in the mathematics classroom, will this mean that they could be cut out of the "American Dream" of "a chicken in every pot, and two cars in every garage" (quoted in Safire, 1993, p. 117)? Does the absence of this seemingly very important encounter mean failure or less than stellar mathematical performance for African Americans in urban high school mathematics classrooms? In a system where mathematics has been the province of European males, these are important questions that should be addressed by mathematics educators in general, but African American mathematics educators in particular.

Background of This Study

This study is an extension of this researcher's interest in the mathematical competence of African American urban high school students and his specific involvement as Field Director of a Mathematics Intervention Program for two years. As Field Director, I was responsible for the following: (a) demonstrating student-centered activities to designated student-teachers, (b) providing training for designated student-teachers, (c) observing student-teachers in their classrooms, and (d) conferring with teachers to assure smooth operation of the project. By being an active participant in this project, both interest and an "insider" position were naturally established for conducting a study. This allowed for continual contact with the participants in the study while data were continuously collected and analyzed (Bogdan & Biklen, 1992).
This study has as its philosophical roots hermeneutic phenomenology; a science which studies people and their lived experiences. Hence, the participants studied were not referred to as subjects. They were instead, referred to as persons, for "as persons we are incomparable, unclassified, uncountable, irreplaceable" (Auden, as cited in Van Manen, 1990, p. 6). What characterizes phenomenological research is primarily that it always begins in the world of a person's lived experience and it is pursued against the background of an understanding of the whole, the communal, and the social (Van Manen, 1990). Gartner (1993) states that:

The world of lived experience is both source and object to phenomenological research. The notion of gathering data is ambiguous within the perspective, and data cannot necessarily be looked at as simple, hard, discrete chunks of evidence. Instead, data are viewed as recollections and constructions of and on the experiences of the participants involved in the research (p. 9).

This allows for the researcher to be the instrument of data-gathering and provides for his/my voice in the study. Thus, in this narrative "the researcher" will be replaced with "I", allowing for a multiplicity of voices while being aware that using the "subjective I" warrants careful scrutiny for validity purposes (Peshkin, 1988).

This study evolved from a prior ethnography, conducted during the 1993-94 school year, whose implications informed the current research directions and questions. The prior ethnography looked at the mathematical experiences of African American twelfth graders in an urban high school, especially those at risk of not graduating as a result of not meeting statewide proficiency test requirements. While this prior ethnography generated several topics for further study, the most significant finding that emerged was the notion that while mathematics intervention programs are purportedly helpful to incessantly failing mathematics
test-takers, a student does not necessarily learn much about the mathematics through involvement in them. One of the senior test-takers who was most vocal about why she felt the mathematics intervention program was not beneficial to her, recalled that, "I feel I learned the things I need to know from my teachers, and not [from] the intervention program!" Hers was the only negative comment from participants interviewed during the prior ethnography and she was so vocal that I, as Field Director, thought it necessary to look further at why she was objecting. In examining and analyzing her interview transcript I began to notice a pattern in her objections:

1) The premise of a mathematics intervention program was good but the structure of the actual program was not.
2) It was out of class participation, so she felt she deserved compensation for the time she devoted to the program.
3) The in-school cooperation of the regular teachers helped her on her journey of learning mathematics during the school year, not affiliation with the mathematics intervention program.
4) Mathematics Intervention Programs' participation should be voluntary for incessant test failures.

After looking carefully at the areas she mentioned and doing some initial reading on mathematics intervention projects, I not only understood where she was coming from, but, in part agreed with her. The implications from the pilot-study then served to guide the current study. Using the focus of mathematics intervention projects and the way they help to promote learning to understand mathematics among African American high school students, I determined that case-study research would be the most appropriate research procedure to guide a study for assessing the mathematics situation of African American students. A naturalistic perspective was needed to provide contextual insights into the lives of the students studied and the phenomena of the incessant failure of these test-takers.
Theoretical Framework

Constructivism has become the new buzz word in the field of mathematics education. While there exists myriad evidence on effectiveness/ineffectiveness of applications of this theory, relatively few research studies exist that support this notion as it pertains to African American children (e.g., Thomas, 1993). Constructivist educators argue that "mathematical insights are always constructed by individuals and their meaning lies within the framework of that individual's experience" (Confrey, 1991, p. 13). More recently, proponents from developmental psychology, theories of the family, human sexuality, psychology of gender (Hare-Mustin & Marecek, 1988), and even computer technology (Forman & Pufall, 1988) have gravitated toward the consideration of constructivism as a theory that "encompasses philosophical, epistemological, post-epistemological, and pedagogical views" (Santos, 1993, p. 2). Within the mathematics education research community, most constructivists generally agree with Noddings' (1990) statements that:

1. All knowledge is constructed. Mathematical knowledge is constructed at least in part, through a process of reflective abstraction.
2. There exist cognitive structures that are activated in the process of construction; that is, they explain the result of cognitive activity in roughly the way a computer program accounts for the output of the computer.
3. Cognitive structures are under continual development. Purposive activity induces transformation of existing structures. The environment presses the organism to adapt.
4. Acknowledgement of constructivism as a cognitive position leads to adoption of methodological constructivism.
   a. Methodological constructivism in research develops methods of study consonant with the assumptions of cognitive constructivism.
   b. Pedagogical constructivism suggests methods of teaching consonant with cognitive constructivism (p. 10).
Elsewhere, Noddings (1993) notes that constructivist teaching must be based in a political or philosophical context. Within the mathematics education community, however, debates still rage as to the appropriate mechanism(s) for incorporating constructivist principles of learning and teaching in the classroom setting.

Santos (1993) contends that the following principles characterize the inquiries of researchers working from constructivist frameworks:

1) The teacher acts as facilitator and guide of learning by modeling questions and conjectures that students construct their own mathematical meanings.

2) Social interaction in classrooms that work as mathematical communities, in which meaning and understanding of mathematical concepts are shared and negotiated by their individual and the social group.

3) Conscious reflection is an integral part of meaning construction when students try to resolve cognitive conflicts that arise in the interactions with either other students in the class or the instructor (p. 3).

However, other researchers (Lampert, 1988; Davis, Maher, & Noddings, 1990; Schoenfeld, 1985) have shown that one way to approximate the one-to-one situation in the classroom environment is the use of highly interactive teaching methods. Another way to approximate the one-to-one situation is to use small group work in mathematics classrooms. When working outside the classroom, the investigator can interact with one student at a time and observe how this student solves certain mathematics tasks and constructs mathematical meaning. The researcher can ask questions, can invite the student to think aloud while resolving problems, and can probe each student's thinking with questions and conjectures. However, Santos (1993) states "when investigators try to use similar principles with the whole classroom, alternative approaches are necessary because the one-to-one interaction is not possible in classrooms with usually 25 or more students" (p. 3). In sum, teachers need
to both model and elicit the process of knowledge construction in the classroom. As Noddings (1990) contends "teachers both model and elicit, but they model by asking questions, following leads, and conjecturing rather than presenting faultless products" (p. 17).

As Vygotsky (1978) noted, social interaction acts as a source in the development of mental ideas and language, and allows at the same time for broadening thought, meanings, concepts and oral and written language. Currently, several researchers follow this basic premise of valuing social interaction for meaning construction in mathematics (e.g., Cobb, Wood, & Yackel, 1990, 1991). In addition, Davis and colleagues (1991), Confrey (1990) and von Glasersfeld (1991) posit that reflection plays a vital role in constructivism. Confrey (1990) states:

Constructivism not only emphasizes the essential role of the constructive process, it also allows one to be aware of the constructions and then to modify them through our conscious reflection on that constructive process... Thus, not only can we assert that a constructive process is involved in all acts of perception and cognition, but also that we gain a measure of access to that constructive process through reflection (p. 109).

Underhill (1991) contributes the following set of assumptions to the discussion:

1. Cognitive conflict and curiosity are the two major mechanisms which motivate learners to learn.
2. Peer interaction is a major factor in producing cognitive conflict.
4. Reflection is the main factor which stimulates cognitive restructuring.
5. Items 1, 2, 3, and 4 are cyclical.
6. The cycle always occurs within and is informed by the learner's experience.
7. This cycle empowers learners, i.e., puts them in control of their own learning (p. 230).
A complimentary theoretical grounding is analyses of race (p. 17); these are linked by "but constructivism as a pedagogical orientation has to be embedded in an ethical or political framework" (Noddings, as cited in Damarin, 1995, p. 30). In her book Caring: A feminist approach to ethics and moral education, Noddings (1984) perception of caring excludes any individual or ethnic group which one is not familiar. But it is framed in a culturally coded way in that the individual or institution playing the role of care-taker can never (emphasis mine) be placed in a position to espouse the responsibility for the unknown learner. So the collective responsibility of institutions insensitive to the notions and conceptions of the race of people different from European American backgrounds and even from European Americans who differ from the "norm" can never be acknowledged as learner of knowledge.

Statement of The Problem

The rate of failure for African American students in urban schools nationwide is distressingly high. Comer's research (1988) indicates that as many as 50 percent of poor inner-city youth dropout of school. Raffini (1988) contends that many of those who remain in school withdraw from academic participation.

According to Smith (1986), school failure and dropout statistics are attributed to the following reasons: suspension from school, poor grades, boredom with classes, inability to keep up with work, problems reading and writing, retention in one or more grades, dislike for school, lack of assistance from teachers, inability to get along with teachers, personal problems, need to earn money, inability to get along with other students, and illness (p. 16). Smith cites attributes of individual students; other writers cite more systemic causes. Brophy
and Rohrkemper (1989, p. 6) have proposed ten topologies of failure syndrome students; they are: underachiever due to perfectionism, underachiever due to alienation, low achiever, passive-aggressive, defiant, hyperactive, distractible, immature, shy/withdrawn, and rejected by peers.

Mushinki-Fulk and Mastropieri (1990, p. 79) classified two distinct groups of students. Mastery-oriented learners are defined as students who attribute success to internal factors such as intelligence or ability. Unskilled students, according to Mushinki-Fulk and Mastropieri, are likely to attribute an occasional high grade to external factors such as good luck or an easy test.

Walker (1987, p. 109), attributes school failures to educational and social disenfranchisement of minority populations, particularly Blacks and Hispanics. Citing a special issue of the Harvard Educational Review (1969), she states that this nation's impetus to open up the educational system to minorities came from the crystallization of the Civil Rights Movement and the demands of Black civil rights leaders in conjunction with various sociopolitical realities. According to Walker (1987, p. 110), recognition of the role of schooling in reproducing social and class differences not only within the society, but within the minority community, can no longer be eschewed.

There exist several perspectives on minority groups' educational and social failures. According to Walker (1987, p. 110), explanations include a culture of poverty thesis; a racism paradigm; and societal contradictions based upon cultural and ideological saturation. According to Borkowski, Weyhing and Carr (1988, p. 46), explanations for student failure include inactivity, being less planned, disorganization and undeveloped skills and strategies.
necessary to achieve in classroom environments. The School Development Program (Haynes, Comer, & Hamilton-Lee, 1988, p. 11), instituted in Benton Harbor, Michigan is one example of educators, psychologists, scholars, and a variety of others including researchers, teachers as theorists, and educational practitioners and technicians, attempting to alleviate learned-helplessness syndrome in at risk, minority and learning disabled student's in this country's schools. Structurally-based strategies or programs of educational change for these students focus on combining appropriate teaching techniques coupled with mental health services (Haynes et al., 1988). Other improvement interventions focus on the development of specific cognitive structures which will facilitate the acquisition, retention, and transfer of knowledge (Borkowski et al., p. 47).

It is the purpose of this study to explore, describe, and understand the phenomena which have greatest influence on the mathematical performance of six African American tenth graders.

The Research Questions

There is an extensive body of research literature on the concept of competence-based testing in the educational system. However, the literature on the subject of students' experience on competence-based tests in the educational system is limited. Moreover, even less has been written on the subject of African Americans' experiences. The major research questions explored in this study were:

1. What is the mathematical portrait of six African American students in preparation for the mathematics portion of a statewide proficiency test?
2. What are the circumstances in the mathematics classroom that impede or support the mathematical performance of these six African American tenth graders before taking the mathematics portion of this statewide proficiency test?

3. How do the circumstances contribute to the success or failure of these African American tenth graders in their own assessment, and in the researcher's assessment?

Significance of The Study

The findings from this study hopefully will be significant in adding to the body of literature with regard to the mathematical proficiency testing experiences by focusing specifically on African Americans. There are no previous studies that have focused on why members of this ethnic group fail this test at disproportionate rates nor how to develop mathematics intervention programs for this group. This study addressed issues of importance to African Americans which have not been examined by other researchers: How do African Americans perceive this failure? How does persistence to pass this test affect African American relationships with their peers who have passed? How does failing the test affect their academic performance in the mathematics classroom? The examination of the mathematical proficiency testing experiences of six African American students will add to our knowledge of how the actual process affects the personal and academic lives of these six African American students.
Overview of The Study

This chapter includes an introduction to the study, a description and background of the study, the stated problem with research questions, and indications of the significance this study can have in the field of education in general, but mathematics education in particular. Chapter II includes a review of research and literatures relevant to this study. Chapter III describes the research methodology followed. Chapter IV presents the data for each African American tenth grader in a traditional narrative format that includes a mixture of descriptive accounts, direct quotations from the participants, and the interpretation and analyses of this researcher. Chapter V presents the findings for the study. Chapter VI presents the conclusions and recommendations for further study.
CHAPTER II
REVIEW OF RELATED RESEARCH AND LITERATURE

An oppressed group's experiences may put its members in a position to see things differently, but their lack of control over the ideological apparatuses of society makes expressing a self-defined standpoint difficult (Patricia H. Collins, 1990, p. 26).

Introduction and Overview of Chapter

The purpose of this study was to follow six African American tenth graders on their journey to passing the mathematics section of a statewide proficiency test. The specific focus was to explore, describe, and understand the complexities of these African Americans and to address the problem(s) they face.

Relevant to this study was the literature in three general areas: a) Historical Context of Mathematics Education for African Americans, b) Origin of Competency-Based Testing, and c) Impact of Competency-Based Testing on African Americans. Here I review the relevant literature that addresses three theoretical explanations that have been offered for the mathematical underachievement of African American urban high school students. The theories that are examined are the "lack of fit" model, castelike minority status theory, and the disidentification theory.
Mathematics Education for African Americans

Tate (1994, p.1) argues that historically, traditional approaches to mathematics education have been closely associated with a Eurocentric philosophy of elitism and social stratification that aimed to build the economic power and leadership of corporate entities. As a result of these beliefs, values, and norms within the white mathematics education community, this community has not fully-responded to the mathematics or educational needs of African Americans. Many public institutions today are inundated with discrimination and cultural insensitivity to a population of people who were not, historically, a part of this Nation's formal education system. Ogbu (1990, p. 41) argues that castelike minorities experience discrimination from the prevailing European American culture, but they are also caught in a web of inferiority and self-defeat that discourages them from living up to their full potential.

As a result of his findings pertaining to the Education of the Negro, Woodson (1968, p. 9) wrote that people in the South concluded that intellectual elevation unfit men for servitude: the more you cultivate their minds, the more unserviceable you make them. It was felt by whites in the South that slaves should be kept in the lowest form of ignorance. About 1830, the New York City Colonization Society, stated that the "improvement of blacks in this country was not the object for which this society was formed" (Mabee, 1979, p. 31). Legislators passed laws in several states that made it a crime for a slave to teach his own children. These statements are part of a legacy which African American students in the United States are struggling to overcome today. According to Ogbu (1990, p. 42), there is only so much you can do with more teachers and books. We have to deal with the structure
of youngsters who do not see the reward for achieving. Deal (1990) believes that
metamorphoses within the way schools function can only take place on a deep level involving
a renegotiation of historically anchored myths, metaphors, meanings, cultural values and
mind-sets. Deal's findings are congruent with French and Bell's contention that change must
first take place in the Human Social Subsystem (French & Bell, 1984, p. 58) in order for
reform to take place in a specific organization such as schools.

Historically, conceptions of public education, in the mid-nineteenth century, were
based on values arising from Protestant-republican ideology. White churchmen and
statesmen, shifted their attitudes from positive to negative regarding Negro education,
fluctuating with political influences at the time. Woodson (1968, p. i) concludes that
"education is a dependent, inter-acting unit of the whole culture. Indeed, it lies at the heart
of the culture, and necessarily reflects the contending values which there prevail."

Ogbu (1990, p. 42) believes that not all minorities are alike. Castelike minorities,
African Americans, or Mexican Americans, for example, do not see their situation as
temporary, as do Asian Americans. Castelike minorities tend to interpret the discrimination
against them as permanent and institutionalized. Although they wish they could get ahead
through education and ability like white Americans, they know they cannot.

According to Waters (1993, p.6), research indicates that school organizations and
concerned individuals have been involved in processes of human-social change in varying
degrees since the inception of the common school movement in the mid-nineteenth century.
Many of these efforts, which have benefited castelike minorities, however, have not become
institutionalized throughout the society, perhaps as a result of policymakers vacillating
between old beliefs and the need for change. Tyack and Hansot (1981, p. 13) claim that schools have perpetuated inequalities in how people view themselves and the world by upholding age-old myths and sacred beliefs.

According to Ogbu (1990, p. 42), the American educational system is not a panacea to African Americans and other nonimmigrant minorities, who believe that the public schools cannot be trusted to educate African American children as they educate European American children. Ogbu (1990, p. 43) thinks there is good reason for that distrust. He points out that African Americans have historically been excluded from high-quality education received by European Americans, and this exclusion, plus ongoing subtle devices within schools today, has hampered the academic performance of African American children.

In addition, Ogbu (1990, p. 43) states, nonimmigrant minorities have consistently been denied access to desirable jobs. He believes that this has discouraged whole generations of castelike minorities from investing time and effort in education and may have prevented them from developing a strong tradition of striving for academic achievement.

Educators, too, are apprehensive about drawing criticisms that may arise from applying uncertain solutions to a group of people whom some believe to be undeserving (Mann, 1985, p. 16). DePalma (1990, p. 22), observes that proponents interested in improving the academic standing of non European American students question the proper role of schools. Accordingly DePalma (1990, p. 22) asks, should traditional public schools, steeped in European American culture and practices, be restructured to serve the growing numbers of non European American students and their individual needs?
History of Competency-Based Testing

One of the most critical and controversial issues in some educational journals over the last fifteen years has been Competency-Based Testing (CBT). Well over three hundred articles have been written on issues related to CBT. Unfortunately, the preponderance of these articles is based on opinions and observations rather than research. For the educator seriously interested in the effects of CBT, little has been written to date. The existing research on the movement has been attitudinal analysis, analysis of instruments, trends in legislation, legal briefs, or research related to specific programs or specific states (Gorce, 1983). With the widespread disparity among tests and the difficulty in testing students, the paucity of research is understandable. That however, have not obviated the need for research on Competency-Based Testing. What would appropriate research on CBT entail?

A primary expectation of CBT advocates was that schools' curricula would change to address more directly perceived student needs. If CBT had any impact, then the curriculum in CBT schools should have changed differently than in Non-Competency-Based Testing (NCBT) schools. More specifically, researchers asked "was there a limiting, reducing, and /or deflecting of the curriculum with decreased attention to certain types of courses such as P.E., health, social sciences, the abstract, electives, the nonbasic, the innovative, the esoteric, and the arts?" "Was there a change in the traditional regimen, traditional subjects, content, instructional approach, and staff assignment?" "Or were there no curricular changes, no addition of courses, no dropping of courses, or diluting of those courses outside the basics, and no requirements change?" Furthermore, "did school size, community type, or ethnic makeup alter schools' responses?" (Gorce, 1983, pp. 370-371).
In an effort to answer these questions, a study was undertaken by Gorce in 1980. Gorce's 1980 study, published in 1983, revealed the following findings on CBT:

1. In stable-enrollment, public senior high North Central Association schools, Competency-Based Testing had limited impact.
2. Competency-Based Testing was not a broad-based educational trend. Despite national publicity, and much public pressure, few schools embraced CBT as a solution to educational ills.
3. The general trend, regardless of the type of school, was to increase emphasis on the "basics" and reduce emphasis on elective subjects, especially foreign language, art, music, and the humanities. Functional electives, primarily practical arts, were emphasized.
4. Summer school, night school, advanced placement, and independent study were not being used to solve educational problems.
5. Students were consistently reported taking more classes, yet the full-time equivalencies were reported as decreasing and the pupil-staff ratios decreasing.
6. It was apparent that CBT schools were doing certain things differently than NCBT schools. They focused their energies on the "basics," primarily language arts and mathematics in all areas, regular day, night school, summer school, independent study, advanced placement, and remedial courses.
7. Any major curricular revisions taking place were occurring in Anglo schools, as opposed to minority schools.
8. The analysis by school size provided more significant differences and more observable trends than any of the other analyses, leading to the conclusion that there is more variation related to the size of the school than other traits.
9. The analysis by community type demonstrated that the rural school was the community type most likely to exhibit significant curricular change, especially rural CBT schools.
10. Because of the pressure placed upon the basic courses in all areas of the curriculum, there was a definite narrowing of the curriculum.
11. It was apparent that despite what critics of American education hypothesized, it is a flexible institution, capable of adjusting to meet the demands of society.
12. Ultimately, the advocates of Competency-Based Testing did achieve their ends. By eliminating electives, they did reduce the frills courses. At the same time, they added remedial courses. By increasing basic skills courses, they improved students skills.
13. The worst fears of those opposed to CBT were also realized. Many courses and parts of courses were eliminated, especially in social studies, the abstract, the electives, the nonbasic, the innovative, the esoteric, and the arts.
14. While no hard evidence existed other than remarks by some principals indicating that some change was caused by reducing funding, there was,
however, sufficient circumstantial evidence to indicate that more factors were in operation on the responses principals gave than just CBT.

15. The tendencies with regard to staffing were complex. As a general rule, the number of full-time equivalencies was being reduced. Not only were students reported as taking more classes, but staff was reduced, or more importantly, the teachers in "basic" areas had not increased; it appears that the teachers of "basic" classes had inordinately large classes, while elective teachers struggled to maintain even skeletal "comprehensive" programs, they had to keep some classes and teachers in the elective areas even though student enrollment data did not justify it (Gorce, 1983, pp. 371-374).

The findings from Gorce's study on whether high schools using Competency-Based Testing altered their curriculum differently than Non-Competency-Based Testing schools thus revealed several changes overall, but not in minority schools.

**Effects of Competency-Based Testing on African Americans**

In mathematics testing as in any culture of assessing the performance of African American students, many of the "sacrosanct" assumptions and practices remain unstated, unexamined, and unacknowledged unless or until they are challenged by divergent beliefs from outside the prevailing white mainstream society. While testing is incessantly socially, racially, and economically stratifying people of color in general, keeping African Americans in particular to lower levels of mathematics, those who have not already been socialized into this culture of competitive testing by previous schooling often become painfully aware of it. They find that their values and beliefs are in conflict with many of the traditional criterion referenced testing practices that constitute an implicit or hidden agenda. For example, standardized or criterion referenced testing has become the quintessential obstacle to the advancement of African Americans seeking high school diplomas in this nation's public schools. Testing by which "one's gain is another's loss is likely to be in conflict with cultures
that do not endorse individual success at the expense of one's peers or that value modesty over assertiveness and cross-age tutoring over competitive interpeer debate" (Adams, 1992, p. 5).

Furthermore, contemporary advocates of criterion referenced testing note that these traditional instructional tests have not even served traditional European American students all that well. Despite the belief held by educational test-designers that tests are culturally neutral and that cultural neutrality is itself an academic and social norm, the assumptions and values that characterize tests mainly derive from aspects of European culture shared by nineteenth-and-twentieth-century European immigrants to this country. Nowhere is this more true than of criterion referenced testing. These immigrant groups benefited to the degree that they already shared a common history and could thereby understand the norms and participate in the behaviors of its educational systems. Yet, criterion referenced tests are narrow in that they eradicate nonverbal, empathetic, visual, symbolic, or nuanced communication; they neglect the social processes by which interpersonal communication, influence, consensus, and commitment included in mathematical problem solving; they overlook the social environment as a source of information, together with observation and questioning as information gathering methodologies; they ignore the values and emotions that African Americans attach to reasons and facts. And traditional criterion referenced tests are also exclusive in that they privilege those whose families, home communities, and prior schooling are congruent with the implicit values and behaviors and who accordingly understand, whether or not they accept them. But, to those not socialized, acculturated, or familiar with
the ways of criterion referenced testing, traditional criterion referenced testing practices seem impersonal, competitive, and off-putting.

Thus the criterion referenced testing practices in urban high schools are in themselves cultural manifestations, presently requiring substantial changes mounted by students coming to school from non European racial and ethnic or non English speaking backgrounds, and by women's questioning of white mainstream's society.

This dominant academic cultural style is characterized by the overlap of content and content-tested, ignoring the role mathematics assessment has played in creating low level curriculum opportunities for African American students in urban schools (Tate, 1994). At least two factors that can account for why this traditional mathematics culture remains unnoticed: First, although the match of the traditional mathematics classroom culture to the learning style of African American mathematics students was never perfect, mismatch was never identified as a frequent cause of student dropout, shifts of academic interests, or transmutations of learning style accomplished in all sorts of personal and idiosyncratic ways. A second factor is presented by general absence of cultural identity among many European American students. This absence of conscious cultural identity obscures the larger issue of cultural difference, reduces all cultural experiences to a single norm, and dismisses as frivolous the culture-consciousness of African American mathematics students who want to stress and value their own ethnic roots.

In other words, it has remained possible for white mainstream students to disregard that theirs is also a culture and to regard "difference" in culture as meaning merely greater or lesser departure from the norm. Thus white mainstream students fail to realize that their
European-derived belief that mathematics provides a bridge to economic and political advancement is based on the assumption that students crossing that bridge start from a culture that is congruent with traditional mathematics testing practices. How confusing it must be, then for African American students whose historical and cultural experience has not reflected the belief of the European American culture that graduating from high school will inevitably provide a vehicle for economic and political advancement, or whose history has been replete with segregation and lack of civil rights (Hacker, 1992), and biased tracking (Celis, 1993). Students (e.g., African Americans) not from a social group holding to the European American cultural framework are misunderstood by their teachers as underprepared, unmotivated, culturally deprived, or unintelligent.

