UNDERSTANDING THE BURDENS OF RACE AT A PREDOMINANTLY WHITE UNIVERSITY: THE EXPERIENCES OF UNDERREPRESENTED STUDENTS IN AN INTRODUCTORY STATISTICS