The role of the mathematics teacher in consciously or unconsciously transmitting a European American cultural system is especially important in addressing challenges since, in the mathematics classroom, all roads lead back to the mathematics teacher. However, if all roads lead back to the mathematics teacher, the call for teaching mathematics differently--like other fundamental changes in mathematics classrooms--depends on the mathematics teachers acceptance and implementation of the recommendations in the NCTM Curriculum and Evaluation Standards (1989). But the difficulty for mathematics teachers of knowing how best to facilitate content-driven learning within a mathematics classroom can lead them, usually unwittingly, into the stance of seeming to preserve academic standards when in fact transmitting an unexamined culture. It seems urgent, given this new emphasis on mathematics, that mathematics teachers not only become aware of ways in which the traditional mathematics classroom culture excludes or constrains learning for African American students.
but also learn how to create environments that acknowledge the cultural diversity that these students bring.

So powerful and pervasive are folkways of mathematics teachers as reinforcers of traditional criterion referenced test practices that it is understandably difficult for high school mathematics teachers to see beyond their own acculturation and to imagine alternative possibilities for the mathematics classroom. The process of designing instructional alternatives engages a mathematics teacher's willingness to consider the many factors that contribute to an urban African American high school student's immediate learning environment. Rather than simply choosing between one testing strategy or another, instructional design involves consideration of the learning process from the viewpoint of the learner and intentional strategies with the perspective of the learner and the intentions of the teacher equally in view. The learning process thus involves implicit cultural values that define the social interrelations and behaviors among and between the mathematics teacher, classroom peers, and the individual.

The literature on the educational implications of African American culture suggests not the dismantling of traditional criterion referenced test practices but rather the incorporation of alternative testing modes that match and engage a broad range of diverse, culturally derived orientations to learning.

Velvel (1993) suggests three factors which account for this long-standing abusive use of tests which is likely to continue as long as the tests continue, or at least for many years.

1) The cautionary guidelines, which the makers and sponsor know are unheeded, are merely a cover to try, unsuccessfully, to attain a state of innocence while peddling social havoc from which they reap millions of dollars annually.
2) They reward the person who, by ability or inclination, reads and answers rapidly, and they punish the individual who reads, decides and generally acts in slow, careful, deliberative, methodical ways. Because so much of real life requires the latter traits, not the former ones, or requires us to deliberately sit back and take a second or even a third or fourth look, the tests disadvantage people who possess these very traits that life often demands.

3) The tests have caused emotional blight. Younger people in particular, whose futures are determined by tests and who lack the supportive experience of prior years of performance in the real world, often suffer a destructive blow to their self worth and confidence if they do poorly on the tests or (in some circles) even if they merely do less than superbly well on them. The blow to self worth is exacerbated because the tests have become widely regarded, no matter how wrongly, as the measure of one's intelligence. Performance which is less than desired on the tests is taken as shattering proof of inferiority. (p.4).

"Lack of Fit Model"

Several researchers (Stiff & Harvey, 1988; Tate, 1994) have theorized that there is simply a "lack of fit" between African American students and the mathematics education process. For example, Stiff and Harvey (1988) maintain that when examining African American students and the mathematics education process, several factors must be considered: (1) course enrollment patterns, (2) role models, (3) significant others, (4) usefulness of mathematics, and (5) attitudes toward mathematics. The problem with this method of fit as it pertains to African American students has been the tendency by educational institutions to consider the characteristics of European American students over African American students (Menacker & Pollack, 1974; Akbar, 1985). African American students are more marginalized and the disconnection of mathematics classroom practice from the experiences and traditions of African American students represents a loss of opportunity to learn mathematics (Tate, 1994). Some maintain that the marginalization and devaluing of African American students are based on conflicts between African American culture and that
which is espoused by the American educational system (Boykin, 1980; Gibson, 1976, Hale-Benson, 1986; Wright, 1970). These researchers posit that African American culture is largely-ignored and devalued in school. Also supporting this lack of fit perspective is research examining the social system of educational institutions, that is, institutions with the purpose of training, educating, and socializing individuals (Maynard, 1980). Social systems have behavioral norms and expectations for students as well as standards for judging behavior. With an emphasis placed on dress, life-style, and communication patterns, the penalty for non-conformity with European American mainstream society is at best a label of different, and at worst a label of deviant. The notion of a cultural conflict, stands as a underlying contributor of the underperformance of African American students (Boykin & Toms, 1985; Hale-Benson, 1986).

In their research on the existence of a unique culture for African Americans, Boykin and Toms (1985) argue that the preparation of children to take on adult roles and responsibilities of society should stem from the family, with non-familial social agents providing reinforcement for the values taught by parents. At present, however, these ideals only reflect the culture of European American mainstream societal experience. In other words, the cultural norms and values taught to European American children have ample opportunity to seek and find reinforcement and validation in such socialization agents as schools, the judicial system, the work place, and the mass media. Cultural norms, beliefs, patterns of behavior, and values taught to African American children, however, do not. Indeed, when examining the role of the American school system as a socialization agent, Hale-Benson (1986) maintains that emphasis is placed on shaping African American children
so they can fit into an educational system designed for European American middle class children. This is precisely what Woodson feared over sixty years ago. Furthermore, Akbar (1985) suggests that African American culture is viewed through the lens of European American culture and thus will be perceived as inadequate. African American culture, as a whole, relative to European American mainstream society culture, is unrecognized and thereby unappreciated in the American school system.

Examples of African American cultural practices that are devalued in the educational system have been described by Hilliard (1976, as cited in Gooden, p. 22) and include the following: First, African Americans tend to respond to things in terms of the whole picture instead of its parts. European Americans tend to believe that everything can be divided and subdivided into pieces. If such a difference exists, imagine its implication for an African American who learns better by an holistic approach, but is taught by a segmented approach. Second, African Americans tend to approximate space, numbers, and time rather than adhere to the linear constraint of precision. Again, imagine the student who has been brought up to believe that a general description of events is sufficient only to discover, often times when it is too late, that specificity is valued more in the academic context. Third, African Americans tend to focus more on people and their activities than on things. This cultural nuance could help explain why African Americans are more likely to choose careers in the helping professions such as teaching, psychology, and social work (Hale-Benson, 1986). It could explain their underperformance and underrepresentation in the hard sciences and mathematics. Such disciplines are typically taught with the people-focus parceled out. Fourth, African Americans have a keen sense of justice and are quick to analyze and perceive injustice.
African American students are thus on guard for injustice in school because their history has been replete with segregation, lack of civil rights, forced busing (Hacker, 1992), biased tracking (Celis, 1993) and testing (Blackwell, 1985). Because these events have occurred so often in the past, there is no reason for people not to expect them in the future. Fifth, African Americans have been socialized to show differential behavior toward elders and whites (Young, 1970; Eder, 1972). This behavior may manifest itself in the form of eye-gaze avoidance, which in the classroom may be misinterpreted as a lack of attention (Byers & Byers, 1972). Finally, African Americans prefer freedom and personal distinctiveness. This is often expressed by style of dress, hair, and name assignment. Such a cultural nuance is often devalued in school because the emphasis in school and in the larger society is placed on assimilation, conformity, and normality (Hilliard, 1976; Hacker, 1992).

"Castelike Minority Status"

Although some researchers argue that a lack of fit best explains academic underperformance by African American students, Ogbu argues that the academic retardation of African American students is based on maintaining a society that is stratified by race and social class (Ogbu, 1978, 1988, 1994). Because African Americans have been relegated to a lower status in American society by their perceived inferiority based on race and their low collective economic status, it is more than likely their specific subordinate status will have implications for their academic achievement. Ogbu contends that African Americans occupy a "castelike minority" status, in that they are relegated to a specific subordinate position in this society. This status is defined by the following four characteristics, which incidently
distinguish them from other ethnic minorities in the United States such as Asian Americans or Hispanic Americans. First, African Americans' presence in this country is the result of forced enslavement. Second, their castelike status is not temporary, it is permanently acquired at birth. Third, historically they have had limited access to good education and economic opportunity because of their group membership rather than their lack of training or ability. Finally, as members of a castelike minority, they have a tendency to attribute their social and economic circumstances to institutional discrimination and racism.

Given these defining characteristics, these castelike minorities are likely to conclude that their educational mobility is constrained due to their perceived inferior status by European American mainstream society. Members of this castelike minority often draw conclusions about the educational mobility of individuals not stigmatized or restricted by castelike minority status. Ogbu maintains that the differences in educational attainment between African American and European American students lies in the nature of the perceptions of educational mobility in a social system that stratifies on the basis of race and social class. Since African Americans expect education to provide the means to improve their social and economic conditions they are disheartened upon encountering segregated school (Bullock, 1970, Weinberg, 1977), negative teacher attitudes and low expectations (Knowles & Prewitt, 1969; Hobbs, 1975), biased testing (Mercer, 1973), biased tracking and ability grouping (Findley, 1973) and biased textbooks and poor curriculum (U.S. Senate Select Committee on Education, 1972). The faith that myriad educational opportunities for African American students will transform their conditions are still in question. Even today, evidence suggests that a fair and equitable education for the majority of African American students in
this nation's schools is still questionable. For example, a magistrate in Illinois recently ruled that bright African American students were denied entry into higher academic tracks, even when their performance exceeded that of higher-track European American students (Celis, 1993).

The result of this conflict between expectations and reality led to a distrust in the educational systems throughout this country. This distrust, Ogbu argues, may have led to a lack of perseverance in academic pursuits. In this regard, he cites lack of effort by African American students who "give up" and who learn to blame the system, as their parents blame the system, for their own failures within this society. Academic underperformance for African American students then is ultimately a function of their specific inferior racial and class status that European American mainstream society has thrust upon them, the failure of the educational system to provide equal opportunity within the academic environment which they attend, and finally, these students overall lack of faith in the educational system.

**Disidentification**

Steele (1992) and colleagues (Brown & Steele, 1992; Spencer & Steele, 1992) echo Ogbu's argument that the social stigma marking African Americans as inferior is a critical element undermining the academic achievement of African American students. These researchers argue that because African Americans are vulnerable to perceptions of inferiority by society at large, and in the classroom in particular, they are constantly under the threat of being linked to their race and social class. Under such circumstances, disidentification may account for academic underperformance of African American students in an effort to protect
their self esteem. In other words, they distance themselves from the academic achievement in the classroom. Steele believes, however, that successful academic performance requires linking self esteem at least partially with academic participation and achievement in the classroom. In this regard, African American students are disadvantaged by virtue of their disidentification in the classroom. Because their race has historically been devalued by the prevailing society, they have the pressure of combating stigma in the classroom in addition to the typical constraints associated with being a student. When African American students are successful, they are regarded as exceptions. African American students failing a course, however, confirm the European American perceptive stigma that African Americans are academically inferior. Academic retardation and underperformance are explanations for the racial vulnerability African Americans face in being stigmatized as academically inferior.

Summary

The literature reviewed here provides theoretical and interpretive resources for this study designed to delineate the progress made by six African American tenth graders on their journey to passing the mathematics section of a statewide proficiency test. Immediate and simultaneous feedback given by their teachers on the mathematics deficiencies, it is believed by this researcher, could enhance their mathematics performance in preparation for the test and thus improve the effectiveness of their performance to pass. This chapter reviewed the literature in several areas to present the background, rationale, and importance of the study. The literature and research described what is offered as theoretical explanations for the dismal performance of African American students.
CHAPTER III
RESEARCH METHODOLOGY

The gift of presence is being able to tell the stories of others.

Methodological Posturing

This is a study of six African American students as they continue their journey into the world of mathematics proficiency testing. The qualitative approach to research captures the spirit and intent of this study, as it looks at the lives of these African American tenth grade students at a most vulnerable period of their schooling. As Van Maanen (1979b) states: "Qualitative research here is used as an umbrella term covering an array of interpretive techniques which seek to describe, decode, translate, and otherwise come to terms with the meaning, not frequency, of certain more or less naturally occurring phenomena in the social world" (p. 520). This type of research is also called "naturalistic" in that the researcher conducts research in a native environment. That is, the data are constructed as a result of people engaging in natural behavior: visiting, looking, eating, and living. The naturalistic approach also avoids the artificial response typical of a controlled or laboratory setting (Guba, 1978: Bogdan & Biklen, 1992; Fetterman, 1989).
The naturalistic or ethnographic approach to qualitative research has as its philosophical core, hermeneutic phenomenology. Van Manen (1990) reports that the phenomenological approach to human science describes how one orients to lived experience, and hermeneutics describes how one interprets the "texts" of life. Therefore, hermeneutic phenomenology is a science which studies persons in the lifeworld and shares the following characteristics:

1) It is the study of lived experience.
2) It is the explication of phenomena as they present themselves to consciousness.
3) It is the study of essences.
4) It is the description of experiential meanings as we live them.
5) It is the human scientific study of phenomena.
6) It is the attentive practice of thoughtfulness.
7) It is a search for what it means to be human.
8) It is poetizing activity (Van Manen, 1990, pp. 9-13).

This study was, in the philosophical tradition of hermeneutic phenomenology, one of "lived experience" (Brodkey, 1987). It caught the fine detail of what the people studied, did, said, and thought, while keeping a perspective on the context of their behavior (Wolcott, 1988).

Ethnographic Approaches In Studying African Americans

Ethnography has been described as "... the art and science of describing a group or culture" (Fetterman, 1989, p.11). As such, it is an attempt to "... provide rich, descriptive data about context, activities, and beliefs of participants" (Goetz & LeCompte 1984, p. 17). What makes the ethnographic approach so distinct is "... the matter of interpreting and
applying the findings from a cultural perspective" (Wolcott, 1980, p.59). Ethnography is, as Van Maanen (1988) says, a written representation of culture.

Attention to the cultural context seems to be the critical factor in determining studies that are considered ethnographies from those studies that use ethnographic methods. In classic ethnographies, attention is given to contexts in which events occur, not simply to the isolated events themselves (Wolcott, 1980). There is thick description of people, setting, action, words and feelings of the people involved in the research (Geertz, 1973). The ethnographer "... is an instrument of lived experience who not only describes the culture as it is revealed to him/her, but also constructs a culture as well" (Wolcott, 1982, p. 87). Thus in an ethnography culture is considered the core of the research. The ethnographer, in turn, studies these cultures, looking at what people do, what they know, and what things they make and use while recognizing that anything observed is only part of a much larger picture (Spradley, 1980).

Not all definitions of ethnography are consistent within the research field, however. Goetz and LeCompte (1984) call ethnography the use of qualitative methods, especially those that involve interaction with participants. Bogdan and Biklen (1992) state that ethnography is the "... attempt to describe culture or aspects of culture" (p. 38). Spindler and Spindler (1987) are more rigid in their definition, stating that a study should not be called an ethnography unless it uses some model of cultural process in data gathering and interpretation. Although there is much ambiguity in the definition of these terms, most educational anthropologists and researchers use the core of culture as a theoretical framework to inform their work (Bogdan & Biklen, 1992).
This dissertation is a true ethnography in the classic sense, because it has as its core looking at African American students in the cultural setting of school. Questions about the appropriateness of using this method for my study include the following:

1) Does this demand attention to the cultural context of the persons studied?
2) Does it allow many aspects of the persons studied to be seen and explored?
3) Does it help the implicit cultural knowledge become explicitly known?
4) Does it allow for jointly-told tales and jointly constructed knowledge?
5) Does it allow for multiple perspectives of interpretation?

After examination of the above questions using ethnography as a frame, it was determined that the ethnographic approach was compatible with the questions being asked. Thus, for the sake of consistency, the terms ethnography, research, and naturalistic study will be used interchangeably throughout the remainder of this document with the full realization that they are not exactly synonymous.

**Self as Research Instrument**

Like ethnography itself, the role of the ethnographer is sometimes controversial. Wax (1971) comments that ethnographers enter the field with a mix of expectations about the nature of the site, the people in it, and the researcher's role in the setting. Goetz and LeCompte (1984) acknowledge that the ethnographer has expectations as well as presuppositions about the site and the people in it. By acknowledging these presuppositions however, the research provides a depth of understanding not often found in other research approaches. Further, by acknowledging and grounding their own views, ethnographers reveal how and why they interpret situations the way they do. Wolcott (1988) states that ethnographers are the instruments of their own research, and as such, question, observe and
interpret all that they see, feel, and hear. He sees this as a great strength in ethnography, because:

The ethnographer is the research instrument (and in spite of ) being biased, inattentive, ethnocentric, partial, forgetful ... incapable of attending to everything at once, easily distracted, simultaneously too involved and too detached ... What better instrument could we ever devise for observing and understanding human behavior? (p. 190).

In this study, I served as the instrument of my own research, seeking to explore, describe, and understand the lived experiences of the students studied, as well as the lives of those surrounding them.

**Insider Position and Multiple Realities**

In ethnographies, there is an attempt to describe cultural scenes from the inside, from a participant, or emic point of view, to "... document the existence of alternative realities and to describe those realities in (the native's) own terms" (Spradley, 1980, p.14). Geertz (1973) calls this the construction of other people's constructions, and it helps to illuminate the experiences that have been lived. The insider voice helps the ethnographer to be aware that knowledge of the external world is partial, contextualized and situated. As such, there is no escape from subjectivity (Eisner, 1988; L. Richardson, 1990). Meaning of cultural situations is not found, but looked upon as the construction of possibilities. By using the insider or emic point of view in my study, I intended to search out and open up the possible interpretations of the lived experiences presented. This entailed using my personal voice, my researcher's voice, and the voices of the participants studied. Multiple interpretations and realities are the
hope of this approach, knowing that being "... subject to multiple interpretations ... are never beyond controversy or debate" (Van Maanen, 1988, p. 35).

**The Research Setting**

Hysteria* High School is located in the inner city of a Midwestern city. It is characterized by a dull brick construction, concrete and asphalt running up to the school's walls, some shraggly shrubs, and limited playground space. Hysteria has a rather stately, impressive entrance; hallways are wide and high ceilinged. To a considerable degree the building contrasts with the surrounding small homes, duplexes, and apartment buildings, most in ill-repair. Hysteria is dull, drab, and rather depressing in appearance. The old, worn building seemed to take on warmth and vitality from it occupants. Students attended Hysteria High School for the very first time on October 12, 1900. The original building, then located five blocks from its present location was built at a cost of $7,000 for land and $62,000 for construction. With Charles Barrett as its first principal, Hysteria High School became the fourth high school in this large Midwestern metropolitan city school system. The present building opened its doors to students on October 13, 1924, with a $915,000 construction cost. Many improvements have been made to the physical structure of the building over the years, such as a new music room, a library center of learning, an industrial arts complex, and a concession stand. Hysteria High School has always had a proud tradition of providing a quality education. Numerous international, national, state, and local leaders

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* The school studied in this inquiry was pseudonamed "Hysteria" High.
have graced its hallowed halls. Graduates of Hysteria High School include a former mayor of this Midwestern city, a superintendent of the city school system, three local high school principals, an Air Force General, and a host of professional athletes and entertainers.

During the American Industrial Revolution the southside of this large Midwestern metropolitan city was the point of entry for many immigrants from Eastern and Western Europe and for African Americans who came from the southern portion of the United States. The school also served as a point of entry for the next wave of immigrants mostly of Asian descent who came during the 1970-80s. Hysteria High School has survived population changes associated with World War I, the Depression years, World War II, the Korean Conflict, the Civil Rights Era, the Vietnam War, and it has remained a strong institution for academic achievement. Three major changes in the city school system in the 1980's impacted the makeup of the student population of Hysteria High School. In 1980, ninth graders were integrated into the high school which had previously served only grades 10-12; court-ordered desegregation was put into action; and another school within this large Midwestern metropolitan city closed its doors for good, which added to Hysteria High School's enrollment. These changes made Hysteria High School the largest high school in the city.

The 1990's ushered in the age of reform in public education, and Hysteria High School became a leader in the reform movement. In 1989, Hysteria High School was selected to be one of five "scout schools" with an educational program based on a shared decision-making process which includes student, faculty, staff, parents, and community. Hysteria High School, in its continuing tradition of academic achievement has always operated on the premise that every student can learn.
The school has accepted the challenge of educating young men and women of today to insure that they become productive citizens well into the 21st century.

**Gaining Access and Building Trust**

Bogdan and Biklen (1992) state that gaining entry to a site is "tricky" and suggest that a field worker be flexible, creative, and persistent. Entry to the site one has determined will yield the most fruitful observational ground may not always be easy or available. Thus, the researcher must negotiate entry before any shared experiences can occur, or any relationships are built (Connelly & Clandinin, 1990). In the summer of 1993, I had the good fortune of being recruited by Dr. B., an assistant professor of mathematics education at Geneva University, to serve as Field Director of a mathematics intervention program to begin Fall 1993. During the summer of 1993, I attended several workshops on effective urban mathematics teaching. These courses provided me with the student-centered activities, teaching methodologies, and learning theories necessary to assist African American students in urban high schools throughout this Midwestern city. Ideas and instructional materials obtained from these workshops would be implemented in two urban schools. This was the initial impetus of a program called Program S.O.U.T.H. (Student Operating Under Total Hysteria) which provided alternative mathematical strategies and approaches as a means of intervention to urban high school students who had not passed the mathematics section of the Statewide Proficiency Examination commonly called the Ninth Grade Proficiency Test. Program S.O.U.T.H. was a year-long mathematics intervention program mainly serving African Americans in urban high schools. These students were coached, tutored, counseled,
and mentored by several student teachers placed in this school to gain and learn valuable knowledge about urban schools, urban classrooms, and the urban experience. The study focused on the dismal performance of African American tenth graders on the mathematics section of the test.

After convincing the principal of Hysteria of the need for the study in her school, and gaining permission to peruse the profiles of potential students for the study, a cumulative list of students was constructed. Each prospective research participant was sent an explanation of the study, permission slips, and a self-addressed stamped envelope to return the completed forms. Once the participants had been selected, they were contacted personally by the researcher requesting their participation in the research. A follow-up contact was made to provide additional information to the participants, to schedule an interview, and/or to answer questions which they might have. The researcher submitted all required applications needed to gain access to the site and to interview participants, and informed parents of the students selected as to the purpose of the study.

In this study, negotiating access and/or entry was not difficult. Being the Field Director of this Mathematics Intervention Program, I was an "insider", which facilitated my living of the experiences first-hand. I have been part of their culture in both an official capacity as Field Director, and in a research capacity. The concern of entry does, however, raise certain issues of protocol related to the ethics of this study, which are addressed in depth in the following section.
Treatment of Ethics

Qualitative research's lifeblood is its people: informants with problems, concerns, and interests (Spradley, 1980). The first and foremost consideration in working with the people of a study is to deal with them in an ethical manner. Taken to its highest degree, the ethical dimensions of a research project can paralyze the researcher and/or make null and void a perfectly sound research project. Historically, the value of research to a society has been promulgated over the rights of human subjects, a practice that has prompted lists of ethical practices from many areas of social sciences in recent years (Eichelberger, 1989). On the one hand, these lists can be looked at as restricting the researcher from doing questionable but potentially valuable research. They can also be looked at as guides for the researcher to protect the researched as well as him/herself if a problem or conflict arises (Spradley, 1980). These ethical concerns fall into several categories: (a) informed consent, (b) protecting the informant(s) from risks and/or harm, (c) the different methodologies used, and (d) the analysis and dissemination of data gathered (Spradley, 1980; Bogdan & Biklen, 1992; Lincoln & Guba, 1985; Erickson, 1986; Riddell, 1989).

Informed consent involves several considerations on the part of the researcher. In this study, participants were given a description of the research project and told the purpose for conducting the research. This includes, as Erickson (1986) says, "... the purposes and activities of research that will occur" (p. 141). This also includes any extra work that the informants have to do as a result of participating in the research. Protecting the informant's privacy and telling him or her exactly what is going to be done with the research, then following through with that information, is also a necessity in order to establish trust and
confidence needed for the researched and researcher alike. Some murkiness arises when one looks at informed consent as a kind of rigid contract, a sure-fire guarantee that things will go as planned in the research. Bogdan and Biklen (1992) state that because the relationship between the informant(s) and researcher is on-going and evolves over time, so too, will the research design. While attempts must be made to try and cover all that emerges in the research, often only a "bare bones description of what will occur can generally be included" (p. 53). The task of the researcher is to keep informing as the design unfolds, to be truthful about the data that are being collected.

The participants should know what potential risks there are by being involved in the research. Rarely in fieldwork situations are these risks medical or physical, but are more in the psychological and/or social realms. The interests of the very vulnerable participants or single participant in the setting must be protected, and the researcher is wise to negotiate for strict confidentiality and protection of information from the outset (Erickson, 1986). Muddying the water a bit, Erickson points out that the researcher almost needs to do a prior study or ethnography in order to anticipate what some of the risks are, and ethical issues that will emerge.

Spradley (1980) cautions against exploitation, another ethical issue that researchers face. Exploitation occurs when the informant gains nothing or actually suffers harm from the research. Spradley suggests that while this exploitation may not be intentional on the part of the researcher, s/he must be cognizant of "fair return". Another type of exploitation occurs as a result of the insider-outsider controversy, as Baca Zinn (1979) so passionately speaks of in her piece on doing insider-research in Chicano families. She states that while exploitation
is a result of unequal social power with the outsider usually having more exploitative capability, insider exploitation occurs as well. One solution to this non-exploitation lies in the relationship between the researcher and the people researched. Wax (1971) talks of the potential exploitative capabilities she had when going to Gila and Tule Lake; she learned that once the Japanese Americans trusted her for who she was the exploitation was somewhat tamed, if not stopped.

A third area of ethical concern is the methodology used in conducting research. Simon and Dippo (1986) argue that "all methods are ways of asking questions which presume an underlying set of assumptions, a structure of relevance, and a form of rationality ..." (p. 195). In this way, any of the methods can be used in an unethical way. Lincoln and Guba (1985) warn against covertness; observations, interviews, and/or member checks must all be done overtly. In fact, they go as far as to say "... if covertness seems to be required in order to ensure "honest" or "nonreactive" response, other ways should be found to obtain the needed information, or the search for that information should be abandoned altogether" (p. 269).

The last area of ethical concern is related to analyzing and disseminating data. Zinn (1979) reports that as researchers go about the business of classifying, analyzing, and disseminating the data, their own feelings and thoughts get lost in the shuffle. Eisner (1988) further pursues this inherent danger in practice:

When in our teaching, our curriculum, and research methods we emphasize the prompt classification and labeling of objects and events, we restrict our consciousness and reduce the likelihood that the qualities of those objects and events will be experienced. Thus, our awareness is always limited by the tools we use. When those tools do not invite further sensory exploration ... (p. 17).
Zinn's concern may be a researcher's direct way of handling bias, another potential ethical problem. Qualitative researchers have wrestled for years with the issues of researcher bias and subjectivity (Bogdan & Biklen, 1992). There is no single way to clear up this ethical dilemma, but attempts can be made to tame it. These include: (a) recognizing and grounding that bias as an issue, (b) being reflexive in field notes and analysis, and (c) admitting that there is no such thing as a neutral approach to the world (Bogdan & Biklen, 1992; Lather, 1986a; Eisner, 1988; Peshkin, 1988). By doing so, qualitative researchers acknowledge and take into account their own beliefs as a method of dealing with them.

As far as dissemination of the research findings, it is crucial that the agreement the researcher made with the informant(s) be upheld. If the research was promised not to be published, it should not be. If the decision has been agreed upon to publish, sometimes a difficult decision must be made between what is acceptable to those who have provided the data, and the wider audience to hear and see the big picture. A possible solution to this problem is to produce two books of findings, one for the general audience and one for the world of academe. Perhaps a better solution, as Riddell (1989) suggests, is to trust oneself as a researcher: to write clearly, accurately, and without mystification. Qualitative research is written by people, for people, and the dissemination of data, as well as the methods used, should at all times reflect this.

Bogdan and Biklen (1992) sum up this and other ethical problems that researchers face as follows:

As a researcher, you have to know yourself, your values, and your beliefs. You have to know how to define your responsibility to other human beings and what your responsibility is when you are put in contact with their suffering. Qualitative
research allows for that contact. For many qualitative researchers, ethical questions do not reside narrowly in the realm of how to behave in the field. Rather, ethics are understood in terms of their life-long obligations to the people who have touched their lives in the course of living the life of a qualitative researcher (p. 55).

In order to protect the anonymity of the people involved in this study, the identity of the participants was kept confidential by using pseudonyms and codes in all written and/or oral reports of the research. Additionally, all information and data gathered during this research were confidential and retained by me as researcher. No data were gathered or disseminated without the consent of the participants.

Analysis of Data

In this study, data were continually analyzed throughout the period of information-gathering and data construction. The analysis of data and plans for writing are presented later in this section.

Case Study Approach

The classical qualitative educational research design is the case study (Firestone & Herriott, 1984). A case study is a detailed examination of one setting, one single participant, or one event (Bogdan & Biklen, 1992; Yin, 1984). The case study is used widely in educational research because it best captures the diversity in experiences and the lack of stabilization among school people and settings (Wildman et. al., 1989). Lincoln and Guba (1985) state six reasons to conduct case study research, and these are consistent with the methodological perspective from which I operated in this study. The case study:

1) is the primary vehicle for the emic inquiry;
2) builds on the reader's tacit knowledge
This study was presented as an observational case study of six African American tenth graders. In the analysis of the lived data, every attempt was made to see this as a case study of lived experiences and consequently, open to multiple interpretations. Thus, it was not held up as a generalizable study.

**Sampling**

Following the determination to use the case study design, internal sampling of the members was determined. Internal sampling means "... the decisions you make once you have a general idea of what you are studying, with whom to talk, what time of the day to observe, and how many documents and what kinds to review" (Bogdan & Biklen, 1992, p. 67). Choices of these kinds are problematic if clear reasons about the site selection and the people chosen to participate are not grounded in the researcher's perspective of doing a case study.

Qualitative sampling strategies are diverse, including time sampling, purposeful sampling, and negative case sampling. These strategies are not to be thought of as mutually exclusive, for more than one sampling strategy can be found in the study. This is known as opportunistic sampling (Patton, 1990) and was employed in the study. The size of the sample is also quite diverse. Sample size depends on: (a) what you want to find out, (b) why you want to find it out, (c) how the findings will be used, and (d) what resources, including time, you will have available for the study (Patton, 1990).
Generally, the larger the sample size the more breadth is given to a study, and the smaller the sample the more depth given. However, the validity, meaningfulness, and insight generated from the qualitative inquiry may have more to do with information-richness of the cases selected and the observational/analytical capabilities of the researcher than with the sample size (Patton, 1990).

In my study I used an opportunistic sampling approach (Patton, 1990) due in part, to the case study design. First, I looked for those persons who provided rich, contextual opportunities for examination (purposeful sampling) and whose study illuminated the research questions. An intensity sample was used as more information was gathered and I began to know the people quite well and know who were the excellent examples of the phenomena studied. Time sampling was used to gather information according to the emergent design. Finally, a convenience sample was chosen so that the persons (N = 6) were in one school.

**Triangulation**

Strengthening a study is an important goal of this and all other ethnographic research and is done, in part, through triangulation. The field worker uses a variety of methods and techniques to ensure the interplay of data (Wolcott, 1988; Fetterman, 1989). No single method ever adequately solves the problem of rival causal factors. Because each method reveals different aspects of empirical reality, multiple sources of data, methods, and theory, grounded in the researcher's beliefs, and that helps give validity to ethnographic methodology.

In this dissertation two kinds of triangulation occurred. Methods and sources of data were varied and diverse. Theoretical sensitivity was evident, thus helping the trustworthiness
of the study. This theoretical sensitivity indicates an awareness of the subtleties of the meaning of the data and the insight and ability to give to them (Strauss & Corbin, 1990). Theoretical sensitivity came from several sources in this study, including: (a) the professional experience I brought to it through my role as Field Director, (b) the personal component of being a teacher, and researcher of the involved participants, (c) the research literature read and applied, and (d) the analytic process of working with the data, which is discussed in a later part of this section. The theoretical sensitivity, the theory and recommendations I developed were faithful to the reality of the phenomenon under study (Strauss & Corbin, 1990).

Other Validity Issues

When a naturalistic study is complete, it is necessary to give evidence that the findings have validity to them. Kvale (1989) says to validate a study one must continually check, question, and theoretically interpret the findings. Triangulation of methods, and data is one way to help accomplish this, as it is one kind of trustworthiness that helps to validate a study.

Trustworthiness of The Study

Guba and Lincoln (1989) state that if the trustworthiness of a study is questionable, the study is naught. Their four criteria for building trustworthiness are credibility, transferability, dependability, and confirmability.
Credibility

Credibility is the establishment of confidence that the findings are true in relation to the members and the context of a study (Lincoln & Guba, 1985). In my study, several techniques were used to help establish credibility. There had been prolonged engagement of up to two years, so I had many opportunities to test out preconceptions, misinformation, and hypotheses. Along with this comes persistent observation, achieved by spending much time in these people's lives. As was previously discussed, triangulation occurred, assuring that multiple methods, sources of data, and theories were used in the study. This was done by (a) sharing the transcripts with the participants and soliciting their reactions/comments, (b) sharing the typed analysis with them and again eliciting their responses, (c) having informal talks with each concerning the next phase(s) of the study, (d) having them complete a grounded survey–grounded from the previously mentioned pilot study.

Transferability

Transferability is the ability of the naturalistic researcher to provide sufficient information about the context in which an inquiry is carried out so readers can make transferable judgments to other cultural contexts (Lincoln & Guba, 1985). This was done in my study by providing thick descriptions, allowing others interested in making a transfer to reach their own conclusions about their interpretation. The use of purposeful sampling, which is explained in greater detail later in this section, helped in providing the sources for thick descriptions.
**Dependability and Confirmability**

Dependability and confirmability were established through triangulation, peer debriefing, and self-reflexivity. Triangulation of data, methods and theory was used, as previously discussed. Two colleagues served as peer debriefers for this study. One in particular spent over a year with me, listening, questioning, and giving me insight on the study and its methodology. Finally, a reflexive journal was kept in order to ground any beliefs that I might have and respond to any methodological and/or theoretical decisions I made. This was a journal I wrote in weekly and kept notes that contain, as Bogdan and Biklen (1992) suggest: a) reflections on methods, b) reflections on ethical issues, c) reflections on myself as researcher, d) reflections on analysis, and e) points of clarification.

**Data Collection and Method of Collection: Lived Experiences**

As was mentioned earlier in this dissertation, "data" is an ambiguous term in educational research. Some see data as hard, discrete chunks of "truth" that are collected; others see it as soft lived-experiences that are constructed (Van Manen, 1990). The question of data is an epistemological one, depending upon how one views the world of research. This study used the terms data and constructing of lived-experiences interchangeably.

In gathering these data, an overarching goal was to reveal how this study was a uniquely human experience. Erickson (1986) states that the central issue of method is to bring research questions and data-collections into a consistent relationship, albeit an evolving one. He sees several approaches to data collection but suggests the deliberative approach to
be the most legitimately accepted way to conduct qualitative research. This deliberative approach guided my data collection and the decisions surrounding this gathering.

I did not come to this study tabula rusa (beginning this research without direction or intent), but brought my experiences and interpretations. My task, as a researcher, was to conduct fieldwork to become more aware reflectively of the life frames of others. With this knowledge, reconstructions of others' experiences can occur. The conduct of the data-gathering and analysis was one of progressive problem-solving. Framing my questions explicitly and seeking relevant data deliberately enabled me to trust the intuitive part of this study. The following description of the sources of data and methods of gathering the lived-experiences is preceded by a general description of my sample.

Sample Description: Persons in the Study

The participants in this study were representative examples of cases who had extensive knowledge about problems experienced with the mathematics section of this statewide proficiency test based on their personal experiences as test-takers, and who gave the researcher valuable information about the issues which were of central importance to the study. This sample size was six Hysteria High School students who had successfully passed all parts of a statewide proficiency test except the mathematics section. All six signed consent forms to participate in this study in September, 1995.
Methods and Data Sources

Here are the methods and data sources that were used:

Participant Observation

Truth can never be known, but what the researcher must attempt to do is collect sufficient and appropriate evidence to ensure that the description is as accurate as possible, given the presentational process (Evertson & Green, 1986). The goal of participant observation is to produce an understanding of the group or culture that is being studied (Bogdan & Biklen, 1992; Wolcott, 1988; Denzin, 1989). Fetterman (1989) states that over time, participant observation sets the stage for more refined techniques and becomes more refined itself as the person understands more about the culture. Denzin (1989) reports four roles of the participant observer, including: (a) complete participant, (b) participant as observer, (c) observer as participant, and (d) complete observer. While not discrediting any of these roles, he emphasizes that the choice of any of these roles will impact the data collection in varying ways. It is up to the researcher to choose his or her own role(s).

In this study, participant observation was one of the major data gathering techniques used. The participant observation occurred in Mr. H's class. On Monday, Thursday, and Friday, I would come into the classroom, sit down and take attendance watching for those who were frequently arriving after class discussion started or the day's assignments were given. I then started taking notes on the students' behaviors, attitudes, and work habits. Since the class was extremely long (84 minutes), I would record whether or not the teacher went over homework, the topics he was covering, whether or not students worked individually or in groups. I would write notes about the idiosyncratic behavior of some students including
some of my participants at times. In the case of the teacher I wrote down the examples he would put on the overhead projector, the exercises he would give the students (including the plethora of worksheets), the jokes he would make or the anecdotes of great mathematicians that he had learned in his travels. When it came to the students, I would write down their comments, questions, answers, vocabulary, or the irrelevant content of their conversations (not pertaining to mathematics or the proficiency test). This method became monotonous, but I continued taking fieldnotes throughout the study. When the teacher would be helping other students, and a student raised his or her hand for help, I would go over since I was familiar with the material. At the end of each class, Mr. H and I would have informal conversation over mathematics or his students' performances. During testing situations, he always informed me in advance; sometimes I would come and watch them take the test, and other times I would arrive after students had completed the test.

**Interviews**

Denzin (1989) has commented that the sociological interview is one version of research coming alive. The interview is also the ethnographer’s most important data-gathering technique as it explains and puts into a larger context what the ethnographer sees and experiences. Interviews require verbal interaction, and language is the human commodity of discourse (Fetterman, 1989). Kvale (1983) states that the qualitative interview is one whose purpose is to gather descriptions of the researched's lifeworld, "... with respect to the interpretation of meaning of the prescribed phenomena" (p. 174). The typed transcriptions and tapes of interviews constitute the material for the subsequent interpretation of meaning.
There are several kinds or categories of interviews, as described by Wolcott (1980), Bogdan and Biklen, (1992), and Denzin (1989):

1) The scheduled, standardized interview (format), where the questions are the same—where there is an attempt to control for uniformity.

2) The non-scheduled, standardized interview (semi-formal), where the researcher works with a list of information required of each respondent and keeps focus on the interview—but the phrasing and pacing suits individual respondents.

3) The non-standardized interview (free or informal) where there are no set, specified questions and no schedule where the people are free to probe and test hypotheses as they emerge.

The informal interview is the most commonly used in ethnographic research, often appearing in the form of casual conversations, yet having an implicit research agenda. As such, the conversations become mutually-shared experiences where the interviewer and the interviewee build upon one another's knowledge and perspectives (Oakley, 1981).

**Design of the Prior Ethnography**

In my 1993-94 prior ethnography, baseline interviews were conducted with all the people who returned the permission slips (N = 6). These interviews were formal and transcribed, used only to substantiate other data sources. During the prior ethnography, two of the interviews were used to construct a grounded survey, an instrument that was the impetus for this current study. As was previously mentioned in Chapter I, Sheila emerged during that prior ethnography as an angry participant which helped shift my interest away from reciprocal mentoring to how students prepare for the mathematics section of this proficiency test.
Design of the Main Study

During the 1995-96 school year, six people were chosen by internal sampling procedures for participation in this dissertation research. These people were selected on the basis of their initial interviews, their relationship to the researcher, and because they were believed to promote the expansion of the developing theory (Bogdan & Biklen, 1992).

Six interviews, lasting approximately one hour in length, were conducted with each of the six students. Because I wanted to view each student's perspective over time, the scheduling of these interviews followed no fixed time-pattern, except that I tried to gather information on their experiences over and beyond their first time taking the mathematics section of this proficiency test. All six interviews were of the informal to semi-structured types, with certain questions emerging from the analyzed data in the previous interview(s). All interviews were audio-recorded and transcribed as quickly as possible following the interview(s) so that analysis was on-going throughout the study. Interview protocols are included in Appendix A.

Methodological/Reflection Journal

This journal was begun on my first day at the research site, September 26, 1995 and extended through January 19, 1996. Descriptive and reflective notes were kept together. Following Bogdan and Biklen's (1992) suggestions, the descriptive part of the notes contained reconstructions of dialogue, descriptions of the physical setting, accounts of particular events, depictions of activities, descriptions of my behavior and moods as the researcher. Also recorded were decisions regarding analysis, code words used, and my changing research propositions. The reflective part of the fieldnotes, which were interspersed with the
descriptive sections included reflections about the procedures and strategies employed in the study (as well as the study's design); reflection of learning, emerging themes, patterns and connections between pieces of data; reflections on my frame of mind such as boredom or excitement about a particular interview, a particular mathematics lesson observed, or consideration of my own subjectivity as researcher (Guba & Lincoln, 1989; Peshkin, 1988), and reflection on the ethical dilemmas involved in observing this urban school, the participants involved in the study during such a vulnerable period of the academic year. There was a section in the journal where I included points of clarification and what I called the "Light Bulb" memos. These memos signaled significant revelations, alerting me to look for or ask about evidence of hunches or interpretations I was formulating. Generally, this document provided an "evidentiary base" (Yin, 1989) of my research data and my evolution as a researcher. It was a self-involved testimony to my efforts at balancing the research experiences I was having with reflection.

**Grounded Survey/Questionnaire**

A survey or questionnaire is a close approximation to a structured interview in that everyone is asked the same question in the same way and in a definite order. Surveys are qualitatively different from interviews, however, due to the distance between the researcher and researched (Fetterman, 1989). In a survey there is much more likelihood for misinterpretations to occur as the distance between the two populations is greater. Often times, surveys in qualitative research have a Comment section after each question to try to bridge some of that distance and provide for the research to have more of a voice.
The survey should first be piloted with a few in that culture so that any problems that arise in its construction and/or administration can be worked in the project is essential. In this dissertation study, one survey was used; it was in my prior ethnography; see Appendix C.

**Field Notes**

Field notes are not data, but documentary materials from which data must be constructed through some formal means of analysis (Erickson, 1986). They are written accounts of what the researcher hears, sees, experiences, thinks, and feels in the course of collecting and reflecting on data in a qualitative study (Bogdan & Biklen, 1992). Field notes contain a descriptive element to them and, like other aspects of qualitative study, are subject to multiple interpretations. This study was documented by field notes and was available for the purpose of construction of data, although they were not primary sources of data.

**Document Analysis**

Guba and Lincoln (1989) state that documents and records are among the most accessible, available, and rich sources of information for the qualitative researcher, but also among the least used. These documents include first-narratives as well as internal documents related to the persons studied (Bogdan & Biklen, 1992). Among the documents I looked for in my study were copies of test scores, attendance records, grade reports, and students' profiles. These were used to augment the primary sources of data.

**Issues of Concerns**

The one major issue of concern throughout this study was my role. I had served as Field Director, researcher, participant observer at some point during my stint in this school
and sometimes the lines seemed to blur. For this reason, I found I needed to continually ground my beliefs and redefine each role through being self-reflexive. This protected not only myself but the others as well.

**Plans For Analyzing and Writing**

The basic units in the process of data analysis are also the basic elements of the written study, according to Erickson (1986). These elements of ethnographic research allow the reader to do these things: 1) Vicariously experience the setting described and confront the key assertions and constructs made in the analysis. 2) Consider the theoretical and personal grounds of the researcher's perspective as it changes throughout the course of study; and, 3) Survey the full range of evidence on which the researcher's interpretive analysis is based.

If the written report lacks any of these elements, or if there are inadequacies in them, it limits the reader's ability to understand the study and judge the researcher's analysis (Erickson, 1986). The analyzing and writing then, are really two sides of the same coin with both being equally important.

The qualitative researcher's aim is not to provide proof in a causal sense, but to demonstrate plausibility, which is the aim for most social research (Campbell, 1978). Qualitative research is often criticized for its lack of proving generalizability. While analysis may be correct on an intuitive level, systematic evidence is needed to warrant the assertions presented. If this is not done, the research and the researcher are justly open to criticism. This problem can be remedied by conducting the kind of data analysis that report the evidence
for the assertions clearly, systematically and expertly and in such a way that the empirical assertions can be tested.

Data analysis is the process of systematically searching and arranging data to increase understanding of them and to enable the researcher to demonstrate what s/he has learned from others (Bogdan & Biklen, 1992). Often in qualitative research studies, analysis occurs in the field as the information is being gathered, ideas are being generated, and hypotheses are being tested. This approach provides for certain expedients in the overall analysis to happen:

1) Forces self to make decisions to narrow the study.
2) Forces self to make decisions concerning the type of study wanted.
3) Develops analytic questions.
4) Plans data collections in light of what is found in previous observations.
5) Allows for writer's comments about the ideas generated.
6) Allows for writing of memos to self about what is being learned.
7) Tries out ideas and themes on members.
8) Begins exploring the literature while in the field
9) Allows for playing with metaphors, analogies and concepts (Bogdan & Biklen, 1992).

Analysis after collection involved the development of coding categories that revealed the setting and context of lived experience. One approach to qualitative analysis is through analytic induction, an approach used to collect and analyze data as well as develop theory and test it. The procedure of analytic induction is employed when some specific problem, question or issue becomes the focus of research.

The data were collected and analyzed to develop a descriptive model that encompasses all cases of the phenomena. The use of analytic analysis in a qualitative study has traditionally made it more valid (Bogdan & Biklen, 1992).
Another method of analysis that is used specifically in case study research is best represented by a funnel. The start of the study is the wide end of the funnel where the researcher casts a wide net about subjects, sources of data, and sites of study. The researcher begins to collect data, modify the study's design, to generate and test concepts and hypotheses, and eventually develop a focus: "The data collection and research activities narrow to sites, subjects, materials, topics, and themes. From broad exploratory beginnings they move to more directed data collection and analysis" (Bogdan & Biklen, 1992, p. 62). The latter funnel-approach was the essence of the study.

It is in the write-up, rather than in the fieldwork, that the materials become ethnographic (Wolcott, 1988). Through writing, the researcher understands data in a new way, and "... new meaning potential asserts itself as s/he elaborates, compresses, innovates and discards" (Rosen, 1986, p. 235). By writing in the field as a continuous companion to fieldwork, clarity and focus is brought into view. Gaps in methodology can be seen and redirected immediately. The researcher is aware of all aspects of the study at once, not just chapters being written. A good written product, according to Goetz and LeCompte (1984) should recreate the shared beliefs, practices, artifacts, folk knowledge, and behavior of some group of people. Finally, it is a report that is mutually created, where mental stores merge to create new ones (Connelly & Clandinin, 1990). By continuously analyzing and writing throughout the study, these exemplars of good products were achieved.

The next section contains the research schedule I followed such as conducting my prior ethnography, going through Human Subjects Review, soliciting participants and obtaining school's permission to conduct the main study. The researcher was assured entree
into the school due to his established relationship with teachers and staff during his two year stint as Field Director for the Mathematics Intervention Program. The table on the subsequent page is a comprehensive summary of the researcher's endeavors and work at Hysteria High School leading up to the main study and students taking of the mathematics section of the proficiency test. Table 3.1 is provided as a summary of his extensive fieldwork and his participation at Hysteria (see next page).

Four strategies—triangulation of data, member checks, peer debriefing, and keeping a methodological/reflective journal were used as salient efforts to overcome the effects of misinformation and distortion. These efforts were extended during "prolonged engagement"—substantial involvement at the site of inquiry and "persistent observation"—"sufficient observation to enable the researcher to identify those characteristics and elements in the situation that are most relevant to the problem or issue being pursued and focusing on them in detail" (Lincoln & Guba, 1985, p. 304). Both prolonged engagement and persistent observation (coupled with the four "trustworthiness" strategies) facilitated my establishing the rapport and trust necessary to uncover constructions and ease my immersion into and understanding of the context's culture (Guba & Lincoln, 1989). As discussed previously, the primary "instrument in naturalistic inquiry is the researcher" (Bogdan & Biklen, 1992; Feagin et al., 1991; Lincoln & Guba, 1985; Wolcott, 1973). Through participant observation, shadowing my research participants, and noting their socialization within the mathematics education process through interviews and document review, the data for the inquiry were collected in the form of fieldnotes and audio-taped interviews. Though the area of research inquiry--the mathematics preparation of African American tenth graders for a statewide
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<tr>
<td>May 1995</td>
<td>Passed Human Subjects Review</td>
</tr>
<tr>
<td>June 1995</td>
<td>Principal granted permission to conduct main study</td>
</tr>
<tr>
<td>July 27, 28</td>
<td>Submitted research prospectus to the District</td>
</tr>
<tr>
<td></td>
<td>Started Solicitation of students</td>
</tr>
<tr>
<td>September 20, 26</td>
<td>Approval from District</td>
</tr>
<tr>
<td></td>
<td>Begin fieldwork and classroom observations</td>
</tr>
<tr>
<td>October 25, 26, 27</td>
<td>Mathematics Proficiency Test</td>
</tr>
<tr>
<td></td>
<td>Interview 1: Snuffi</td>
</tr>
<tr>
<td></td>
<td>Interview 1: Tia, Art</td>
</tr>
<tr>
<td>November 3, 5</td>
<td>Interview 1: Jasmine, Wanda</td>
</tr>
<tr>
<td></td>
<td>Interview 1: Boo</td>
</tr>
<tr>
<td>December 7, 8, 14</td>
<td>Interview 2: Snuffi, Jasmine, Wanda</td>
</tr>
<tr>
<td></td>
<td>Interview 2: Tia, Art, Boo</td>
</tr>
<tr>
<td></td>
<td>Interview 3: Snuffi, Jasmine, Wanda, Tia, Art, Boo</td>
</tr>
<tr>
<td>January 17, 1996</td>
<td>Interview 4: Snuffi, Jasmine, Wanda, Tia, Art, Boo</td>
</tr>
<tr>
<td></td>
<td>Interview 5: Snuffi, Jasmine, Wanda, Tia, Art, Boo</td>
</tr>
<tr>
<td></td>
<td>Interview 6: Snuffi, Jasmine, Wanda, Tia, Art, Boo</td>
</tr>
<tr>
<td></td>
<td>Tia passes the test (Congratulations!)</td>
</tr>
<tr>
<td></td>
<td>Completed classroom observations</td>
</tr>
<tr>
<td></td>
<td>Administered grounded survey to participants</td>
</tr>
</tbody>
</table>

Table 3.1: Data Collection Summary
proficiency test -- evolved at the research site, the researcher's biases, interests, values and perspectives have nonetheless influenced the direction of the study, the data collected and its analysis.

The concern for neutrality in traditional social science inquiry is different from that of the interpretive model. In the interpretive model, the effect of the researcher on the research is unavoidable; it cannot be prevented. Thus, in addressing how the researcher influenced the research, the influence is assumed and documented. Documentation of this influence included: maintaining and organizing the raw data and summaries in such a way that an auditor (Guba & Lincoln, 1989) can trace the data; keeping a methodological/reflection journal chronicling my values and insights; and meeting with my two peer debriefers to heighten an awareness of my values and biases as the data were being gathered and organized.

Data Analysis Procedures

Data analysis was on-going throughout this study, which allowed for emergent patterns, theory (Lincoln & Guba, 1985; Strauss & Corbin, 1990), and continuous unfolding where gaps could be seen in the data and attended to or not.

As the study began, I posed three general research questions that arose from the pilot study, my role in the intervention project, and the reading of related literature. These sources all allude to the idea that mathematics intervention programs, while structured as attempts at helping African Americans, have often overlooked important knowledge about how this group learns mathematics.

As the first round of interviews was being transcribed, subquestions were constructed, to serve as guides for future interviews and to further define the emergent data. Coding
began following each interview's transcription. The first read-through of the interviews produced a description/profile of the interview, set against the framework of the research questions and ensuing subquestions. During the second reading of the data, initial concepts were formed around the research questions and what had been discovered about the persons during the first reading. These concepts were then organized into broad categories dealing with place, time, and actors (Wolcott, 1980), which made the ensuing sorting of data easier at the wide funnel of the study. This allowed for a winnowing down of the data, to discover the essences of these African American tenth graders' experiences without becoming bogged down by trying to include everything described (Wolcott, 1980). The next phase entailed coding the data and reorganizing it around recurring patterns and themes.

Coding represents the way in which data are broken down, conceptualized and put back together (Strauss & Corbin, 1990). Several copies of the transcribed data were reproduced so that the data fit into several categories depending upon the codes assigned them. Using a statement-by-statement analysis, transcripts were cut apart and statements placed on 5" x 8" index cards, according to the research question and subquestions under which they fell. The codes assigned to each card consisted of the number of the interview (if appropriate) followed by the initial of the student's first name, page number of the statement, initial representing the data source (interview, reflective paper, or survey) and finally, the research question and subquestion represented.

I then wrote in the margins of every card what each statement seemed to represent, often having several categories represented in one statement. These categories were related to other categories, making subsidiary categories of the one core category of these African
American tenth graders' perceptions of mathematics proficiency testing. This core category was abstract enough to encompass all the others, which allowed me to commit to this as the central phenomenon of the study and analytically tell the story of the six African American tenth graders. My advisor served as auditor for the study.

**Analysis of Data Sources**

Having described the major strategies used to collect the data, this section presents the specific strategies used to organize and analyze the data gathered from four sources—participant observation, interviews, document review and a grounded survey. Three phases of data analysis are described: initial analysis during which a "broad net was cast" and I attempted to articulate my research focus; intermediate analysis during which more data were collected (in an attempt to confirm or disconfirm patterns in the data), organized and arranged through transcriptions, coding, tabulation and enumeration; and closing or integrative analysis during which data were summarized and put into formats—narratives, taxonomies, and tabulations. Again it should be noted that during the multiple weeks at the site (during which over 400 hours were logged) the data collection and analysis processes were intertwined and interrelated. Agar (1980) offered this description of the process:

> You learn something ("collect some data"), then you try to make sense out of it ("data analysis"), then you go back and see if the interpretations makes sense in light of new experiences ("collect more data"), then you refine your interpretations ("more data analysis"), and so on. The process is dialectic, not linear (p. 9).

**Initial Data Analysis**

This phase extended from the first week at the site, September 26, through December 8, 1995. During this time the first set of data collected from observations and twelve open-
ended interviews were reviewed. Through observation and discussions with the participants and my two peer debriefers, and reflections on the fieldnotes and transcriptions of interviews, I continued to articulate my research focus. During this initial analysis, twelve interviews were transcribed. These transcriptions were typed and placed in an "initial analysis notebook." Transcriptions, fieldnotes and notes from six protocols were reviewed and were color-coded. For example, pink highlighting signaled discussion of mathematics difficulties; blue highlighting signaled discussion of preparation; orange highlighting signaled teacher's role; and green highlighting signaled mathematics problems to be resolved.

After this was completed it was noted that three themes predominated in interviews and observations: inadequate preparation, apathy among teachers, apathy among students. Each participant was given an oral summary and asked to respond to the initial analysis "findings." Each concurred that the indicated themes were indeed applicable to the Hysteria context during this particular time.

Intermediate Analysis

The second phase extended through the thirteenth week and fourteenth week at the site. During this time more data were collected through observations and interviews. On December 14, 1995, the researcher discontinued the interviews and observations due to university and school closing for the Christmas holidays. The researcher resumed observation and interviews on January 17, 1996. During this time document review was introduced here, also. Particular attention was paid to those documents, dealing with the initial analysis themes, such as attendance rosters, homework and classwork sheets, and test scores. A
second set of unstructured interviews was held with the participants. The opening question was, "Do you like mathematics?" Again, transcriptions of the twelve interviews were made and put in a separate "intermediate analysis notebook" along with fieldnotes and interview protocol summaries. Color and word coding was completed and led to the emergence of three themes (somewhat similar to initial analysis themes)—student accountability, teacher accountability, assessment of mathematics skills. Confirming member checks by oral discussion with the participants and consultation with my two peer debriefers again occurred.

**Closing Analysis**

This third phase took place during the last days at the site, January 17 through January 19, 1996. Observations continued, as did interviewing; the participants each completed two interviews and a grounded survey. The content of these interviews (14 questions) emerged from the themes of the initial and intermediate analysis phases. The dialogue from these twenty four interviews was transcribed and put into a "closing analysis notebook" along with fieldnotes, and interview protocol summaries. During this time period it was impossible to color and word code all of the closing analysis fieldnotes. Nonetheless, all of the fieldnotes were reread with attention focusing on the themes that corresponded to the themes of the interviews. Here themes from the interviews were: personal stress as a repeated test-taker; feeling a lack of control over one's destiny; potential risk of not receiving a high school diploma; and feelings of personal responsibility for his/her mathematical learning and continued success. Ample evidence supporting these themes was found in a careful perusal
of the researcher's fieldnotes. Fieldnote descriptions supporting any themes from the initial, intermediate and closing analyses were color coded in lavender highlighting.

Again, confirming member checks were conducted and oral discussion was shared for feedback. Meetings with my peer debriefers encouraged me to review fieldnotes and interview transcripts to discern any topics that did not relate to my evolving research questions. It was "rediscovered" that significant concerns of the participants were future preparation for the mathematics section of the test, and potential of not receiving a high school diploma. Particularly, these themes were noticeable in interview statements. It was the decision of this researcher to note this in the final research study as a necessary area of further study. In keeping with the focus of this study, the specific political aspects of the proficiency test were not addressed. As the research questions indicate, mathematics preparation and student responsibility are the predominant concerns of this inquiry. As intensive member checking occurred throughout this phase, a written summary was not submitted to any of the research participants. Moreover, by this time numerous urgent issues demanded the time and attention of the research participants (end of the semester final examinations and the scheduling for next semester's classes). There was time, however, for our usual scheduled oral member check sessions, during which overviews of study summaries were reviewed, and I was able to summarize and recount the specific themes of data analysis to date. Finally on January 19, 1996, a grounded survey was given to each participant to complete and return to the researcher.
**Integrative Analysis**

During the phase of the closing analysis efforts were made to further integrate the data and interpretations. Three notebooks, with one of each of the research questions taped to the front, were used in this phase. In a sort of question and answer format, evidence—quotes and descriptive accounts—from interviews, observations and document review were taken from the three "analysis notebooks" and sorted into the appropriate "research question notebook." For example, with regard to the research questions, observations, interviews and document review data in any of the three analysis notebooks pertaining, in even a remote way, to other respective research questions were placed in their respective notebook. At this point, certain taxonomies began to be identifiable—especially with regard to preparation. In the end, all relevant observation descriptions and interview quotes were in the notebook addressing their respective research question.

**Summary**

This was a naturalistic study of six African American tenth graders' journey to passing the mathematics section of a statewide proficiency test. As a naturalistic study, its data were constructed as a result of these African American tenth graders engaging in natural behaviors and the sharing of their lived experiences. The case study method was used and deemed the most appropriate way to help understand the contextual aspects of these African American tenth graders' journeys. I chose to interweave narrative vignettes with all our voices so that a highly contextualized, multifaceted study was presented, allowing for multiple interpretations of the shared experiences.
Data were primarily gathered through interviews, reflective papers, and grounded surveys. Further triangulation occurred by utilizing other methods to gather data as secondary sources. The display of data reflected the stories these African American tenth graders told, as well as the contextual nature of the study.

Analysis was done in three phases described as initial analysis, intermediate analysis and closing/integrative analysis as was mentioned above. Chapter IV presents the data for each African American tenth grader in a traditional narrative format that includes a mixture of descriptive accounts, direct quotations from the participants, and the interpretations and analyses of this researcher. These narrative accounts, which are "translations" of sorts (Bogdan & Biklen, 1992, p. 189) are structured around the research questions of this study, achieving a question-answer format (Yin, 1989). I have attempted in much the same vein as Lightfoot (1983) to present an enlightening portrait- "reflecting a compelling paradox of a moment in time and timelessness" (p. 5). It is worth noting that this study of the mathematics preparation of African American tenth graders for a statewide proficiency test is a first. As such it is exploratory and its findings must not be overinterpreted. These are case studies in which events occurred in a particular place (Hysteria High School), at a particular time (September 26 through January 19, 1996), and under particular circumstances (preparation for a mathematics proficiency test). Although this "atypicality" is viewed as an enormous asset, it is duly noted here.

For each set of recurring patterns and themes conclusions were drawn and implications made for practice, especially as they relate to mathematics preparation and these six African American tenth graders. After the drafts of Chapter IV were completed, each
African American tenth grader in this study received a copy of the sections that pertain to him or her for review and comments. These were incorporated into the final version of Chapter V. The implications for practice were suggested in Chapter VI, along with recommendations for further consideration. Following the completion of Chapter IV or V drafts, copies were again given to the six African American tenth graders for their edification.
CHAPTER IV

WHAT IS THIS TEST AND WHO ARE THESE STUDENTS?

Introduction

This chapter contains the history of the test, the case study stories of the six African American tenth graders who participated in this study, a story of engagement and disengagement of the students in the mathematics classroom, and the researcher's story of these six participants. Each story contains mostly facts about the person's personal history and his or her engagement within a mathematics classroom gathered in the interviews. Discussion and further application of the case studies to the research questions can be found in Chapters V and VI.

The History of the Test

The requirements that students take a Statewide Proficiency Test went into effect at the beginning of 1990-91 academic year. By the action of the State Board of Education, all ninth grade students in that and subsequent years, and who entered the ninth grade prior to the 1990-91 school year but who dropped out of school and re-entered after September 1, 1990 are bound by the new high school requirements.

The Proficiency Examination, commonly called the Ninth Grade Proficiency Test is a criterion-referenced test designed to assess competence on designated minimum reading,
writing, mathematics, and citizenship skills. In order to receive a high school diploma, students bound by the policy must pass all four skill areas of the examination (i.e., reading, writing, mathematics, and citizenship), in addition to fulfilling the regular graduation requirements of their school districts. The test is initially administered during the fall of a student's ninth grade year. Students failing the initial administration are retested in the spring as well as the fall and spring of their tenth, eleventh, and twelfth-grade year; high school seniors are given a final opportunity to take the test in May. Thus each student receives nine opportunities to pass the test prior to the time of his or her class graduation. When the test was first given, Tindall Heights unlike some school districts, allowed seniors who had not passed the test to participate in commencement; they would receive a certificate instead of a diploma. It is now policy that Tindall Heights school district does not allow these seniors to participate in commencement. To exacerbate matters the legislature of this Midwestern city has incorporated a twelfth grade proficiency test as an additional requirement for graduation. There is empirical evidence to corroborate that more students fail the mathematics section of the test by comparison of race or urban versus suburban school districts.

The mathematics portion of the test is divided into five content areas. These are Arithmetic (30%), Measurement (25%), Geometry (15%), Data Analysis (15%), and Algebra (15%). Thus the test consists of forty test items which are divided by Arithmetic (12 items), Measurement (10 items), Geometry (6 items), Data Analysis (6 items), and Algebra (6 items). The Department of Education (1989) developed learning outcomes to define the content areas, the learning outcomes, and the items in each category (see Table 4.1, 4.2).
Arithmetic Learning Outcomes

1. Compute with whole numbers, fractions, and decimals.
2. Compare, order, and determine equivalence of fractions, decimals, percents, whole numbers, and integers.
3. Solve and use proportions.
4. Round numbers to the nearest thousand, hundred, ten, one, tenth, and hundredth.
5. Solve problems and make applications involving percentages.

<table>
<thead>
<tr>
<th>30% of the test</th>
<th>12 items</th>
</tr>
</thead>
<tbody>
<tr>
<td>knowledge and skill level</td>
<td>3 items</td>
</tr>
<tr>
<td>Conceptual understanding</td>
<td>3 items</td>
</tr>
<tr>
<td>Problem-solving/application</td>
<td>6 items</td>
</tr>
</tbody>
</table>

Measurement Learning Outcomes

6. Select and compute with appropriate standard or metric units to measure length, areas, volumes, angles, weight, capacity, time, temperature, and money.
7. Convert, compare, and compute with common units of measure within the same measurement system.
8. Read the scale on a measurement device to the nearest mark and make interpolations where appropriate.

<table>
<thead>
<tr>
<th>25% of the test</th>
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</tr>
</thead>
<tbody>
<tr>
<td>knowledge and skill level</td>
<td>3 items</td>
</tr>
<tr>
<td>Conceptual understanding</td>
<td>3 items</td>
</tr>
<tr>
<td>Problem-solving/application</td>
<td>4 items</td>
</tr>
</tbody>
</table>

Table 4.1: Mathematics Outcomes in Arithmetic and Measurement
Geometry Learning Outcomes

9. Recognize, classify, and use characteristics of lines and simple two-dimensional figures.
10. Find perimeters (circumference) and areas of polygons (circles).
11. Find surface area and volumes of rectangular solids.

15% of the test 6 items
knowledge and skill level 2 items
Conceptual understanding 2 items
Problem-solving/application 2 items

Data Analysis Learning Outcomes

12. Read interpret, and use the tables, charts, maps, and graphs to identify patterns, note trends, and draw conclusions from tables, charts, and graphs.
13. Use elementary notions of probability.

15% of the test 6 items
knowledge and skill level 2 items
Conceptual understanding 2 items
Problem-solving/application 2 items

Algebra Concepts Learning Outcomes

15. Solve simple number sentences and use formulas.
16. Evaluate algebraic expressions (simple substitutions).

15% of the test 6 items
knowledge and skill level 2 items
Conceptual understanding 2 items
Problem-solving/application 2 items

Table 4.2: Mathematics Outcomes in Geometry, Data Analysis, and Algebra
A Test of Mathematics Competence

Since the state keeps the test secure, it is impossible for teachers, parents, students, or researchers to gain access to actual test items, or to examine and compare old tests; anyone interested must resort to practice tests for guidance on what the test actually contains. Concerns about the content on the mathematics portion of the test led this researcher to find representative samples of the actual test. Mathematics teachers at Hysteria provided me with a copy of all mathematics practice tests students had been given to study over the course of taking the test. From these mathematics practice tests, the researcher chose mathematics problems from several documents as representative samples for each of the learning outcomes assessed on the test. These are included in Appendix B.

The following table presents the actual performance of the participants of this study on the mathematics portion of the proficiency test. Only one of my participants, Tia, successfully passed the test in October; several got relatively high test scores (see Table 4.3).

<table>
<thead>
<tr>
<th></th>
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</tr>
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<tbody>
<tr>
<td>Snuffi</td>
<td>186</td>
<td>186</td>
<td>183</td>
<td>190</td>
</tr>
<tr>
<td>Jasmine</td>
<td>184</td>
<td>182</td>
<td>187</td>
<td>178</td>
</tr>
<tr>
<td>Tia</td>
<td>184</td>
<td>198</td>
<td>P</td>
<td>N/A</td>
</tr>
<tr>
<td>Wanda</td>
<td>184</td>
<td>192</td>
<td>185</td>
<td>192</td>
</tr>
<tr>
<td>Art</td>
<td>195</td>
<td>194</td>
<td>197</td>
<td>199</td>
</tr>
<tr>
<td>Boo</td>
<td>192</td>
<td>194</td>
<td>191</td>
<td>P</td>
</tr>
</tbody>
</table>

Table 4.3: Results of Mathematics Proficiency Test
A Dialogue between a researcher and his participants

In the subsequent stories you are about to read, I have chosen to interweave the voice of the researcher and the participants because the voices of these African American urban high school students and the researcher go unheard, and unacknowledged in academic and scholarly discourses. When I was a young man growing up in public schools in Macon, Georgia, the orderliness of arithmetic appealed to me. The rules made sense to me and mathematics seemed useful. Mathematics has always been exciting and satisfying to me. I learned at an early age to align my columns, carry when adding, borrow when subtracting. I got pleasure from turning in neat papers. However, as a high school and later as a college mathematics student, I found that mathematics was really more than the sensible rules and neat papers. The more mathematics classes I took, the more creative and intuitive mathematics became for me. It was a "different" way of thinking and viewing the world. I began to enjoy mathematics even more than I had liked arithmetic. Mathematics had become more challenging, a great manipulator which no longer was just manipulations of numbers and variables.

As a teacher and presently a researcher, I learned that many students in general and some African American students in particular did not feel the love and wonder for mathematics that I felt. For too many of my friends, family members, colleagues and students, there was not an appreciation of the orderliness in arithmetic. They did not see or view rules as understandable, creative ways to arrive at correct answers. Instead, many saw the rules as something to be memorized that made no sense. After I had given what I thought was clear explanations, some students still did not know how to proceed. They found
mathematics boring. "Why do I have to learn this stuff, I don't think none of it is necessary and I don't think the math is necessary. It isn't something we use. In everyday life you don't use Algebra, any metric or none of that. I don't think it is necessary. Unless you are going to college" (Jasmine, Interview 1).

It became increasingly clear that the beauty of algebraic reasoning or geometric proving was not a part of these students' understanding of the world around them. In general, Arithmetic, Measurement, Geometry, Data Analysis, and Algebra and all that "other mathematics" belonged to me, their teacher, and to the school. How could I as researcher help engage them in the learning? I saw the teacher bring in chess sets as a mechanism to get them involved in his classroom. This experience began a process for me and should be told from the vantage point of the research participants and the researcher.

The stories you about to hear in this section, and the students you are about to meet are Snuffi, Jasmine, Tia, Wanda, Art, and Boo. These participants chose their own pseudonyms. It is my hope that you will see the colorful lives of these inspiring students, as the researcher shares in the dialogue with his participants. I have chosen to write these stories in the first person, using the colorful vocabulary of the students. As a former student of an inner city school, I share a situatedness with them, which my life experiences mirrored and are inextricably linked to the setting and the participants that I studied.
The Case of Snuffi: memorization, perseverance, and determination

"When I took the proficiency test, I felt really confident. I had been studying. Some material was very simple except percents. Some parts were really difficult, but I just kept checking them over and over until it was time to go. The test is really something I want to pass, it is deciding my life. The mathematics part is like going through a maze and at some point you got to get out of that maze just like I got to pass this test. It is deciding what is going to happen to me in the future" (Snuffi, December 7, 1996).

Introduction to Snuffi

My name is Snuffi and I am a 15 year old African American male. In my spare time, I collect pogs, baseball cards, play video games, and talk on the telephone to my girlfriend (Snuffi, Interview 1). I spend a great deal of my time and energy raising and playing with my two dogs and one cat. When I am not playing with my pets, I am either out in the neighborhood playing with my friends, talking to my girlfriend on the telephone, watching television, or playing video games (Snuffi, Interview 1).

Learning is valued and fostered in my family. Everyday before I talk on the telephone or play video games I have to complete my homework. An emphasis on learning is also evident in my family’s career choices. My mother is a teacher’s aide at an elementary school and my stepfather is a physical therapist (Snuffi, Interview 1). My future goals are to graduate from high school, graduate from college, and become an elementary school teacher because I have seen all the good things my mother has done with her little kids in her role as a teacher’s aide (Snuffi, Interview 1). I feel I have a good chance of becoming an elementary school teacher since they are looking for a "few good men" (Snuffi, Interview 1).

My mother checks with my mathematics teacher on a regular basis as to my progress in his class (Snuffi, Interview 2). As part of their agreement my mathematics teacher was
supposed to call my mother when I was not doing well in the mathematics class and he did not keep his end of the agreement (Snuffi, Interview 2). Every day I would ask the teacher how I was doing in the class and the teacher would respond that I was doing fine. My mother told my teacher during their first conference to call her when anything went wrong so she would know what I needed to do to bring up my grade and apparently the teacher did not do it (Snuffi, Interview 2). For my interim grade the mathematics teacher gave me a U. What I could not understand was with all the students I am around during mathematics class, I could not understand why I received a U and all of my friends received a S except one other guy in the group who also received a U. I felt we did the same amount of work, we were equally disruptive in class, we got the same amount of things wrong. However, I did not understand, I tried talking to the mathematics teacher after class, but the teacher ignored me. I feel I have to work harder, cut down on my talking and prove the mathematics teacher wrong. After receiving a U for my interim, I thought for sure I was going to receive a F for the semester even after all the work I was doing. Nonetheless, I continued to talk, but I was finishing his work and turning it in to the teacher (Snuffi, Interview 2). My mother is concerned about my grades in this class, since she did not graduate from high school, she is making sure that I get a better education so I can move on and I will not dropout of high school (Snuffi, Interview 2).

At the beginning of my preparation for the test I did not review preparation materials on a regular basis and I had no other way to prepare for the test other than memorize. As a student who has taken the test repeatedly, I find that memorizing mathematics formulas and procedures do not come easy because the material is not interesting to me (Snuffi, Interview
3). With the writing, reading and citizenship I did not have to think, it was easy. However, besides having limited time and no interest in mathematics, I also have had a personal tutor to help me or I would stay and receive help from one of the mathematics teachers who volunteered to tutor students after school (Snuffi, Interview 3).

My primary mode for learning mathematics for the proficiency test has been memorization. Memorization means being sent home from school with a "ton of worksheets" that I am to study several weeks before the test and then being tested on it via a practice test during my regular mathematics class. I felt like I had adequately prepared for the test. When I took the test I felt really confident. I had been studying all my preparation materials. I felt some of the material on the test was very simple except percentages. Some parts were very difficult and I kept checking them over and over until it was time to turn in the test. I felt the mathematics section of the test is really something I want to pass because it is deciding my life (Snuffi, Interview 2). The mathematics is like going through a maze and at some point I got to get out of that maze just like I got to pass this test. It is deciding what is going to happen to me in the future (Snuffi, Interview 2). Perhaps my own understanding of the "turn-offs" I felt toward mathematics started when I was young and continued during my high school years and in particular in preparation for the mathematics section of the proficiency test.

During the semester in which Randy's study took place, I took Geometry. I enjoyed particularly the lessons on logic, perimeter, area, and circumference. I did not enjoy the activity on the hypsometer because I thought it was difficult (Snuffi, Interview 2). Throughout the semester the daily routine of my mathematics teacher was he attempted to
get the class quiet, then used the overhead projector for that day's assignment. He would pass out the paper for the material we were covering, we would work on those sheets together and talk. That class was never quiet, we had that class for two periods and we had work and the teacher came around and helped us out and then gave other work. Occasionally someone would play a practical joke, like the one time one of my classmates brought in a whoopee cushion, it was making noise and my mathematics teacher was just laughing because he thought it was funny (Snuffi, Interview 1). In this mathematics class, I was quite disappointed by the attitude of many of my peers toward learning. As a student I feel that if kids do not want to learn they should not come to school, they should dropout, then it would be easy for those students who want to learn and those teachers who want to teach (Snuffi, Interview 1). I believe that they also should have a special school or special classes for really bad students who have a hard time learning and who will not listen to the teacher (Snuffi, Interview 1).

My opinion about mathematics varies considerably as to whether it is hard or not. At various points in Randy's study, I described mathematics as "easy", "hard", and "unfair" (Snuffi, Interview 1) and I evaluated myself only average in my ability to do mathematics; adding, subtracting, multiplying, and dividing are what I have been doing ever since elementary school and since the sixth and the seventh grade I have been working with numbers (Snuffi, Interview 4). I say mathematics started getting really confusing during the eighth, ninth and part of my tenth grade (Snuffi, Interview 4). When I was younger I did not realize I had to work with letters in mathematics until one of my friends told me. He showed me some of his high school work and told me look what you have to do in high school. I became paranoid because I saw all those letters and said Oh my God (Snuffi, Interview 1)!
I wanted to know how do you add and subtract letters so I really got scared. I say it is okay because it is like taking your alphabets and numbers and putting them together. I heard that they even had programs in kindergarten that taught young children Algebra. I think it is good to start when you are young. Time and interest are important factors now in my notion of a "good mathematics student." To me a good mathematics student is a student who really has a unique way to learn mathematics, and wants to learn mathematics badly (Snuffi, Interview 6), wants to learn mathematics so he can graduate from high school and college.

A good mathematics student is not the one who gets things easily and has an "I know it" attitude (Snuffi, Interview 6), but who has to work. I value the deep level learning that involves effort. To me mathematics learning means obtaining knowledge. Further I recognize that I have learned something new when I can relate it to something else. Being able to relate the knowledge to something else, is an advantage.

Lastly, I disclosed on Randy's survey that I had difficulty describing my progress within the mathematics classroom during class time. When asked in the final interview if I thought I could do better on the mathematics proficiency test because I had been through this geometry course I responded affirmatively, saying, It would be easy -- I used it. It is part of me now (Snuffi, Interview 6)! However, I feel the good mathematics teachers are those teachers who are willing to help interested students learn the subject of mathematics, have patience, and are willing to find other possible ways to make students understand mathematics (Snuffi, Interview 6). In terms of mathematics, I diagnosed myself as having the "bad habits" of mathematics in studying for the test at the last minute, I got nervous, I did everything in a hurry and nothing got done.
The Case of Jasmine: An ambivalent student

"Everybody cannot learn mathematics! You have some students who do not do well, like for instance I do not like mathematics and I actually chose not to do it. I can do it, if I just sit, pay attention and just get serious about it, but I am lazy" (Jasmine, January 18, 1996).

Introduction to Jasmine

My name is Jasmine and I am a 15 year old African American female undecided on my future goals. Since I have no hobbies, my extracurricular activities include participating in Double Dutch, playing on my high school basketball team, and being a member of Future Homemakers of America (FHA) (Jasmine, Interview 1). I have become very selfish looking out for myself and no other. I believe "things should go my way or no way at all" (Jasmine, Interview 1). I struggle with the notion of being a serious student or being the mediocre student that will lead the rough life which includes participation in gang rituals and the initiation ceremony of new members. As a discouraged student, I hope in the next two years to pass the test and get my driver's license. I cannot get a driver's license without having passed the test (Jasmine, Interview 1). (This was a law being discussed with state legislature earlier in the year). I know it is important to learn mathematics because mathematics is everywhere and I know I need mathematics of some kind and some mathematics skills but I am lazy (Jasmine, Interview 5). I described my family as a "barrel of apples"; each member has its own shape and its own sweetness, but all being apples we are united as one (Jasmine, Interview 1). I am not on good terms with my mother and this limits my conversation with her, I do not talk to my mother about school, because my mother is always lecturing me on the importance of school. When we do talk, the conversation is very short. How was your day, what teachers have you gotten in an argument with, or, how was basketball practice?
My parents expect me to do well in school, but I cannot decide whether to be a "gangsta" or a serious student. I am not your regular mischievous student. I am a very bright student, but extremely lazy. Though I enjoyed mathematics as a child and in middle school, "the death of my grandmother along with the mathematics proficiency test have caused me to change my opinion of mathematics." I was more interested in it until I took the proficiency test, and then I said forget it! I blame low self esteem for not having passed the mathematics test so far. While I am not on speaking terms with my parents, I do talk to my neighbor Kevin from time to time about my problems in life or mathematics. He works at a science center and is good at mathematics and sometimes I go over to his house for help. When I visit him sometimes he is doing mathematics I have never seen before. I have developed a largely pessimistic attitude about the mathematics section of the proficiency test. Because it does not make sense to me, I feel I should not have to take the proficiency test. I will have worked for twelve years only to be held back as a result of not passing the test with the minimum score of 200 (Jasmine, Interview 1). In my opinion, a person cannot get one problem wrong on the test, and that this is not right because the test is holding me and other people back from graduating and getting a high school diploma. In my opinion, students should not have to take the test at all (Jasmine, Interview 1). The test is not a necessity to me and definitely not the mathematics. I feel it is not something I am going to use. In everyday life, I feel I will not use Algebra, metrics, or any of that stuff, unless I go to college. Even though, I feel mathematics is boring and I hate mathematics, I feel I will eventually pass the test because I have an understanding of area and perimeter, two of my weaknesses. I say these were two areas that were missing in my process to pass the test. The data analysis was simple, but I
was lost when it came to area and perimeter, now that I understand those two concepts, I feel I am ready for the test next time (Jasmine, Interview 1). I admit I wished I could get a little help on the test because of the way some of the problems are worded. I say there are some word problems that I do not understand because of the wording and I wish I could raise my hand and have someone come over and make me better understand the problem. I do not want them to give me the answer, I want them to make me better understand the problem. I admit I do not want the answer, but I want to learn how to do the problem.

My preparation for the test has been listening to the mathematics teacher in class, taking a practice proficiency test and then watching the teacher go over the practice test. The teachers, in my opinion, are not doing all that they should be doing. I say they offer after-school help, help during lunch period, I feel they try to help for the most part (Jasmine, Interview 2). When Randy asked me about last-minute cramming, I told him it does not work for me because I look at my paper, it seems all mixed up, and I then get confused because I have crammed so much and tried to memorize all the material in a short period of time. I feel it is better to study one section one day and another section another day then I can remember more. Other changes I feel have occurred in reference to the test, the mathematics is getting worse. They keep throwing more things on the test, the test is getting smarter, but we are not. I feel the people who designed the test do not have to take it-why should we?

School is a trip! (Jasmine, Interview 1) Hysteria's kids do not care about the school and hardly anyone wants to attend classes I say. "The school is not appealing anymore and if it closes down the students would not care. My biggest concern is that the gangs have taken over this school and probably all the rest of the schools in the city. I say the school is
mostly "Bloods", but this year the school has been flooded with "Crips" that live in one of the local apartment complexes (Jasmine, Interview 1). I think that half the staff at Hysteria do not care and the other half acts like they have serious personal and familial problems. Several of the teachers in my view are notorious for "writing kids up" and sending them out of the classroom. We are being written up for "stupid stuff" like getting out of your seat, sharpening your pencil without asking, asking to go to the restroom and the teacher says no!(Jasmine, Interview 1) I feel since we sit in class for two periods, we should be allowed to go to the restroom without this being written up. Although I enjoy this mathematics class, I feel it contains many disruptions, but that occur among some students. I say that in a whole classroom full of kids that they will not sit there like saints that somebody is going to interrupt something. I admit that students have to agitate somebody else— that is just school. At this point, I feel that a student can participate in the distraction from learning or she cannot, that is their choice. However, I say that a student can add to a problem or he or she can help the problem by not joining in. I admit mathematics is a "loner" (Jasmine, Interview 4). I say it really is. I say that there is not any other class like mathematics, students have to work or they are not going to pass. Everything else I find I can kind of ease by or guess, but in mathematics I have to get the question right. I admit that to learn mathematics, I need good comprehension skills, I need to learn how to listen, I need to understand it, make sure I understand it, go over it, go over it, and have somebody else check it (Jasmine, Interview 4).

When Randy asked what makes a good mathematics student, I said that it is someone who has good attendance, good attention skills in the mathematics classroom, she wants to learn mathematics, she likes to listen, and she is not afraid to challenge the mathematics
teacher I am clear about the importance of mathematics, I have to do it, I think I would not study mathematics if it was not mandatory, but I say it is mandatory. Plus mathematics is everywhere I go, and I cannot get around it. So I have to learn it! In the final interview, I revealed to Randy that a good mathematics teacher must have patience, a willingness to give overtime to the student, or extra help to those who need it" (Jasmine, Interview 6).

My friends are also important, but I feel I have to carefully select friends because almost everyone has something negative to say, and almost never do they compliment you. I believe every teenager feels the need to have a boyfriend or girlfriend to at least have the feeling of having a companion. In my view, the schools are getting worse each year, and teenagers are being taken over by gangs or suicide. It is my belief that kids need to be taught at an early age that life is worth some pain or some heartaches, and that you cannot run from your problems. In other words, "If you love yourself, then others will love you " (Jasmine, Interview 1). I believe the world is coming to a huge war because humans are too greedy. Soon there will be none around. I hope to attend college, but have not decided what would be my major course of study.

The Case of Tia: Application, connection, and retention

"The mathematics proficiency test is an individual thing and a student has to put her mind to it and think about it and study for it. If they do not understand then I suggest they find somebody that can help. It takes a person who knows how to do mathematics to help" (Tia, December 8, 1996).

Introduction to Tia

Tia is my name and I am a 16 year old African American female who wishes to become an accountant. Since I like to work with numbers I need all the mathematics courses
I can take (Tia, Interview 1). I have to do my homework as soon as I come home; once homework is done, maybe I can play some games on the computer, then it is off to work. I enjoy playing the flute, talking on the telephone, going to work, and playing on the computer. I especially enjoy working with numbers, equations, and formulas that I feel may help me solve certain mathematics problems (Tia, Interview 1). I live with my mother who works as claim examiner at the unemployment office. Before entering the hallowed halls of Hysteria my middle school mathematics teacher recommended that I take high levels of mathematics. My middle school teacher also gave me a kind of outlook on the proficiency test: She really did not give us the questions, but let us know what possibly could be on the test. Through my first entrance into a mathematics classroom at Hysteria, I was considered a very good mathematics student; I usually get a B, sometimes an A, but I usually average a B in my harder mathematics classes. I have not had a D or F, and I have not messed up so I get A or B grades. My placement in Geometry was not really my choice; because I passed Algebra I in the eighth grade, my middle school teacher recommended that I take Geometry in high school (Tia, Interview 2). I enjoy doing equations, estimation, finding the area of triangles and doing Algebra.

I admit that my mathematics class is probably the most challenging class I take. I feel I really have to pay attention in that class and that I cannot miss one thing because then it throws me off and mathematics is structured such that, I need one concept to understand the next (Tia, Interview 4). I told Randy that my mathematics teacher should be accountable for me not passing the test; he was supposed to go over material with us and he did not do it the right way. I felt like that was not fair because if I have questions, the teacher should always
be ready to answer my questions especially if I am trying to learn something new. The class was rowdy, my teacher felt like if we wanted to interrupt class, then he would give us the mathematics packet and make us do it on our own (Tia, Interview 4). I felt like I was one out of the 20 or 30 people in that class who wanted to learn. There were a few who were trying to learn, but the rest of the class they were "acting goofy" because they did not need the class. Nonetheless, we were exposed to many theorems! I enjoyed that class because it was challenging and much of the material I could use later on down the line. Last year I felt like I learned a lot because the teacher was good, she explained things. When I had questions the teacher would answer my questions and she offered for me to come in after school or in the morning for help. I felt that really helped me out a lot and made me feel like I knew what I was doing in that class. This year I became frustrated with the teacher and said I wished the teacher could have gone over more material that could possibly be on the test. Instead he went over all the material we had done for the year and he knew everything was not going to be on the test. He knew there was certain material that would be on the test; he should have gone over that material. I admit I was very vocal about this and was one of the first to tell the teacher, but to no avail.

In an interview with Randy, I commented that not passing the test gives me some idea where I stand in mathematics and whether I am understanding what I am learning. The two previous times I took the test, my score was 184. I admit that the part I did not like most on the proficiency test was the measurement. I really did not like the measuring on the test (Tia, Interview 1). I feel the rest was easy, but it was not really all that easy, but it was still a really difficult test and I hope to pass it. I revealed to Randy the easiest parts of the test were
adding and dividing fractions, solving equations and doing problem solving problems. However, I have grown tired of taking the test; it is getting on my nerves (Tia, Interview 3)! I am tired of coming to school and taking the test for two hours. I admit that I cannot be expected to know the material because some students have gotten a good review from their teacher and I did not. I say some students remembered material and I did not. Though I have to work at it, mathematics comes somewhat easily to me because it involves formulas and equations -- which I can relate. The percents, measurements, and problem-solving questions were kind of difficult, I think that is what got me. I admit that last minute cramming led me to be confused about the information I was trying to cram into my head. The mathematics proficiency test is an individual thing and a student has to put his/her mind to it and think about it and study for it (Tia, Interview 3). If they do not understand then I suggest they find somebody that can help. It takes a person who knows how to do mathematics to help. I admit that there are some students who do not pay attention, have a mental problem when it comes to mathematics and just cannot catch on as fast as other students through no fault of their own. As a mathematics teacher, if I could create a program for students who had not passed the proficiency test, I would include measurements, fractions, and solicit volunteers willing to help those in need.

When asked what makes a good mathematics student, I said that it is someone who pays attention in class, and does well on mathematics tests. When asked what makes a good mathematics teacher, I responded that it is someone who is ready to explain, give good explanations, and ready to answer questions (Tia, Interview 6). As a future accountant I know I have to be good in mathematics (Tia, Interview 6).
The Case of Wanda: frustrated, motivated, and growing

"I feel upset, I feel frustrated, and sometimes I get mad and just want to cry. I want to cry because I am stuck on a problem for ten to fifteen minutes and usually I could be on the last problem, but I am stuck on that one problem" (Wanda, January 19, 1996).

Introduction to Wanda

My name is Wanda and I am a 15 year old African American female who is growing up in a family in which a college education was not valued; neither of my parents received four-years of high school education. I live in a large five-bedroom house with my sister, two cousins, and grandmother. I have one brother and one sister. The conversations my grandmother and I have are the height of my day. She asks me how was my day and whether or not the proficiency test results are back. I tell her they are in, but we have not gotten them yet. She says, I hope you passed and if not I want you to keep on trying and get the test out of the way. I believe everything in life revolves around mathematics (Wanda, Interview 1). I say mathematics is a very important thing. My aunt works as a nurse's assistant and has to do all the prescriptions that require measurements, a form of mathematics. My hobbies consist of reading African American literature, singing, dancing, playing the saxophone, and talking on the telephone (Wanda, Interview 1). I enjoy discussion on controversial topics as sports, gangs, and racism. I have a love for collegiate and professional basketball and football. I enjoy listening to jazz, rhythm and blues, and rap. I am a very outspoken young woman that is well liked by my peers.

At home I like to curl up with a cup of kool-aid and a good novel (Wanda, Interview 1). I also read to my little niece. In fact, basically, one of my first loves is reading. I love to read if you do not put me on the spot and tell me, you have to read this. I admit reading for
school purposes has been more or less a turn-off because as a child I was forced to read and
get everything memorized (Wanda, Interview 1). My history in mathematics was not parallel
to the other case study participants; it was rougher. I reported to Randy not liking
mathematics in my early years of schooling, and having suffered from the experience of failing
Algebra I in the eighth grade (Wanda, Interview 1). My aspiration is maintaining a 'B'
average because the 'B' reflects that I worked for the grade. A successful student in my mind
is one who knows numbers pretty well, gets the A in the mathematics class, and takes really
good mathematics notes.

Like the other participants, I came into this study not having passed the mathematics
section of the proficiency test. I commented that I was unsure about the meaning of several
of the mathematics concepts to be covered on the test and that I was unsure about my own
abilities or habits as a mathematics student.

I informed Randy that I did very little reviewing for the proficiency test. If I knew it,
I knew it and if I did not, I memorized it before the test. What was so revealing while I had
practiced this technique a number of times before the test, I realized it was no help in my
passing or preparing for the test (Wanda, Interview 4). In fact, I said the hardest thing about
cramming for the test the night before was that I often forgot what I had studied. I reported
to Randy that I did not find this technique advantageous to passing or preparing for the test.
I expressed a concern that I would continue to struggle with mathematics. This is a problem
that continued from my childhood and may well have slowed my ability to improve as a
mathematics student (Wanda, Interview 2). Further, I am dealing with mathematical despair
due to my beliefs about mathematics learned as a young girl. Or perhaps because my early
mathematics experiences have been so fragmented, and this has always led me to think in fragments. When interviewed later by Randy, I said that taking really good mathematics notes and asking the mathematics teacher for help when I am confused have been beneficial to me, but I have not done much mathematics textbook reading in preparation for the test (Wanda, Interview 2). I admit once oversleeping for the test because I had crammed so much the night before and having to take the makeup. In the mathematics classroom, if I was the teacher I would find all ways possible to help my students. I would ask those students who really knew the material to help those students who did not know the material. Throughout the study I commented to Randy that mathematics class is really long, they go faster then other classes. The books are thicker and I feel the mathematics teacher covers more during the period. The daily routine in my mathematics class was I sharpened my pencil, got out my mathematics book, looked on the overhead for the assignment, got the assignment, and then got to work. In the mathematics classroom, I feel there is a select group of students who mess up learning for the majority. I say if they want to mess up their education then they can do that, but they are not supposed to mess up other students' education. What is disappointing, we are afraid to make a comment to those who are considered "rowdy" or "rude" in the class. We just sit quietly until the disrespectful group stops misbehaving. There are some students who are not doing homework or coming to class and they are passing (Wanda, Interview 3). I feel my troubles started in mathematics during my first encounter with Algebra and I have not been able to recover. I enjoy Algebra especially plotting points, and finding square roots. I also enjoy finding slopes, intercepts and graph lines.
I admit, however, that the majority of the material on the proficiency test is really material I have been learning my whole life like fractions, and problem solving (Wanda, Interview 2). I have to study more and blame no one but myself. Instead of studying I was out with my friends. I have to study more, study more mathematics notes because I know I have to pass. The proficiency test is the reason I cannot graduate early (Wanda, Interview 1). Due to my deficiencies in mathematics I was not able to memorize important formulas like the area of a square, area of a circle, and those types formulas that I recognized are on the test.

In preparation for the test, I feel the mathematics teacher should give the practice material earlier and stop waiting until the last minute to give the practice testing material. When asked in the final interview if I thought I could do better on the test I told Randy, it would be easy. I say part of the problem has been not studying enough, just doing work and not understanding it, just letting it go on, and not retaining the information allowing it to pass through your head. Many of the students that fail the proficiency test are failing because they do not understand basic mathematics. They skip basic mathematics on the test and go to the hard material. I have passed the reading, writing, and citizenship, the other mandatory three parts of the test, on my first attempt. I define mathematics as anything that deals with numbers, money, problem solving, addition and subtraction. It is my opinion that every student can learn mathematics and do well. I am a not good mathematics student according to the grades I receive, I get decent grades but I would like the A's or B's, but instead I get the C's and sometimes D's (Wanda, Interview 5).
Students in gangs have taken over, but I say there is hope but it is necessary to remove many of the students to combat the problem. For the summer, I worked with the Public Industry Council, I was also given the opportunity to attend a proficiency test seminar offered by my employer. I was shocked at the number who needed a review on fractions and measurements. These were people who failed Algebra during the school year.

After high school I plan to attend Central State University, play in the band, and major in music and psychology. After college I would like to become a law enforcement officer or medical field worker.

**The Case of Art: time, effort, and interest**

"If you want to learn mathematics bad enough, then you are going to learn it. If you do not want to learn mathematics, then [you can] sit around and play in mathematics class and you are not going to get much out of mathematics as you would if you paid attention in class" (Art, January 18, 1996).

**Introduction to Art**

My name is Art. I am a 16 year old African American male who wishes to become a pharmacist. My hobbies consist of drawing, riding my bicycle, and working out with weights. I also enjoy repairing old cars given to me by my father. The collection so far consists of a 1987 Escort G.T. and a 1986 Buick Regal. I am not spoiled, but my father enjoys seeing me doing productive things. My preference is for the 1986 Buick Regal because it feels more luxurious and roomier. I commented during one of my interviews with Randy how my sister and I did not get along. I admit while the relationship with my sister was rocky in the beginning, it has improved in recent years although she still considers me her "little brother" a term I hate (Art, Interview 1). With my mother, a title division supervisor,
and my father as an automobile mechanic there is no doubt in my mind that I will reach my goal.

The school is okay, despite the students who act up. I hang with the students who want to learn, and separate myself from the students who do not want to learn and socialize with the students who do want to learn, I have been able to succeed (Art, Interview 1). I am very serious about my studies and sat through an Algebra class twice because I did not want to ruin my B average. I admit that I am really a good mathematics student and get good grades. I have not flunked any of my mathematics classes and my teachers have always given me good grades. I get my grade B or C, but I should be getting an A. I admit by being in the mathematics classroom and the mathematics laboratory I was able to identify other weaknesses that I did not know I had (Art, Interview 1). Just to study the mathematics notes and not understand the material is not beneficial to me. I have to ask my teacher when I do not understand and keep repeating what the teacher told me and think of something to help me memorize it. Besides I find the mathematics practice test extremely beneficial due to my ability to do mathematics, I found that the materials were appropriate in helping me in another mathematics class. I admit the test is important to pass because if I do not, it will hurt me eventually because I want to have College Preparatory written on my diploma and if I do not pass this test, this will not happen. The disruptive behavior of some students in the mathematics classroom does not bother me. I ignore it! I ignore it because I do not need it! When it becomes too annoying the mathematics teacher writes the student up and sends him (or her) out to see an administrator.
My parents have been an inspiration to me, they wish me luck and assist me in the mathematics proficiency test material that I do not understand. My most significant needs are in the area of fractions. I rate myself average to above average on most mathematics skills. While I am an avid mathematics student, I do have some problems with fractions. It is my view that cramming for the test is like a rush and a rush on my mind. I will say many of my fellow students are not doing well on the test because they have other things on their mind like girls, and they hang with their friends and worry about the wrong things like when they are going to get a new pair of tennis shoes or going to the mall next.

To an extreme, I had begun to study weeks before the test rather than two weeks before the test or the night before the test, relieving the pressure of learning everything at once. Lastly, I have found that constant review -- even reviewing mathematics notes for a half-hour a day -- helps to prepare me for the proficiency test (Art, Interview 3). Coming into the mathematics proficiency test I was aware that my test preparation strategies were insufficient. At that point I was relying on memorization and cramming the night before the test. Continuous review made sense to me which enabled me to experiment with different ways to take mathematics notes and review for the test. This reduced my mathematics test anxiety and boosted my confidence about myself as a mathematics learner (Art, Interview 5). I reported that I would probably do better now on the test because now I know how to study mathematics and I am knowledgeable about things. When asked what makes a good mathematics student, I said that it is someone who has good mathematics skills, uses their mathematics time wisely, and handles themselves well in the mathematics classroom (Art, Interview 6). I admit that a good mathematics teacher must be someone who has patience,
can teach, has control of students and the mathematics class, and is willing to help students at all times (Art, Interview 6).

A year ago I considered playing football for the school, but decided at the last minute to back out. I plan to play my junior or senior year, but I really want to concentrate on my school work. I spend my summers at the beach playing with my friends who I visit in North Carolina. In my view summers are my time to play, to be to myself, and so when school starts back I have removed all my playing out of my system. Although I am good at English, Science, and mathematics, I plan to major in pharmacy or chemistry in college. As a future pharmacist I say mathematics can be very interesting.

**The Case of Boo: refreshing, confusing, and committed**

"When I do not understand mathematics and my mathematics teacher is not explaining it right, and he keeps trying to tell me I understand it. That annoys me" (Boo, October 5, 1995).

**Introduction to Boo**

My name is Boo and I am 16 year old African American female. I live with my single mother and four siblings (2 brothers, 2 sisters) in a fairly decent neighborhood on the southside of a large Midwestern metropolitan city. I often commented to Randy about the closeness of my family and my love for my other siblings. My hobbies include drawing, singing, dancing, and acting. I am active in extracurricular activities at Hysteria, where I am on the cheerleading squad, captain on the Army ROTC drill team, and a member of the softball team. Learning was valued and fostered in my family. As a child, my other siblings and I would gather around our mother, and be fascinated by the stories each told about how their day in elementary school went. An emphasis on learning is also evident in the family's
future career choices. All my siblings aspire to attend college and hope to major in education, medicine, or law. Beyond high school, I hope to attend college and major in architectural engineering. I currently work as a cashier at Roosters.

Besides the mathematics preparation material being useful to me as a mathematics student, I have found the materials appropriate for my brother who also attends Hysteria (Boo, Interview 1). My primary mode for learning mathematics is largely memorization, there was no sufficient review (Boo, Interview 1). Memorization largely meant teacher giving us many worksheets. This year I did not prepare as much. I just got a ton of worksheets (Boo, Interview 1). As a student memorizing mathematics was easy for me because I found the material was interesting to me (Boo, Interview 1). With mathematics I did not have to think, it just comes (Boo, Interview 1).

The mathematics proficiency test, it was really hard, but it was not really hard, but I did not pass it (Boo, Interview 1). I missed it by a couple of points. My teacher was telling me to do all this work and that it would be on the proficiency test, and I got the test and nothing they taught us was on the test. Things like fractions I know how to do, but I needed my memory refreshed. So when I came to the proficiency test, I was sitting there like oh I cannot remember. It had material we had done a long time ago, but I needed my memory refreshed. Even though I felt comfortable with my mathematics skills, I thought all the other parts were easy. In my early preparation for studying mathematics and for the test over-night memorization was a must, time was now on my side to spend with the material. To me learning is just getting it over a long period of time which means constant review. Through
constant review, I kept my memory alive. I described constant review as a study habit in which I learned the information -- without being put under pressure to learn (Boo, Interview 3).

I have learned to recognize and value the different ways of learning amongst my fellow classmates. I believe this later formed the groundwork for which I judge my own abilities as a mathematics student. To me a good mathematics student is a student who listens, does her work, and is interested in mathematics. A good mathematics student to me is not the brainy student who gets things easily and has an "I know it" attitude, but who has to work (Boo, Interview 6). I value the level of effort that learning involves. To me learning means acquiring knowledge. Further I recognize that I have learned something new when I can apply it to another mathematics class. This ability to relate the mathematics to something else, I say is an advantage. I am committed to passing the test and remain fascinated with the mathematics ideas taken from this course (Boo, Interview 6).

During the semester in which Randy's study took place, I took Algebra and Geometry. I feel that my mathematics class was filled with students who were there to act stupid and show off. There is not much you can really do with them. I will say that teachers need to make the class more fun and not get in power struggles with the students. Because students will prove to you that you do not have any power over them, just try to talk with them, reason with them, and try not to treat them like a little kid because that makes them angrier (Boo, Interview 4). I enjoyed mathematics class. I think mathematics class is funnier, than my other classes. The teacher just sits at his or her desk in my other classes, but in my mathematics class he talks to us and he is fun (Boo, Interview 3). Sometimes he dances around the room.
when he passes back papers (Boo, Interview 2). When asked in the final interview what to look for in a good mathematics teacher (Boo, Interview 6), I said that it is someone who is comfortable in front of students, someone who is good at mathematics, listens to and understands the students, and has a great sense of humor (Boo, Interview 6). The mathematics teacher allowed me to work independently and turn in all my assignments at the end of the period. I admit that the mathematics course was easy for me and that I did not apply the concepts and techniques I learned in the course. There are several reasons for this I believe. First, this was a mathematics course, therefore, like history and science in my younger days, I did not have to think -- it just come because it is interesting to me. I mentioned in another interview that it was easy to memorize for this course, especially using mnemonics. Studying for the course was like second nature to me -- perhaps meaning that I did not have to return to old memorizing behaviors because I already knew the information at a deeper level. Further, my other classes were time consuming and more intense, therefore I found relating to the mathematics course much easier and therefore it came to me without much effort. That is, it made sense to me and I could easily relate to it. I say mathematics is easy because I work ahead in the book and come to class with questions. I believe in taking an active part in my mathematics learning. Learning for me involved knowing how to do mathematics problems and applying those problems on the proficiency test (Boo, Interview 4). Our closing conversation went like this:

Randy: How do you feel about not having passed the test so far?
Boo: I do not like it, but I cannot help it.
Randy: What keeps you motivated to keep taking the test?
Boo: I want to pass it so I can go to college.
Randy: How do you feel about classmates who have passed and do you feel like there were some students who passed who you feel should not have passed?
Boo: I feel if you passed then you did well.

At age 12, I participated in a modified version of the Broadway musical "Cats." This was the highlight of my life. I say I was born to be in the spotlight. Although I still enjoy mathematics, when I was younger I used to love mathematics. I thought I really, really knew mathematics but now it is really getting harder and more complicated, I still like it, but not as much as I used to. During the summer instead of working on proficiency material, I had the opportunity to visit West Virginia, Georgia, and then North Carolina.

A Story of engagement and disengagement: Taking Students Seriously

As a researcher at Hysteria I present a conception of student engagement and disengagement within a mathematics classroom. In my profession of mathematics education I now face the problem of how to enhance the instruction to meet the instructional needs of all students, but in particular one group: African Americans in an urban high school. The question then comes to mind: Is there a set of mathematical pedagogical moves or student activities that are more likely to enhance membership and authentic work? To answer this question, one might synthesize the research evidence on proposed interventions such as Madeline Hunter's mastery teaching, cooperative learning, the use of case studies, writing to learn, and peer tutoring. Unfortunately, a review of this sort would probably give few clues on how to build membership and authentic work in the Hysteria classroom. First, empirical studies of such interventions have not usually given explicit attention to membership and
authentic work. Second, logical analysis is most likely to conclude that the potential of any activity to promote membership or engagement will depend more on how it is implemented than on its inherent structure and function. Third, when students' ideas are taken seriously, this tells the students that they are important members of a learning community, and the work of responding to teachers' questions is more authentic because the students can actually influence the course of the conversation. In this sense, questions that take students seriously promote engagement.

In this section, I illustrate a way of looking at discourse of teaching of mathematics in a 10th grade classroom. Snuffi, Jasmine, Tia, Wanda, Art, and Boo are 10th graders who I observed in an urban high school mathematics classroom. They get along well enough in school, but do not find much excitement in their mathematics class. In mathematics class, for example, they do most of their homework most of the time, which they say takes them less than an hour each week. They find some of the mathematics interesting, and report that they generally like to say one or two things during class discussions. They say they often work as hard as they can, but rarely concentrate so hard that time passes quickly. I got the impression from these observations that they work as hard as they think they need to.

Let's spend 82 minutes with these students during one typical mathematics class. The period begins with the ritual of attendance-taking. That accomplished, Mr. H, the mathematics teacher reminds students to pay attention to the assignment on the overhead projector. Mr. H is earnest, not especially dynamic but conscientious though not well-organized. He projects a feeling of competence, but not much excitement or passion. Snuffi, Jasmine, Tia, Wanda, Art, and Boo have been chatting with several of the guys and girls from
across the classroom; casually they take out their calculators, some paper and a pencil, eventually finding the assignment on the overhead, and begin. For the next 20 minutes, they sit quietly and work on the worksheet, as if they were alone in the classroom.

Next, they dutifully take turns going to the overhead to write in an answer to the problem Mr. H has written on the overhead. This activity takes about 20 minutes and the first half of the period is almost over. The second half is occupied with more worksheets for students and Mr. H.‘s answering questions of students still confused from the first half assignment. In the second half of the class, students break into small groups to try to discuss and solve many of the mathematics problems on the worksheets. Snuffi, Jasmine, Tia, Wanda, Art, and Boo raise their hands a few times for Mr. H or the researcher to come over and help them so they could continue the assignment.

Is this kind of instruction engaging? Although Snuffi, Jasmine, Tia, Wanda, Art, and Boo do enough work to get by, they find little reason to put more than minimal effort into mathematics class. Their mathematics class sessions, and their responses, accord with what many mathematics education observers have said about mathematics instruction in America’s urban high schools: Mathematics teachers do most of the talking and almost all the planning; controversies and complications are avoided; the tenor of mathematics instruction is devoid of passion. The mathematics teacher and Snuffi, Jasmine, Tia, Wanda, Art, and Boo seem to have made some kind of "treaty" ("stalemate" might be a better word). Students go along with most demands, as long as they do not have to work too hard; and, they pass the class with a decent grade.
What is being exchanged in such repetitions, a series of interactions between the mathematics teacher and Snuffi, Jasmine, Tia, Wanda, Art, and Boo? There is little give-and-take in the substance of the discourse, compared with ordinary conversation. Snuffi, Jasmine, Tia, Wanda, Art, and Boo, their other classmates, and their teacher were not trading opinions and information back and forth, nor was the teacher seriously interested in what these students were thinking. Instead, exchange in classroom discourse typically had a procedural basis: teacher asks, and students answer. The content of a student's answer is not judged on its intrinsic merit, but on its conformity to a prespecified idea. In mathematics classes like this students are engaged in procedures of discourse, but not in its substance. They pay attention and follow directions, but are not intellectually committed to issues of mathematics instructional content. And why should they be? They have little at stake in it, for they are given little opportunity to contribute anything real or new to the conversation.

The researcher's story: His view of the participants

In this section, I begin with a reflection of how I view Snuffi. Through analysis of his interviews, Snuffi's discussion of his progress with the mathematics generally addressed the amount of interest he had put in mathematics and the amount of time he had personally, or was allotted in the mathematics classroom, to do the exercises. In my view, he can be a good mathematics student, he must become totally aware of his weaknesses in mathematics and seriously work on them. Despite his propensity toward digesting information in the mathematics classroom, and his salient attempts at make meaning through application, throughout the quarter I believe that the mathematics teacher served the role of information
giver, and that Snuffi as the mathematics student was the information receiver, but that his opinions were not relevant to class discussions. He knows memorization does not work, but as a receiver, that is the only tool available to him.

Although Jasmine considered herself lazy, any one who watches her in the mathematics classroom would not gather that impression. I documented her frustration and disappointment with her success as a mathematics student; this frustration was worsened by her lack of interest in mathematics, her lack of seriousness as a student, and her complete ambivalence about school and mathematics. Throughout the research study and in particular the observations I noted Jasmine's declining self-esteem as she struggled with mathematics. In class after class I observed her lamenting behavior of what a bad mathematics student she had become. I eventually responded to this by encouraging her not to view the perceived problem as a crutch for other weaknesses she was discovering through the mathematics class. Further, I suggested that her mathematics skills were not as bad as she harshly criticized them. For Jasmine, I think her confidence to take mathematics seriously will grow out of her experience and wanting to graduate. It became increasingly clear to me about the type of assistance she needs for preparation for the test. She cannot relate to a mathematics teacher that tells a mathematics student what not to do, because she has already figured out what did not work in the mathematics problem. Jasmine in my view needs to check her understanding of what she has read and learned by being prepared to answer the mathematics teachers' questions in class. She is the kind of mathematics student who goes into class not having already read the material so that in class she could "prove" to her peers that she does not
know it. Instead she needs mathematics teachers who will help her get beyond the point of what I call "mathematics peer pressure owing to the culture of acting white."

Mathematics teachers who just give answers are of no use to Tia, instead she needs the mathematics teacher who can provide the answer, but at the same time engage in an explanation of the answer given so that association of that explanation can be used in a past, present, or future context. From my observations and interviews, I found that Tia had been falling into a state of nihilism because of her fear of not graduating, and fear of not passing the mathematics portion of this test—the final frontier to graduation. I saw a young lady in Tia, who had become frustrated and disappointed in her mathematics teacher; this frustration was exacerbated by the time and attention not being spent on preparing for the proficiency test. Therefore, out of necessity, due to stress and "disequilibrium" that Tia was experiencing as the testing date fast approached, she called upon the skills of her mother's brother who is a mathematics teacher and who spent several hours preparing her for the test. In my observation, she has expertise for problem solving questions and wisdomatics skills of previous mathematics classes to solve several problems on the test. I venture to say that mathematics learning for Tia meant to know it deeply so there was easy access/retrieval of the material; however, in her own experience with learning, she had only been able to memorize for tests and was developing the ability to make deeper associations.

In my analysis of Wanda, I found that she had become complacent to her mathematics weaknesses and that this belief and behavior did not lead to overall enhancement of her attitude and self-confidence toward mathematical learning. Thus, I documented her as being very disappointed and frustrated with the level of success she had in mathematics as a student;
the frustration was exacerbated by not having passed the test and by her acute fear of mathematics. Throughout the observations and interviews I noted her declining self-esteem as she struggled to understand basic mathematics. It became increasingly clear to this researcher, that she was caught in her lamented belief about not being good in mathematics and how horrible she had become. I eventually responded to this by encouraging her to think positively about mathematics and the things she could do. Instead of viewing the perceived problem as a crutch for other weaknesses she was sure to detect, I encouraged her not to be tripped by basic mathematics such as percents, fractions and measurements.

Considering, Art, on the other hand, I truly believed that this mathematics course was an empowering experience for him. I believe he found a place where application was valued and sought out, where differences were okay both in adapting to being a student and learning about himself mathematically. He had finally been heard -- he had spoken up and processed information the way I feel he needed to in this mathematics class and therefore felt the ability of empowerment, which I feel led to his ability to take control of his own learning with little assistance from the mathematics teacher. This mathematics class supported and fostered the introspective nature of his meaning making process for learning mathematics. Throughout the semester I noted that Art's increasing self esteem as he continued to get a better understanding of mathematics. In observation after observation and interview after interview I saw what a better mathematics students he had become. I eventually responded by encouraging him to keep his confidence high and continue to work harder than he had ever worked. He valued social interaction in the mathematics classroom, but because that was not available to him given his commitment to learning mathematics, he worked on his own and
then required assistance to help him clear up any problems he discovered along the way. He was very engaging, but quiet. I found him regaining touch with his goals; and, in order to reinstate himself as a viable mathematics student, despite the time it took, he began to reevaluate his mathematics preparation study techniques. I found that Art had a deeper mathematics learning association with making meaning, but when put to the task often was not able to enact that deeper meaning.

Once observation of Boo started in the mathematics classroom, I noticed she was fascinated by the things she learned about herself and mathematics. As a mathematics student Boo was quite thorough in her work as demonstrated by her worksheets being answered in complete sentences on several different occasions. I am clear about the form of assistance she needs. She is a quiet, but gifted student, that is lost in the ruins of Hysteria. In my analysis, her confidence will probably grow as she is exposed to more advanced mathematics teachers and classes that cannot be found at Hysteria. Mathematics teachers who just give answers are no use to her, she is extremely analytical and instead values the mathematics teacher who gives answers along with explanations (and has a sense of humor). While these mathematics teachers provide explanations, they further must provide a context for associating that information with past, present, and future mathematics material. Throughout the semester, I noted Boo's joy and excitement when it came to solving mathematics problems. In classroom observations and her interviews she described "mathematics as fun" "Mathematics as challenging" and "mathematics as interesting." I eventually responded to this by encouraging her to seek out her dream of becoming an architectural engineer and to take all the advanced mathematics courses Hysteria had to offer.
The ability to pass the mathematics test rests on these students' ability to become self-disciplined and learn mathematics as a pastime so that their respective dream can become a reality. I have enjoyed observing and interviewing these students and understanding the plight. Several factors may explain the success I had communicating with these six African American tenth graders; since their fates are intricately woven with my own I relived my experiences as a student in an urban mathematics classroom through the lives my students were encountering and living. I am and was committed to helping this high school and these students excel and expressed passion, concern, and confidence in their ability to succeed in school and the mathematics proficiency test. I became a part of the day-to-day experiences of these African American students; growing up in Macon, Georgia, I am considered one of the lucky ones. I wanted to participants to see what it feels like to rise from the bottom of humble beginnings. My life paralleled daily their struggles as similar struggles I encountered in the myriad of classrooms I entered in my being schooled during the period of my formative schooling. My reincarnation through the body cavity of these students brought new insights and several questions of what it means to be an African American in an urban school and mathematics classroom. The experience left me with one glowing question: How can I redefine my role as a student-centered educator in a teacher-centered profession? It was in the context of this urban mathematics classroom that I served as an example of "interpersonal caring" (Walker, 1993) and "connectedness" (Foster, 1991) with the students in my study and in this class. While I could communicate, relate, and share a similar background with them this did not guarantee or assure me that my interactions would be productive, fluid, or uncomplicated with these students nor did it reduce the pain I felt as I watched the conditions
which these students encountered in this mathematics classroom. What stands out as I departed my participants and the environment at "Hysteria" is that there is hope and progress in the making for my participants. I admonish those who will read this story that this is merely one researcher's interpretation and his translation of the classroom environment at one urban high school and their plight to alleviate the tension among those who want to learn and those who create an environment nonconducive to learning. I can only hope that this interpretation has done justice to the situation and can aid in rectifying the conditions in which the students study.
CHAPTER V
FINDINGS OF THE STUDY

Introduction

This study was designed to understand the complexities of six African American tenth graders and their preparation for a mathematics proficiency test. Consistent with the stated purpose, the threefold objective of this study was: (1) to explore the nature and types of phenomena which have the greatest influence on the mathematical performance of six African American tenth graders in preparation for a proficiency test; (2) to describe the mathematics classroom of this urban high school in terms of complexity during this period of mathematical preparation for this test; and (3) to explore the role these students and their teachers play in preparing them for the test whether adequately or not.

This chapter provides analyses and reflections of the data which have been collected, analyzed, and interpreted in the previous chapter. My discussion addresses four issues: (1) student engagement, (2) implications for teaching, (3) my three research questions, and (4) my reflection as an African American mathematics educator.

From the beginning of my observations, I began to analyze the data (typed records of specific verbatim behaviors). This analysis helped me to direct my further observations. I formulated new questions throughout the observations, searching for recurring themes that
would explain participants’ attitudes and interactions during their mathematics classes and their preparation for the mathematics section of the proficiency test.

"Educational engagement" refers to the psychological investment required to comprehend and master knowledge and skills explicitly taught in school (Wehlage, Rutter, Smith, Lesko, & Fernandez, 1989). Wehlage and his colleagues describe two levels of engagement: 1) students can simply do what they are asked, or 2) they can demonstrate real interest in and commitment to school tasks. A single pattern emerged that formed around the concept of the engagement of students. The clearest picture to emerge from the data was the nature of curricular activities likely to foster high versus low engagement. The patterns of engagement became clear when viewed from the perspective of the curriculum. These participants revealed similar attitudes about mathematics in the types of mathematics problems or activities that they preferred. In analyzing their responses to the types of preferred problems, three main mathematics activities stood out. First, several participants felt challenged and engaged when solving open-ended word problems or questions that dealt with contexts that were relevant to them. Second, some participants expressed a clear preference for problem solving when working in groups. And, third, participants enjoyed actually "doing" the activities, particularly when doing geometry problems. Several participants talked in terms of action, in the way they (including their mathematics teacher) were actually preparing for the mathematics section. Students recognized that "cramming" is not helpful at the following comments indicate:

Snuffi: Well, if you start studying at the last minute, you get nervous and stuff like that. You do everything in a hurry and you get nothing done.
Jasmine: Because when you cram stuff, then when you look at the paper, it all
mixed, then you get confused because you done cram so much and
tried to memorize in that one night and so it does help. It helps if you
look at this part one day and look at the next section the next day, then
you can remember more.

Tia: You cannot study and think over it the way you want to. You are
trying to cram it and the information you are cramming in it is not
clear.

Wanda: Because you have to cram it all in, and when you get ready to take the
test. You have forgotten it all.

Boo: Because you get all confused in stuff and you need more time to study
your work, and more days or a couple of hours then it won't all be
crammed in there and you will be ready.

Art: If you try to cram everything in at the last minute, then you are going
to forget something. It is a rush, and it is a rush on your mind.

Thus, the students knew continued engagement was necessary. As discussed by the
students in interviews and by the researcher in the previous chapter, they also knew that
memorization, even over a long period, was not effective; a different kind of engagement was
required. In some mathematics classroom sessions, the teacher broke the routine described
in Chapter IV and asked students to become involved in different classroom activities. Some
were engaging, but many were not. Snuffi presented the clearest explanation of what it is like
when a participant was not highly engaged and had not "tasted" success in a mathematics
class. Snuffi: I did not enjoy the activity on the hypsometer because it was very difficult.

Given preferences about the activities and problems, how did participants respond to
these types of problems in the mathematics classroom? The following episode occurred
during a lesson about the hypsometer, a topic many of the students and participants found
boring and difficult. As the mathematics teacher began the lesson, he and other students in
the class immediately laid their heads on their desk. I had been in the class for several weeks and this was the first time I had seen a majority of the students with their heads down. This lesson did not provoke much engagement.

Nonetheless, the following excerpt illustrated that the students and one of my participants begin spontaneously interacting without much input from the teacher when presented with mathematics problems that they could not readily connect with reality. When the teacher asked the students what was a hypsometer, the students could not answer the question. This involvement indicates that they were not interested nor making connections between the discussion and meaning in their own lives. (Note particularly Snuffi's part in the dialog).

Mr. H: Today we are talking about the hypsometer. This will not be an easy activity, but to begin the topic, we will use some simple materials.

Diana: Can I pass out the materials?

Mr. H.: Yes, make sure each student get a piece of manila folder, a pair of scissors, a washer, a piece of string and a straw. You will have to share the tape.

Snuffi: Hypsometer!

Robert: Why do we have to do this? This is boring

Ed: Yell, Mr. H. why are we doing?

Mr. H: Why do you think, Ed?

Ed: I do not know.

Raven: Just be quiet and do it (She was very inconsistent in her participation in class, but she came to the teacher's defense.)

Ed: Well, I guess you are right Raven. (Students were jumping in and out of the discussion to get a turn at the mathematics teacher, but I paid particular attention to these students.)

Although they participated in some sense, almost all of the participants were not highly engaged in this lesson. The topic seemed to be a very boring one. A few participants did not demonstrate a real interest and commitment to the mathematical tasks, did not exhibit
on-task behavior, displayed negative attitudes about mathematics, and showed an internal motivation not to do well. Over the course of the study the types of problems that seemed to direct high engagement were geometry, cooperative activities, problem solving, and measurement.

During the interviews when the participants were given the opportunity to talk about the types of mathematics problems that they did not like, they mentioned problems that required less thinking and emphasized procedures. Problems they disliked fell into two groups. First, all participants discussed their dissatisfaction when reviewing over and over problems that they already knew. Finding the perimeter and area of irregular polygons were mentioned as an example by two-thirds of the interviewed participants. Second, participants expressed dissatisfaction with "just watching" the teacher work problems. Two participants explained why they disliked these drill-and-rote problems:

**Boo:** When I do not understand mathematics and my mathematics teacher is not explaining it right, and he keeps trying to tell me I understand it. That annoys me!

**Tia:** He is the type of teacher who if you asked him questions you were supposed to know because you had a couple of the smart people in there. He thought everybody was supposed to know and when you asked, then he made it seems like you were very feel stupid on the inside. You asked the question and all he would say is read the book.

One of the participants had difficulty feeling motivated when her mathematics teacher worked examples and homework problems. Explanations of what it was like were given by the participant: **Jasmine:** Math class is a loner. It really is. There is not any other class like math you got to work, you got to really work or you are not going to pass (small chuckle!). Everything else you can kind of ease by or you can guess but math you have to get the question right or not.
The participants' behavior during a lesson on finding the perimeter of circular polygons typified a lesson with high engagement. There were frequent attention and on-task behavior. The teacher did not have to constantly remind the students to pay attention.

In contrast to the hypsometer, the following incident from the classroom observations is an example of more engaging classroom activity:

Mr. H: Make five circles on the paper being passed out.  
**Teacher draws a circle on the overhead projector, and ask each student to find the circumference.**

Mr. H: There was a guy named Archimedes he made a circle ... make a figure inside the circle with four or more sides ... We want to approximate, so draw a figure of four or five sides. Archimedes went up to ninety-six sides. (Off on a tangent) Another story of Archimedes was he was sitting in the bath tub. Maybe he had hemorrhoids.

Raymond: Were they intense?

Mr. H: I do not know, but I do know Napoleon had hemorrhoids and that is what kept him out of most of his battles.  
**He jumps back to Archimedes and finishes the story of how Archimedes discovered how to find the perimeter of irregular figures.**

Mr. H: He jumps out of the bath tub and run down the street. Shouting, Eureka! Eureka!

Me: Sharing mathematical history with the mathematics class is a start. This mathematics teacher is knowledgeable, his teaching can use a tune-up.

Mr. H. was using the overhead in the front of the room. The class was working on the perimeter of circular polygons. During this lesson it is obvious that the participants were engaged in learning. Even though these participants were in the beginning Geometry class, they were working on finding the perimeter of circular polygons.

When participants were engaged in high levels, they were not "acting goofy" they were not talking, they were listening, not laying heads down on their desks, not laughing with neighbors, not playing with items on their desks, and scribbling on the chalkboard. When
asked about their attitudes toward these types of problems, the statements included "It is alright," and "I like this."

Although the two episodes that I have presented suggest possible explanations for the high and low levels of engagement, I must caution against over generalization. This discussion suggests explanations, although all possible alternatives cannot be identified. Instruction is too complex and varied to be captured by a few examples. However, episodes do indicate potential links between engagement of students and instruction. There were no clear indications about whether attitude created on-task behavior or the converse. Did internal motivation change attitudes and direct behavior, or did the type of problems change the internal motivation? I concluded through my data analysis that the high levels of involvement cycled among the variables of types of problems, attitudes, motivation, and behavior. Developing teachers' metacognitive awareness and changing their beliefs, thoughts, and attitudes about mathematics and mathematics instruction is likely to be at worst problematic and at best clarify their own learning irregularities with and understanding of mathematics topics. And consequently, their mathematics understanding will influence their present and future students' understanding, attitudes, thoughts, and beliefs about mathematics. In particular, when focusing on specific mathematics topics, if mathematics teachers are aware of own mathematics savvy (strengths and limitations) and of their beliefs about the specific topic, they will develop a better understanding of this topic and most likely develop an awareness of the complexities involved with learning and teaching.
Implications for Teaching

Ross, Bondy, and Kyle (1993) discuss impediments to student engagement. A major factor is some teachers' narrow conception of learning. In school, students learn tasks that often have little to do with the real world, such as mathematics computation taken out of the context of problems relevant to the students' lives. While in the real world people often work together to solve problems, in school solving mathematics problems is almost always an individual activity (Tobias, 1981). If students make no connection between their learning and their own lives, they will often not value the learning (Ross et al., 1993). The result is that routine, irrelevant curricular tasks tend to bore the students. Because the content of the school curriculum is seen as irrelevant by students, many students stop asking questions and become disengaged from school.

Additionally, this study confirms indications that students are not passive recipients of teacher instruction but are active interpreters of the classroom environment (Weinstein, 1983). Teachers need to be more sensitive to the students' messages regarding the conditions of learning. The comments of the students' studied reinforce the recommendations in the NCTM Curriculum and Standards (1989). Mathematics teaching should emphasize topics like measurement and geometry, that have a logical connection with the real world. Lampert (1991) states that open-ended problems concerning real world situations provoke teacher-student discussion and communicate to students what is important in doing mathematics. Holmes (1985) says that open-ended questions challenge students to explore and become engaged in generating their own new questions. We learn mathematics particularly well when
we are actively creating the problems and solution strategies (Moses, Bjork, & Ginsburg, 1990), that is, when we are actively constructing knowledge.

When problems relate to the students' real world of people, action, and things, learning algorithms can be engaging for students (Williams, 1988). The students were highly engaged when they were working with manipulatives. Manipulatives help students relate real problems to the real world. Manipulative materials not only engage the students but can also help students visualize (Hiebert, 1990). Manipulatives can be used to stimulate thinking because they create action that forces thinking. Through exploring concepts and algorithms with concrete materials, students develop better understandings and more positive attitudes about mathematics (Hodges, 1983; Martinez, 1987). Manipulatives were not used by Mr. H. Another instructional situation that engaged students was cooperative problem solving. Cooperative learning activities require students to pay attention to others' as well as their own contributions. Davidson (1985) says that cooperative learning provides pleasurable opportunities for groups to study subject matter to complete assignments. Small-group cooperative learning can not only be used to foster engagement with the curriculum, but increase effective mathematical communication, problem solving, logical reasoning, and the making of mathematical solutions (Gregory & Morsink, 1984). Students learn by talking, listening, explaining, and thinking with others, as well as by themselves (Davidson, 1990; Lampert, 1991). In cooperative groups, students are actively involved in learning mathematics. They learn to cooperate with others, to improve their social skills, and to communicate in the language of mathematics. Students are not bored in class and like mathematics more than when they are not involved in teacher-centered approaches to
instruction. They are engaged at high-levels and are interested in the mathematical activities (Holmes, 1985).

Teachers provide the experiences that exert powerful influence on students’ attitude about mathematics. It is essential that we examine our classroom procedures and routine to determine what we can do to prevent further negative experiences with mathematics (Battista, 1986). Because of the way that mathematics is often presented in school, we should not be surprised at some students' overwhelming boredom and belief that mathematics is only about getting the correct answers.

Think about the following images of mathematics expressed by two of the articulate teenagers in my research study.

Math class is a loner. It really is. There is not any other class like math you got to work, you got to really work or you are not going to pass (small chuckle!). Everything else you can kind of ease by or you can guess but math you have to get the question right or not (Jasmine, Interview 1).

You know mathematics is boring when you sit in class and dream about cleaning your sink (A student in a Geometry class that I observed on May 2, 1994).

It is not surprising that people who hold these images of mathematics -- as a rigid and authoritarian subject -- will avoid engaging in mathematical activities, even if they have the ability. We cannot ignore the fact that almost every day, in most mathematics classes, the teacher introduces a new concept or rule by lecture, applies it in a few simple examples, assigns exercises for practice on homework; then, the next day the teacher goes over these homework exercises and finally verifies that the student understands by giving them a test (Borasi, 1990). Students who experience this type of instruction become passive learners,
focusing on memorization rather than conceptual understanding and can cease achieving (Wehlage et al., 1990).

Goodman (1970) contends that "school can separate students from real participation in their own education, and ultimate curiosity and learning." But if a student regularly has positive experiences with nonroutine mathematical problems, an attitude of curiosity about problem solving could develop.

Sustaining student engagement in educational tasks is a significant problem (Wehlage et al., 1990). However, the general conclusions of this study provide some indication that the difficulties can be overcome. A teacher who provides student-centered approaches to mathematics plays a major role. To learn mathematics, students must want to learn and feel good about learning. What counts is that mathematics educators become aware of situations that can cause low engagement and work with students in ways that increase engagement levels. Effective mathematics teaching focuses on instruction that promotes students' activity. Mathematics teachers need to move away from lecturing and move toward activities that motivate their students. Without motivation, learning is reduced to only a sequence of activities externally imposed by the teacher on the student. When students care about what they are doing to the point that they are actively engaged, their attitudes will keep them learning and seeking to understand. My observations and the participants in my study indicated repeatedly that the activities discussed by these researchers are largely absent from their classroom.
**Research Questions**

I asked questions of my data, "Who are my participants in this mathematics classroom?" "How do my participants respond when they do not understand?" "When are my participants on task?" "Do my participants let their mathematics teacher know when they do not understand?" "What are my participants ways to get help?" In searching for these answers through observations and interviews, I was able to narrow the scope of my research to study a pattern that was forming around my participants' engagement in the mathematics classroom. What types of mathematical activities prepared my participants for the mathematics section of the proficiency test? Are participants' attitudes and actions influenced by the types of mathematics problems that they are studying? I decided to investigate these areas through interviews with the participants. I asked questions like the following: "What kinds of mathematics problems do you like?" "What is your favorite day that you remember in a mathematics class?" "What kinds of mathematics problems do you find boring?" "What happens to help you perform well on a mathematics test?" "How do you begin to understand?"

The findings from these questions are presented in this chapter as responses to the research questions posed: What is the mathematical portrait of six African American students in preparation for the mathematics portion of a statewide proficiency test? What are the circumstances in the mathematics classroom that impede or support the mathematical performance of these six African American tenth graders before taking the mathematics portion of this statewide proficiency test? How do these circumstances contribute to the
success or failure of these African American tenth graders in their own assessment, and in the researcher's assessment?

Question 1: What is the mathematical portrait of six African American students in preparation for the mathematics portion of a statewide proficiency test? This urban mathematics classroom was in trouble. In fact, the problems of this mathematics classroom were of such crippling proportions that many of the students may not survive. It is possible that this is only one of the many urban mathematics' classrooms nearing collapse. I sat in this classroom three times a week watching the enormous energy of urban youth wasted on frivolous mathematical instruction that neither prepared them for the test, nor the world they would face outside the hallowed halls of "Hysteria". The students sat at their desks arranged in rows. Most were talking, a few would look out of the window, and the remainder were looking contemplatively or blankly into space as the teacher stood at the overhead projector attempting to give that day's assignment or the plethora of worksheets that inundated these students' desks and my tote bag. In visit after visit after visit, I would leave "Hysteria" disheartened and commenting to myself: "I saw hardly any mathematics teaching all period." Was I right? Was there hardly any teaching or learning for that matter? These are questions not easily answered. Writers, speakers, and researchers reinforce our own memories and portrait of urban mathematics classrooms with reference to cells, each with thirty or so "docile bodies", desks in a row, a teacher standing at the overhead in the front of the room, and students looking toward the teacher. A snapshot of such a scene would freeze in time a teacher lecturing and questioning and students in a variety of poses of listening and responding. A black-and-white print, rather than one in color, conveys the image.
We know that today urban mathematics classrooms sometimes deviate, but I found thirty or more students in an uncarpeted space, not quite rectangular, taking up the area of four conventional box-shaped classrooms. It included a conversation pit for group discussions (mostly of a frivolous nature and nonmathematics related) and role playing; teachers and students who would prefer to be somewhere else. The mathematics classroom I observed was unlike one in the old images so many of my "privileged" ivory tower colleagues share. What I saw was desks arranged in rows, oriented toward the teacher at the front of the room; and I saw the lack of mathematical educational resources or mathematical manipulative materials. I witnessed no marked variations on the pedagogical procedures of the mathematics teacher and/or the students' mathematics activities. The mathematical portrait that emerged is a dismal one, I do in fact doubt that this mathematics classroom, as presently conceived and conducted is capable of providing my participants and the large segment of young people with the mathematics education they and the democracy require, and I submit that among the things that can be done to improve all elements of the mathematics education for this classroom and many like it two are major: a more compelling mathematics curriculum, and professional mathematics education for teachers which encompasses three components that are ideal for a curriculum for African American students (Hale-Benson, 1986): (1) Political/cultural (ideology), (2) Pedagogical relevance (method), and (3) Academic rigor (content) (p. 152). Done in concert, these could make a significant difference.

Question 2: What are the circumstances in the mathematics classroom that impede or support the mathematical performance of these six African American tenth graders before taking the mathematics portion of this statewide proficiency test? Wear one pair
of glasses and this mathematics classroom appear to be the worst of a place to visit. Put on
another and it appears to be the best. The negative picture emerges when the growing
awareness of the stifling conditions that six African American tenth graders encounter in
preparation for a mathematics proficiency test in an urban mathematics classroom. It is
virtually impossible to study and describe this mathematics classroom "all of a piece." This
mathematics classroom is too complex and so I chose pieces of the whole appearing to
characterize this mathematics classroom, even though each may manifest differently. The first
theme is the function of mathematics. Mathematics appears not to be sharply exciting to these
African American tenth graders, although they need to know it to survive in this technological
world. Inevitably, they need to know it for job preparation and intellectual development. I
was hoping that the mathematics teacher would emphasize and discuss with his students the
importance of mathematics educational functions almost exclusively, but he did not. A
second theme is the relevance of mathematics in the lives of these African American students.
These students, presumably, are the mathematics' classroom's primary clients. But they are
not only clients seeking out mathematical educational services in the way they seek health
services. They are in the mathematics classroom as a part of school requirement and
intellectually growing up. There is no choice. It would be a surprise to find that students
have a clear, common purpose for being in a mathematics classroom. It seems more
reasonable to assume that the mathematics teacher would provide a compulsory setting in
which all students seek to satisfy their interests and find relevance in mathematics as best they
can. The problems of making mathematics learning meaningful, to say nothing of compelling
or exciting, appear and reappear in the literature as problematic. One is forced to raise
questions about the potency of mathematics and the conventions by which it functions. For example, what are mathematics classrooms doing to recognize changes in the values of the young? Mathematics teaching can be made more efficient. But making it more relevant in the lives of African Americans in particular is one of the most demanding challenges we face in the mathematics education profession. A third theme is the how the teacher teaches and a fourth is the circumstances surrounding teaching. This teacher both conditions and is conditioned by the circumstances of the school. This school should be first for the students, second, for the students, and third, for the students. But to ignore the fact that students are influenced by the teacher, who in turn is influenced by his workplace, would be to lead me to an already preexisting simplistic diagnosis and inadequate proposal for improvement in urban mathematics classrooms where the majority of "docile bodies" happen to be African Americans. A fifth theme is the array or lack of array of activities, materials, and tests constituting the mathematics classroom. And the final theme is the active disruptors; there is very little doubt among this researcher, and the participants in this study that incessant disruptions from active disruptors can make for a hostile and hysterical environment in this mathematics classroom and mathematics classrooms in general. In this classroom I begin to see a picture of the disempowerment of the mathematics teacher and the enormous control of "rowdy" students. What then emerged clearly, though impossible, is the need for tougher and more rigid penalty for the active disruptor. This would provide for improving the circumstances under which this mathematics teacher and many other mathematics teachers see as frustrating their desire and effort to teach. The notion supports the underlying assumption that incessant disruptions experienced in the mathematics classroom negatively
influence the preparation and quality of the mathematics education provided, as perceived by the students in this study. But one must also ask whether disruption is itself not only a cause, but more importantly an effect of the approach to mathematics taken here.

Question 3: How do the circumstances contribute to the success or failure of these African American tenth graders in their own assessment, and in the researcher's assessment? In these data and in this mathematics classroom I begin to see a picture of what my participants viewed. They agreed, generally, on the importance of basic mathematical skills and mathematics subject matter and increasing the store of information about the various areas on the mathematics proficiency test. At the same time, they perceived the necessity for their mathematics teachers to be in control of mathematics classroom circumstances and mathematics preparation for the test. Presumably, if student behavior gets out of hand, they believed, their mathematics teacher could not fulfill his central function of teaching mathematics. My interpretation is that the mathematics teacher, aware of the rather crowded box in which he and his students live each day, sees the need to be in control, to prevent unruly students from dominating, as a necessary condition for student mathematics learning and preparation for the test. I viewed this class as out of control and the mathematics teacher as very soft when punishing those who stood as barriers to their learning and the learning of others. When this mathematics teacher finds himself restrained and inhibited by the problems of his classroom that appear not to be within his control, it is reasonable to expect frustration and dissatisfaction to set in. Undoubtedly, his effectiveness, in turn, is constrained and the very problems frustrating this mathematics teacher are exacerbated. These students' (my participants) perceptions of the quality of mathematics education decline.
It is reasonable to assume that the actual preparation for the test and the quality of mathematics education declines also.

Interviews and observations provided evidence that participants in this mathematics classroom had different attitudes about the mathematics curriculum and mathematics preparation for the proficiency test. The old saying "good things are ruined in the end" is exemplary of what was happening to my participants. These are "good students" - have passed the other parts of the test, understand the rules of school, have goals for the future. Unlike the stereotypes of kids- doing nothing but watching television and "hanging out" (when not engaged in school), as a group they are active in music and theater (flute, saxophone, and CATS) and sports. Wanda likes to read (but has separated reading from "reading for school" in her mind). They have goals: Snuffi wants to be an elementary teacher, Art wants to be a pharmacist, Boo wants to pursue a career as an architectural engineer, Tia wants to be an accountant, and finally, Wanda opts for the field of law enforcement (police officer). They have done everything that the society, and schools have asked of them and the school and the society have failed to educate these African Americans and others within the school. To have a liking for mathematics as a high school student is a rare occasion. These students while not generally lovers of mathematics, seem to enjoy or appreciate the usefulness and importance of the subject.

Throughout the interviews I detected a surprising lack of bitterness from the participants. They did not seem to be irritated by the consequences that this test lends itself. To them it seems to be another obstacle, and since their schooling has been replete with obstacles and barriers, they see it as another barrier to cross. In some absolute sense, the test
was hard for at least five of them (Tia successfully passed on her fourth attempt). This test must be hard for them - they failed, but they go back and forth as to the hardness or softness of the test. It is a very consistent notion among my participants that the content and the test have changed each time taken. Could they be right? This is a question that the State Department of Education can answer. Since the test is kept under lock and key, the kids could be right. What I noticed about my participants is that they have a keen perception of the injustices of the school and the society as a whole. The secrecy of the test is a legitimate concern of this researcher which reaches far beyond the hallowed halls of this urban school. The test could be a deliberate (whether conscious or not) attempt to the stratification of the majority of African American urban high school students.

Now, this puts us in the realm of regulating the economic conditions of a particular ethnic group. The issues of disidentification, caste-like minorities, and lack of fit discussed in chapter II evoke questions: (1) Can the trend of disidentification among some African American high school students in urban mathematics classrooms be reversed?; (2) Why do some African Americans urban high school students disidentify with the mathematics curriculum?, (3) How promising will an African American future be if they continue to disidentify with the mathematics being offered in schools?, (4) Why does the label castelike minority seem to be a perfect label for some African Americans?, (5) Is disidentify a plausible rationale for the mathematics performance of some African Americans?, and (6) Does the social stigma of castelike minority impact the performance of African Americans in mathematics and on mathematics assessment tests?
Another concern of this researcher is the test is so well protected that there is no way of determining the bias in wording, or the way problems are performed by the students. This is a concern in that many of these students could be doing these problem partially correct and a small amount of feedback can give them a better understanding of their mistakes. So if the test is as "easy" as the public thinks-Why are they failing? The mathematics preparation of these students by their teachers and the school in particular is one reason. However, the students must also shoulder some of the responsibility of their failure. It would be patently absurd to exempt the students from their part in the matter, it is a fact that mathematics is an important subject and while we shift the blame to students, we as mathematics educators are partly to blame by the subtle and subliminal messages that we convey to students. We know by empirical evidence that some of the same "turn offs" of mathematics experienced by students are experienced by the teachers that teach them and so the teachers convey the message of the unimportance of mathematics, a message coopted by the students as a mere strategy to exempt them from their role as a serious student. The mechanism of the use of the slogan "I am not good at math" or "I hate math" cannot be accepted as evidence of these students dislike for mathematics. I have become increasingly annoyed by the considerable number of teachers who I hear say that "I am not good in math", but at the same time teaching the subject and the ill-advised message to the students-the individual that needs it most. As can be seen from the examples of data, the analysis revealed that a formidable component of engagement for these participants was the type of mathematics problems that they were involved in doing. When problem solving in groups and working with manipulatives, students had positive attitudes about mathematics. When performing drill and
practice, memorization and rote, and computation out-of-context, students were most often bored with learning and felt low levels of engagement. Many favorite types of mathematics problems were shared by the participants, and many participants named the same disliked problems. That is, the types of problems had an impact on the participants' attitudes and reactions during the mathematics class.

Summary

The purpose of the study was to help mathematics educators understand better student engagement with the mathematics curriculum and its influence on student engagement. I specifically wanted to investigate what is the portrait of the mathematical performance of six African American students in preparation for the mathematics portion of this statewide proficiency test?; what are the circumstances in the mathematics classroom that impede or support the mathematical performance of these six African American tenth graders before taking the mathematics portion of this statewide proficiency test?, and how do the circumstances contribute to the failure of these African American tenth graders in their own assessment, in their teacher's assessment, and in the researcher's assessment? First, the data collected suggest that students' levels of engagement and success were apparent for the same students during different types of activity structures. Not surprisingly, students were likely to succeed when they were engaged with the curriculum.

Second, patterns of low engagement suggested that certain types of instructional activities were more likely to result in engagement by students. When executing drill and practice, memorization and rote learning tasks, and computation, students were least likely to be engaged. During these tasks, students were likely to comply minimally with teacher
direction, exhibit off-task behavior, and display poor attitudes about mathematics. In contrast, when students worked with opened-ended word problems, participated cooperatively in groups to solve problems or worked with manipulative materials, they were more likely engaged. During these activities, students demonstrated interest and commitment to tasks, expressed positive attitudes about mathematics, and showed internal motivation to do well.

Educational engagement occurs on a continuum, but it is always a prerequisite to learning (Wehlage et al., 1990). High levels of engagement are demonstrated when students answer questions, discuss issues, write papers, complete homework, and perform tasks at school.

**Reflections on Fieldwork: By A Mathematics Educator**

My name is Randy and I am storyteller. Throughout these pages I have woven a discussion of two problems generally silenced in discussions about qualitative research in mathematics education: first, the act of telling the ethnographic story, and second the notion of what Crichlow (1993) calls the "post fieldwork problematic of coming to terms with one's role as a "native" participant-observer" (p. 435). I believe that coming to terms with this role is a critically important reflexive moment in the process of producing an ethnographic account. These two problems are closely interrelated, as the story I shall tell will implicitly show. The first refers to the process of writing the ethnographic narrative of field research in mathematics education; that is, as British cultural critic Angela McRobbie (1982) aptly put it, transforming the raw material of fieldwork into "something quite different" (p. 54). The second has to do with one's relationship to the research "subjects," and to ethnographic
research as a specifically social and analytic activity (Wexler, 1987, 1992; Limon, 1991). The questions I raise here are, I think, also interconnected to issues of ethnographic authority, construction, and representation. Proponents of a critically reflexive anthropology such as Clifford Geertz, James Clifford, Edward Said, and Leslie Roman have influenced me in this regard. My particular interest in addressing these issues grows out of on-going reflections on a mathematics intervention program for adolescents I conducted in an urban high school. At the same time that I am concerned to develop useful theoretical and practical knowledge from the "data" collected for this study, I am also interested in exploring what it means to write about and to produce ethnographic knowledge as a "native" ethnographer. Indeed, for me, these are not mutually exclusive endeavors. For purposes of this discussion, however, it is the latter concern that I shall focus on.

In his recent thought provoking essay, "Notes of a Native Anthropologist," Jose E. Limon (1991) describes himself as a "native" anthropologist. His work is in southern Texas. The people and the culture he studies are those of working-class Mexican-Americans or, as Limon notes, "'Mexicanos,' as [the people] still prefer to call themselves" (p. 116). Limon considers himself to be a "native" anthropologist not only because he has spent most of his professional career as an ethnographer studying the "ideologically accented culture" of South Texas Mexicanos. But, he says, "Unlike most anthropologists...it happens that I am born and bred in the place I study" (p. 116).

Like Limon and Crichlow, I understand myself to be a native ethnographer. I am an African American born and raised in a big city environment. Now I work ethnographically in inner city community enclaves under social domination and in schools predominantly
populated by the children of working class and working poor African Americans. This is not
the place to pursue a comprehensive discussion on what has been termed "indigenous" or
native anthropology and "subaltern" or "insider ethnic research and writing," (Aguilar, 1981;
Ohnuki-Tierney, 1984; Dorst, 1987; Spivak, 1988; Limon, 1991). It will suffice to say that
my predecessor or, as Limon calls them, "precursory," ethnographers in inner city community
field research are Kenneth Clark (1965) and Joyce Ann Ladner (1971). I will quote briefly
from both to indicate the character of the dilemma they faced in their respective field research
projects during the 1960s. Working in Harlem in 1965, Clark articulated his subjective
dilemma in maintaining the role of participant observer as "difficult," particularly

When one is not only a participant in the community but when one brings to the
attempt to use this method, with a degree of clarity and objectivity essential for social
science accuracy, a personal history of association with and concern for many of the
people in the very community one seeks to study (Clark, 1965, p. xvi).

Reflecting on her study of the transition from adolescence to adulthood among young African
American women in public housing projects in East St. Louis, Ladner asserted in 1971 that,

As I became more involved with the subjects of this research, I knew I would not be
able to play the role of dispassionate scientist, whose major objective was to extract
certain data from them that would simply describe and theorize about their conditions.
I began to perceive my role as a Black person, with empathy and attachment, and, to
a great extent, their day-to-day lives and future destinies became intricately interwoven with my own. This did not occur without a considerable amount of
agonizing self-evaluation and conflict over "whose side was I on" (Ladner, 1971, p.
xiii, emphasis in original).

I take Clark and Ladner to be my precursors because I faced similar dilemmas during my
fieldwork experience in 1995. I do not, however, want to make more of this than is
necessary. What I want to say is this: "to make the claim of "native" is not, of course, to
assert a kind of epistemological privilege over non-natives or so called "outsiders""

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To be a native ethnographer, in Limon's insightful view, "refers to the particular challenge posed to the 'native' ... in his or her attempt ethnographically to represent ethnic worlds riven with cultural contradictions in this postmodern moment, while responding to a history of flattening stereotypical representations of these worlds" (p. 116). It is important to point out that in his fieldwork and writing, the native anthropologist confronts and seeks to transform those "flattening" representational practices which mark the history of ethnography and continue, in many instances, to implicitly abet the presence of qualitative methodologies (Crichlow, 1993, p. 438). In addition, the "native" ethnographer is never a one-dimensional being. He is simultaneously of another place as well. He possesses a "combination of birthrights". Like Limon and Crichlow, I am a child of the "Enlightenment," and a student of modern critical theory and postmodern debates over race, identity, and representation. No doubt as well, by academic accomplishments and professional choice, I have become "middle class," and experience a broader set of privileges than normally found in the setting I studied. (While this is a profound point, it is equally important to emphasize that this status does not insulate me from the virulent institutional racism of American society or the fluctuation of the economic and labor markets.) The important point, as Limon suggests, is that this "combination of birthrights has produced an interesting complexity" (p. 116). I believe that the working out -- the coming to terms with, as it were -- the dilemmas and possibilities of this complexity is what constitutes the particularity of ethnographic practice of the native ethnographer. In telling my story, I do not seek to put forward a linear thesis or offer a definitive answer to the issues; rather I want to
illustrate them for any contribution that might be made to critical discussions of qualitative research in mathematics education.

Again, like any other educational ethnographer I had a place I was trying to make sense of: a research site; and I had a research problem. My place was an inner city high school serving a predominantly African American student body. My research problem focused on one of the most difficult questions for mathematics educational researchers and practitioners within a large Midwestern city: why are African Americans disproportionately amongst the groups not passing the mathematics section of a proficiency test? This issue holds particular warrant within the urban African American community, where a significant proportion of adolescents experience alienation, fail to graduate from high school, and subsequently find it increasingly difficult, if not impossible, to negotiate the exigencies of the post-industrial social order.

In an effort to understand this persistent dilemma I employed participant-observation and ethnographic field research methodologies. I wanted to examine processes of what Crichlow (1993) called "educational commitment" and "disaffection" in an urban public high school. I sought to examine black adolescents' everyday mathematical school experience to ascertain the "multifarious choices", "decisions", "roles", "meanings", and other "verbal" and "non-verbal" feelings that help to account for differential school outcomes. I was primarily interested in how these differences were produced and reproduced in social and cultural context.

Drawing upon theoretical work in sociology (Bowles and Gintis, 1976; Willis, 1977; Wexler, 1983) and psychology (Connell, 1991), "commitment" and "disaffection" represented
ideal types of participation and withdrawal behavior exhibited among youths within the organizational context of schools. As I conceived it, the commitment-disaffection continuum basically provided a framework for focusing on questions of students' differential experiences of engagement and success in school.

After extensive weeks of fieldwork in an urban high school and community and, again, many agonizing months of post fieldwork analysis, I subsequently constructed an account of distinct yet overlapping subcultural student groupings observed in the school: what I called the "Overcoming the Burden of Acting White" minority subculture of Mathematics; 2) the Mathematically Ambivalent Youth Culture; and 3) the Hysteria Urban Youth Culture. Detailed ethnographic case studies describe and analyze the high school mathematical experience of six African American tenth graders. The case study accounts of four young women and two young men serve to problematize any simple notion that the African American tenth graders merely assume or enact committed or disaffected behaviors in a naturally given or inevitable way.

Generally, my study found that engaged and disaffected patterns of behaviors are fostered in a complex matrix of social interaction among adolescents' identity needs, interpersonal relationships, and the organizational demands of the urban school context.

Aside from making the "technical" decisions involving analytic methods, giving voice to the study required that I come to terms with my role as native participant-observer, my relationship to the research problem and the research "participants". The personal conflicts and ethical dilemmas of my role as a native fieldworker began to mount before the data collection was complete and intensified during the post-fieldwork press to analyze the
interview and participant observation data—to write up the story. While I was deeply invested in the research problem as an African American male whose life experiences overlapped diachronically with those of the urban African American adolescents I "studied", I became intensely aware that studying their lives would also serve as a vehicle for me to complete the academic requirements for a university degree and to advance my own professional life. I felt strongly about the need to bring fresh insights and understanding to bear on the question of African American tenth graders mathematics experience in the urban high school. Despite these best intentions, however, I was conscious of the irony that many of the African American tenth graders I observed were deeply "entrapped " (Glasgow, 1981) in the structural inequalities I deplored and wanted to change in schools, urban mathematics classrooms, and inner-city communities. What I observed daily in the school I studied was the tremendous energy and potential of young men and women going to waste. I was frustrated by the lack of resources being directed toward students, particularly those who were incessantly failing the mathematics section of a proficiency test. As a researcher, I had little power to influence the school leadership to alter the organizational imperative of the school. Instead, I observed day-after-day how institutional energy was directed toward the continued stratification of students and "keeping the lid on" the everyday dynamics of the school. Those few meaningful learning opportunities provided were limited to the brightest members of what I call "Overcoming the Burden of Acting White" minority subculture of mathematics.

Given the limits of intervention or transformative action to which I could commit as a researcher, I began to feel that my project was in actuality a useless one; that any positive
use it might have served was irretrievable. As a native, I felt that in my fieldwork I had been simply intruding on the daily suffering of these African American tenth graders to benefit myself. I was writing stories about them to which they had little or no access; my work would not aid them in transforming their lives or the conditions under which they attended school. I was taking their voices; taking their time; taking their common-sense knowledge. In my privileged position as an outside researcher and doctoral candidate, I felt that I was taking from them without giving anything of equitable value back. Reconciling these tensions so as to recover the more valuable contributions the study could make required considerable reflection and reevaluation.

Leslie Roman's (1987, 1992) critique of ethnographic practice and reflexive account of her own experience as an ethnographer provided useful defining terms for exploring the discomfort I was experiencing. It was after reading her work that I understood what I could before not articulate about conducting myself as a "fully immersed yet disengaged ethnographer" (Roman, 1987, p. 136).

Roman's description of the two "ideal type" problems that produce this contradictory stance in the fieldwork process strongly resonated with my experience and with what I felt acutely during my stalled attempts to analyze the data: a nagging sense of being a "voyeur" and an "intellectual tourist". Roman employs the concept of voyeur to depict a discursive set of codes and cultural practices to which an ethnographer not only consents but employs from a privileged vantage point to play down and minimize the "a priori theory she uses to view, describe, interpret, frame questions, and represent the knowledge and meaning of her research subjects." Moreover, the ethnographic voyeur's use-value of the research subject's knowledge
is often manifest within exchange relations linked to "commodified pleasure (sexual or economic) of the researcher,"; a pleasure which is often disrupted and problematized "when the group under study feels intruded upon by the researcher." Consciously or unconsciously, the voyeur's rapport with the research subjects is premised upon the idea of temporally (and spatially) defined contact. That is, the ethnographer's preconceived role is to "extract common-sense knowledge from the research subjects and withdraw from the intimacy and alliances established when the research is completed" (p. 136).

The ethnographer as "intellectual tourist" is also constituted by a similar set of discursive codes and cultural practices, but Roman distinguishes this complimentary approach to field research "as a brief excursion, foray, or sightseeing tour into 'other' people's lived culture." This a key difference. Roman notes that, "unlike the subject position taken by the voyeur, the ethnographer as intellectual tourist may, for abbreviated periods of time, become deeply involved in the daily lives of her research subjects so as to achieve 'cultural immersion' and the status of a participant observer." What really constitutes the ethnographer as intellectual tourist is when his or her tour of duty is complete. That is, when "the ethnographer's intimacy and rapport with the research subjects and possible material inequalities of their lives halts abruptly in order to begin the data analysis and complete the research process" (pp. 136-137); that is, to write-up the story!

Consideration of Roman's definitions of voyeur and intellectual tourist led me to a more nuanced and situated understanding of the double-edged nature of my fieldwork. I understood that while one is in the "field" these subject positions are neither unified nor overdetermined in the sense of being all of one, static piece. Rather, my subject positions as
native, native ethnographer, and aspiring academic as well as my practices and social relations of collecting data and sustaining the fieldwork, were more complex and contradictory, cutting in dual directions at once and always secured in response to multiple kinds of interactions.

On one edge, not unlike the shifting field roles and strategies of what Roman and others have termed "fly on the wall" or "going native", tourism and voyeurism are produced and reproduced when the researcher enters a setting as an outsider, particularly an academic outsider, and acts -- whether consciously or not -- through class and professional privileges that are not shared by or accessible to those he studies. I entered the field naively oriented by the language, meanings and conventions of mainstream qualitative research in education (e.g., Bogdan & Biklen, 1992), and hence unproblematically reproduced the research stance that British sociologist Valerie Walkerdine (1986) identified as "a 'will to truth' in which the production of knowledge has real effects in the surveillance and regulation of the Other" (p. 197). These conditions of detachment and saturation are what Roman and others portray as immanent in non-reflexive ethnographic research (cf., Ruby, 1980). Acknowledgement of this contradictory space and confronting the fracturing effects it engendered helped me to break out of the immobilized and stifling place I occupied in my failed efforts to construct an ethnographic account. These subjective processes of reflection and reflexivity are conspicuously absent within most ethnographic accounts of field research (for an exceptional analysis see, Dorst, 1987).

On the other edge, the task of staying in the field extensively was situated in a particular context that demanded from me multiple forms of social relations and interactions. On some occasions, I relinquished the controlled researcher's stance between observation and
participation and I "went native" in a planned or unplanned, but always human, effort to understand by becoming as much a part of the school context as I possibly could - to experience the school world in the same way it is experienced by the teacher and the students. These moments of tourism were, however, only made possible through genuine rapport and mutual understanding cultivated over time, and an intimacy engendered by ongoing interaction in context.

Nonetheless, Hysteria High School, as I pseudonymously called it, was not my world. I was the proverbial native son returned to the urban context but in many ways no longer of it. In the end, the reality was that I had to immerse myself -- in fact re-immers e in a metaphorical sense-there in order to capture the processes of mathematics preparation for a proficiency test among adolescents and to render a story that might help others (and myself) better to understand the situation. Despite the contradictions inherent in the role, both the objective and personal purposes of the fieldwork were in some way to contribute to improving the provision of schooling for urban adolescents.

I raise these difficult issues, or what Roman has called the "objectively inherent inequalities of being an academic" (p. 156), not simply to lament the circumstances of my research as a native; nor do I want to draw the unwarranted conclusion that educational research of a social, contextual and analytic nature is ethically impossible. Rather, I simply want to make my coming to terms with the situated dilemma of fieldwork a necessary reflexive part of the account. I believe that accepting the unresolved problematics and liabilities of my field roles and practices was a significant moment in moving on to the more important responsibility of telling the story and drawing implications for schooling. If writing
is even a limited form of action, then the ethnographic account cannot be meaningfully written simply as if the anomalies of fieldwork, which ethical tensions exacerbate, do not matter. There is no easy way past this quandary once the fieldwork is completed. I believe that the lesson learned for me as a native, but also one that applies to others engaged in ethnographic work, is that self-reflection, criticism, and evaluation is part of the difficult and painstaking process of ethnography. To do meaningful ethnographic work, as a native ethnographer or otherwise, requires continual confrontations and a reflexive working through the ethical, political and intellectual dilemmas as a central part of the ongoing strategies and practices of the field research itself.

In constructing accounts of the groups of school adolescents I call the "Overcoming the Burden of Acting White" minority subculture of mathematics, the Mathematically Ambivalent Youth Culture, and the Hysteria Urban Youth Culture, I attempted to exercise the responsibility of the native observer, the native participant, the native participant-observer; the academic who withdraws from the intimacy of the fieldwork to make sense of and to portray what I had seen, heard and learned about what I once was: an African American adolescent experiencing schooling in the inner city. What helped me to move the writing forward was the recognition that there are different elements and levels of transformative action; giving voice to the account in the tentative and transitional form of an academic dissertation is one such level of action - one way to try to make a difference. As an on-going ethnographic work - a work in continuous process - I hope that the account, as a provisional and contingent act of intervention, will not only inform but provide the basis for asking new questions, for making connections between theory and practice, and for further research into
the African American adolescent mathematical experience of urban education and contemporary inner city conditions. Out of the personal dissonance that was central to producing the descriptions and analysis in this study come, I believe, the possibilities of empowerment and change. Perhaps my work will also make a worthwhile contribution to our collective knowledge base. In summary, clearly, only those individuals and groups living under social domination can transform the conditions of their oppression and exploitation.

At best, qualitative researchers in alliance and democratic dialogue with members of socially dominated communities can mutually and collectively construct forms of struggle, knowledge, and political action that may serve to transform oppressive conditions (see Roman, 1992).

As a native ethnographer like Jose Limon, Kenneth Clark, Joyce Ladner, and Warren Crichlow taking an ethical stance toward advocacy means engaging in the ongoing reflexive, revisionary work that will enable me to respond critically (and effectively) to the existing conditions of my community and transformatively toward the generally negating history of ethnographic representations that continue to circulate with my profession and this society. This is the most important commitment I think I can make in conducting qualitative research in mathematics education.
CHAPTER VI

DISCUSSION

Findings are soon forgotten, but not ideas.

B. Glaser in *Qualitative Research for Education*, p. 164.

Introduction

These case studies are the first to examine the mathematics preparation of African Americans. As such they provide crucial baseline data on a notable phenomenon in mathematics education. One central function of this study was to illuminate what is predicted, by this researcher, to be an incessant trend in mathematics education and urban schools. This study has a number of implications for further research that pertain to the mathematics education and mathematics preparation of African Americans and those who aspire to pass the mathematics section of the proficiency test and seek a better life beyond the hallowed halls of urban high schools. Much of the data reported in the literature on the mathematics preparation of African Americans was collected more than a decade ago and does not reflect the contemporary issue of the mathematics preparation. These case studies examined the unique nature of mathematics preparation as it pertains to African Americans and presents accounts of how such mathematics preparation adequately (or not adequately) prepares incessant test-takers for the proficiency test. Data from these case studies suggest that the mathematics preparation for African Americans is a significant event indicative of notable
changes in the mathematics classroom, and more broadly, in urban schools. Turbulent mathematics classroom forces - dramatic shifts in the school settings economic profile, and political and social culture - coupled with the considerable gang activity and violence can create an environment nonconducive to the mathematics preparation and mathematical learning of African Americans. These forces functioning separately and collectively shape the mathematics preparation environment through regular interaction with the students; these forces create an environmental texture within which the rational decision maker of mathematics pursues satisfactory choices bounded by imperfect mathematics information, time, cost constraints, and his/her own cognitive mathematics limitations. It is clear that the mathematics environment and decisions which emerge from it are not really separable. The findings of these case studies support several common themes in the mathematics preparation of select African American students within this urban high school. First, the formal mathematics instruction and mathematics preparation are in constant hysterical motion. New ideas, changes in the mathematics classrooms, shifts in the mathematics teachers population; decision of higher political authorities constituted changes in both the Hysteria's community at-large and Hysteria high school. The mathematics interactive process is a synergistic one in which the formal mathematics classroom instruction, preparation, and leadership, and the larger school community exert influence and control on each other with each simultaneously being unchanged.

The mathematics teacher exercises enormous control (to varying degrees) over the adequate and or inadequate preparation of African Americans and others within the mathematics classroom. The general mathematics environment exercises considerable control
over the mathematics preparation decision making of the Hysteria African American students. Changes in societal values, the emergence of concerned citizens in the form of interest groups at the local level and the recognition of growing threats to the education of American urban high school students were key factors that contributed to the mathematics environmental dynamics of the school. These mathematics environmental forces were responsible for this influx and affected the mathematics instruction and mathematics preparation of African Americans. Most notably, the mathematical environmental forces which shaped and determined the lack of mathematics preparation made by Hysteria African Americans were the mathematics teacher's acceptance of the incessant nonmathematical related interruptions within the classroom, and the social and political structures of the classroom.

Economically, Hysteria experienced stress due to the massive failure of its diverse ethnic groups and the astronomical dropout rates, and absenteeism. Socially, the school underwent unprecedented demographic changes in the socioeconomic status, and racial/ethnic composition of its populace. Politically, there were growing defiant voices and powerful interest groups in turbulent relationships with the school's mathematics teachers. Each of these forces, separately and collectively, complimented mathematics classrooms to reevaluate how the school would accomplish creative decisions. Substantial interaction on the part of the mathematics teacher is vital. Reliance on the standard operating procedures of effective mathematics classroom decorum is also essential to the mathematical learning of not just African Americans, but all students in these classrooms. It is unlikely that the mathematics teacher will feel tremendous pressure to address the crippling mathematics preparation which threatens the graduation and future goals of African Americans.
The third theme that these case studies support is that the mathematics teacher does not act alone, he or she significantly influences the behaviors in mathematics classrooms. The mathematics classroom is a direct result of the teacher not rectifying behaviors and events as soon as they occur. His tendency to not lead but rather manage the classroom has permitted nonmathematical related behavior and events to dominate the classroom owing to the penalty of other students' education. As a result of this the mathematics teacher behavior is in need of reconstructive surgery. Decision making activity included substantial direct goal setting and implementation such as using student-centered activities, opening school sites for mandatory after school tutoring for repeated test failures, and mandatory mathematics professional development workshops. During my stint at Hysteria, the school underwent several changes and was put on course for continual structural change.

The mathematics teacher was not a "Lone Ranger". He operated in concert with other mathematics teachers and within the parameters of mathematics classroom mandates. Even, still, the mathematics teacher's unique and poor leadership were marveled by his students. His mathematics abilities, personal and professional politics, commitments and concerns, and personal lifestyle significantly influenced the mathematics classroom course of action.

The fourth theme - the mathematics ability of the teacher function predominates the students within his class. No previous research examines the separate and unique nature of mathematics preparation. This glaring research gap points to several articulate assumption of the literature in mathematics education. The assumptions are (1) the mathematics education crisis for African American will continue to exist during my tenure in the academy; (2) the mathematics teacher is a placeholder charged with managing (that is, exercising
power/control over the inadequate mathematics preparation of African Americans) and not a decision maker charged with leading (that is, exercising empowerment and autonomy in the adequate mathematics preparation of African Americans); and (3) the mathematics education scientific community within this large Midwestern metropolitan city has primarily made short term, what I call the "bandaid" panaceas, to the mathematics education and mathematics preparation of African American.

The findings of these case studies do not support these assumptions. Repeatedly, it was articulated by Hysteria school students and the mathematics teachers -- that the school was constantly in a state of hysteria during the mathematics preparation was possible or desirable. Though it is not traditionally the function of the mathematics teachers, it was asserted that mere hysteria is functional for the school.

Hysteria is a school in need of continuity and new mathematics teachers. These two realities combined with the mathematics teacher's unorthodox approach to discipline in the mathematics classroom coupled with the leadership imperative of a decision maker rather than the conventional management imperative of a placeholder as an attempt to meet the mathematical needs of African Americans were totally disastrous.

Three issues dominated the mathematics classroom - rowdy students, an unprepared, unmotivated teachers, and myriad apathetic students. The mathematics teacher was a veteran lame-duck. His mathematical ability did not result in significant change during my stint in this school and the school remained the same.
Implications for Further Study

From any research study evolving issues warranting further research must unfold.

In the future, researchers may wish to:

1. Examine the effects and implications of the mathematics preparation of other ethnic groups as opposed to the mathematics preparation of African Americans;

2. Examine the effects and implications of the decision made by the mathematics teacher, particularly on the material he/she uses in preparing students;

3. Gather comparative case study data on other ethnic groups;

4. Gather comparative case study data on ethnic groups in school crisis and those in schools not experiencing crisis;

5. Collect data on the frequency of ethnic groups and subtypes;

6. Survey the state's ethnic groups and data on how to better prepare them for the test;

7. Examine the effectiveness of mathematics teachers teaching in classrooms with large majority of nonwhite students;

8. Collect state's quantitative data on the incidence of ethnic groups and the tenure length of taking the test.

This study has attempted to contribute to the still very small literature and research knowledge about African American urban high school students, as well as to the growing knowledge in mathematics education. Much more ethnographic research needs to be done with African Americans. With the growing number of mathematics educators and social scientists in the African American community and an increasing interest in the African American heritage among the postcolonial generations, the optimal circumstances for initiating further ethnographic research of the abundance of African American experiences with the mathematics classroom appear to be here. This group, as one of the rich ethnic
communities of the world, should be assured of continuation. Yet, with the possibility of an African American community, at least their experiences should continue in written documents.

The debate surrounding the mathematics section of the proficiency test is an ongoing process. Hopefully, this study has contributed to this discussion by outlining important different perspectives and illustrating what the current "mathematics preparation" did not and apparently cannot offer one particular group.
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APPENDIX A: INTERVIEW PROTOCOLS
INTERVIEW PROTOCOL I

1. Have you had any particularly good or bad experiences in mathematics or mathematics lab classes that stand out in your memory?

2. Would you talk about your history in mathematics classes from your early years of school up until now?

3. What mathematics courses did you take last year?

4. What help you the most to learn mathematics?

5. What do you think of the proficiency exams, and in particular the mathematics section?

6. How did you prepare for the test last year? , and This year?

7. Would you provide examples of the type of work you did in preparing for the test?

8. What type of assistance did you receive from the teachers? Explain. Anyone else?

9. Did you participate in any of the extra offerings available, such as tutoring, Saturday school, or summer school? Describe, evaluate.

10. What parts of the mathematics test are easiest for you? Hardest?

11. What was your scale score? How has it changed since grade nine?

12. Do you think it is important to pass the test? Explain.

13. How have the activities in mathematics lab helped you in preparing for the proficiency test in the past?

14. What are your future plans?
INTERVIEW PROTOCOL II


2. What mathematics course will you take this year? Why are you taking that course?

3. What is the most important thing you learned in this course?

4. What did you expect to learn in this course?

5. Tell me one new problem you can do now.

6. Suppose that I did not know anything about this course. If I asked you to describe the daily routine in this mathematics class, what would you say? How is disciplined handled?

7. How do you feel in this mathematics class?

8. What activity (activities) do you like in this course the most?

9. Tell me what you have been learning in this mathematics class. Did you enjoy this? Why or Why not?

10. What formulas or ideas do you wish you could have remembered during the mathematics proficiency test?

11. Do you see the mathematics proficiency test as culturally bias?

12. What type of feedback do your mathematics teacher give you on classwork?

13. Do you think the mathematics test reflects what you know?

14. How do you feel about being in Geometry B as opposed to a regular Geometry class? How do you feel in this class? How did you get placed in this class?

15. Can you think of anything else about the mathematics section of the proficiency test that you would like to share with me?
INTERVIEW PROTOCOL III

1. Did your mathematics class adequately prepare you for taking the mathematics section of the proficiency test? Why? or Why not?

2. Do you feel that last minute cramming prior to taking the mathematics section of the test is a good way to prepare for the test? Why? or Why not?

3. What advice could you have offered to your mathematics teacher that could have better prepared you?

4. Having taken the test for the ______ time. How has the material on the test changed over time?

5. Does it seem to be harder now, then when you took the test the first time?

6. Having taken the test, if you by chance have to take the test again, what formulas do you feel you need to memorize?

7. What do you do the night before taking the mathematics section of the test?

8. Did you have a successful mathematics history prior to taking the mathematics section of the test for the first time?

9. What do you see or feel contribute to you not having passed the mathematics section of the test?

10. Who do you feel should be accountable for you not having passed the mathematics section?

11. How do you feel about not having passed the test so far?

12. What keep you motivated to keep taking the test?

13. How do you feel about classmates that have passed and do you feel there are some students who have passed who you feel should not have passed?

14. How do you spend your summers? Did you review any mathematics or mathematics preparation materials?
1. How would you describe to your little brother or sister what your mathematics experiences have been like this year?

2. What advice on learning mathematics would you offer your little brother or sister?

3. If you were the teacher of a mathematics class, what changes would you make?

4. How do you compare your mathematics class with other classes you are taking in high school?

5. What is your least favorite part of mathematics?

6. What do you like best about mathematics?

7. Overall, what is mathematics?
INTERVIEW PROTOCOL V

1. How often do you talk with your parents or guardians about school? Tell me the last time you talked with your parents or guardians about school?

2. Do your parents or guardians expect you to do well in school? Do they expect you to do well in mathematics?

3. Do you think it is important to learn mathematics? Why?

4. Do you know anyone who uses mathematics? Who? How do they use mathematics?

5. Are there any students who just are not smart enough to be good at mathematics or can every student learn mathematics if they try hard enough?

6. Why do you think there are some students who cannot do very well in mathematics (or how do you know everyone can learn mathematics)?

7. Do you do well in mathematics? Explain.
1. Tell me what to look for in a good mathematics student.
2. Tell me what to look for in a good mathematics teacher.
3. How does it feel not to be able to figure out a mathematics problem?
4. How does it feel to do poorly on the classroom mathematics test or quiz?
5. How does it feel to do well on the classroom mathematics test or quiz?
6. Why do you think you are studying mathematics?
7. If you had the power to create your own mathematics program for students who have not passed the mathematics section of the proficiency test, what would you recommend?
APPENDIX B: MATHEMATICS PRACTICE PROBLEMS
The Problems

1. The following were deducted from Jennifer's $360 earnings: Federal Income Tax, $42; State Income Tax, $15; and health insurance, $30. How much did she take home?
   A. $317 C. $273
   B. $447 D. $87

2. Which inequality is true?
   A. $7.35 < 7.350 C. $7.35 < 7.3
   B. $7.35 > 7.305 D. $7.3 > 7.35

3. A road construction company is placing a warning sign every 360 feet on a section of highway that is under repairs. If the total length of the construction zone is 2,160 yards, how many signs does the company need?
   A. 6 C. 30
   B. 18 D. 54

4. There were seventeen thousand fans at Monday's game, rounded to the nearest thousand. What is the lowest number of fans that might have been at the game?
   A. 17,499 C. 16,501
   B. 16,499 D. 17,000

5. Margaret bought a stereo at a sale where everything was 65% off. How much did she pay for a stereo originally priced at $400.00?
   A. $140.00 C. $1,142.00
   B. $260.00 D. $615.00

6. Ramon is making a holiday display of foil-covered boxes. He cuts foil paper to fit and then glues it to the box surface. The boxes are 12 inches by 6 inches by 6 inches. He has a roll of red foil which is 36 inches wide and 62 inches long. How many boxes can he cover?
   A. 5 boxes C. 8 boxes
   B. 6 boxes D. 12 boxes
7. If a gallon of water weighs about 4 kilograms, how much will a quart weigh?
   A. 800 grams       C. 1,000 grams
   B. 16,000 grams    D. 2 kg

8. On a map one-fourth inch represents ten miles. The measurement of the distance from Cleveland to Cedar Point is 1 3/4 inches. Which amount below is the best answer for the distance from Cleveland to Cedar Point?
   A. 90 miles       C. 70 miles
   B. 8 miles        D. 12 miles

9. What kind of triangle has three congruent sides?
   A. Equilateral       C. Isosceles
   B. Scalene          D. Right

10. A pentagon has two sides of length 3 cm and three sides of length 4 cm. What is the perimeter?
    A. 15 cm       C. 20 cm
    B. 18 cm      D. 35 cm

11. Phil decided to paint the walls of the room before storing his boxes. If one gallon of paint covers 200 square feet of surface area, how many gallons of paint did he have to buy?
    A. 2 gal.       C. 6 gal.
    B. 3 gal.       D. 10 gal.

13. A package contains twenty red m & m's, twelve green m & m's, and sixteen yellow m & m's. If one m & m is drawn from the package, what is the probability that the m & m is green?
    A. 5/12       C. 1/3
    B. 1/4      D. 1/12

14. A student scores 85 and 92 on the first two tests. If the tests are graded on a scale from 0 to 100, what is the lowest the student can average for three tests?
    A. 59       C. 90
    B. 88.5     D. 92

15. A pizza costs $9.00 plus $0.75 per topping. What is the cost of a pizza with 5 toppings?
    A. $C = 9 + .75 + 5$       C. $C = 5(.75) + 9$
    B. $C = 5(9 + .75)$       D. $C = 5 + 9(.75)$
16. The surface area of an open-top box of width, \( w \), length, \( l \), and height, \( h \) is given by the formula:

\[ s = lw + 2lh + 2wh \]

What is the surface area in square inches of a box with width = 3 inches, length = 5 inches, and height = 4 inches?
A. 59  C. 79
B. 47  D. 82

17. Round 43,832 to the nearest thousand.
A. 43,800  C. 40,000
B. 44,000  D. 43,000

18. Maija wants to enlarge a figure that is 10 inches tall and 15 inches wide so that it will fill as much of a 20 inch by 24 inch poster as possible. What size should the enlarged figure be?
A. 20 in. by 30 in.  C. 16 in. by 24 in.

19. If Speedy can type thirty words in forty-five seconds, how many words can he type in one minute?
A. 40 words  C. 75 words
B. 66 words  D. 90 words

20. A car which cost $12,000 two years ago is worth $9,000 today. What percent of its value did it lose?
A. 90%  C. 12%
B. 25%  D. 75%

21. About how many 10-oz. glasses of fruit juice can you get from a gallon (128 oz.) jug?
A. 2 glasses  C. 12 glasses
B. 5 glasses  D. 13 glasses

22. One-half million seconds is most nearly equal to
A. 6 months  C. 6 days
B. 6 weeks  D. 6 hours

22. A loaf of whole wheat bread contains 7 grams of fat. Convert the amount of fat to kilograms.
A. 7000 kg  C. 0.07 kg
B. 0.007 kg  D. 0.007 kg
23. If an inch equals 2.54 centimeters, then 10 centimeters is how many inches?
   A. 25.4  C. 39.4
   B. 3.94  D. .254

24. The probability is .4 that a given day will be cloudy. Using this as a guide, how many sunny days can be expected in a 90-day period?
   A. 40  C. 54
   B. 50  D. 86

25. Solve $4t + 10 = 20$
   A. 8  C. 3
   B. 2.5  D. 12

26. A bridge has a load limit seventeen tons. How many trucks weighing three thousand pounds each will the bridge support at one time?
   A. 11  C. 17
   B. 12  D. 25

27. How many square feet are there in twelve square yards?
   A. 144  C. 36
   B. 108  D. 48

28. Which statement is not correct?
   A. 36 oz. = 3 lbs.  C. 1 gal. = 8 pt.
   B. 5 yd. = 15 ft.  D. 2 tons = 4000 lb.

29. The average temperature on Monday was 74 fahrenheit. The average temperature on Tuesday was 26 Celsius. Which statement is true?
   A. Monday was colder than Tuesday  C. There was no difference
   B. Monday was warmer than Tuesday  D. Tuesday was colder than Monday

30. The table shows the number of people in each town of Brown County. Which town has the smallest population?

<table>
<thead>
<tr>
<th>Town</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brown</td>
<td>40,000</td>
</tr>
<tr>
<td>Flowerville</td>
<td>2,000</td>
</tr>
<tr>
<td>Ludlum</td>
<td>2,500</td>
</tr>
<tr>
<td>Schubeck</td>
<td>22,000</td>
</tr>
</tbody>
</table>
31. This graph shows the increase in the number of dinners served at "Bob's" during a week, Monday through Saturday. The average (mean) daily increase in the number of dinners served is closest to which of the following numbers?

<table>
<thead>
<tr>
<th>Day of the week</th>
<th># of dinners served</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>10</td>
</tr>
<tr>
<td>T</td>
<td>15</td>
</tr>
<tr>
<td>W</td>
<td>40</td>
</tr>
<tr>
<td>Th</td>
<td>50</td>
</tr>
<tr>
<td>F</td>
<td>60</td>
</tr>
<tr>
<td>S</td>
<td>80</td>
</tr>
</tbody>
</table>

Dinners at Bob's

A. 6       C. 20
B. 13      D. 37

32. Using the following graph which compares the growth of males and females. How many years old is the male when he reaches the height of an eleven-year-old females?

Rates of growth

A. 10       C. 12
B. 11.5     D. 12.5

33. Find the circumference of the circle shown. Round your answer to the nearest whole number.

A. 22 m       C. 132 m
B. 44 m       D. 154 m
34. The dimensions of a rectangular swimming pool are 15 feet by 30 feet. The dimensions of a rectangular deck that surrounds the pool are 31 feet by 40 feet. Find the area of the deck only.

![Diagram of pool and deck]

A. 1,690 sq ft. C. 790 sq ft.
B. 1,240 sq ft. D. 450 sq ft.

35. Using the metric ruler below, find the distance between points A and B.

![Metric ruler]

A. 3.4 cm C. 7.7 cm
B. 4.3 cm D. 15.4 cm

36. What is 35% of $80.00?
A. $52.00 C. $28.00
B. $26.00 D. $228.57

37. The formula $I = P \times R \times T$ calculates the interest ($I$) given the principal ($P$), the rate ($R$), and the time ($T$) that money is invested. Find $I$ when $P = $4,000, $R = 7\%$, and $T = 3$ years.
A. $280 C. $920
B. $1,200 D. $840

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38. To the nearest integer what is the value of $t$ in the expression
\[ 265.34 - t = 65.32 \]
A. 201  
B. 331  
C. 330  
D. 200

39. The Smart family budget is shown below. If the monthly income is $2,000, how much is spent on food and rent?

```
The Smart Family Budget
```

A. $700  
B. $1,200  
C. $500  
D. $600

40. Use the graph shown to determine how many people attended the game on October 6.

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CINCINNATI BAN LIES
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A. 4,750  
B. 4,500  
C. 475  
D. 47,500

APPENDIX C: GROUNDED SURVEY
Grounded Survey
The Geneva University

Survey of a student knowledge/exposure to his/her mathematics class and to the state­wide proficiency examination in mathematics.

BACKGROUND INFORMATION

This survey is being conducted to find out the extent of knowledge and exposure a student has had pertaining to the statewide proficiency examination in mathematics. Your responses are confidential. Thank you for taking the time to complete this survey!

1. Check one: _____ Less than 15 _____ 15 or 16 _____ 17 or 18
   _____ 19 - 21 _____ Over 21

2. Check one: _____ Male _____ Female

3. Check one: _____ Freshman _____ Sophomore
   _____ Junior _____ Senior

4. Check one: _____ African American _____ Hispanic American
   _____ Native American _____ Asian American
   _____ European American _____ Other

5. Your after high school short term and long term goals ____________________.

6. Highest level of education completed by either parent or significant adult(s) in the home.
   _____ Elementary _____ Junior High
   _____ High School _____ College
   _____ Graduate School _____ Professional

Please use any adjective you think appropriate to describe the following:

7. Mathematics is ____________________.
8. My mathematics teacher is ____________________.
9. My mathematics classroom is ____________________.
10. My classmates in the mathematics class are ____________________.

Thanks again for your help; we really appreciate it.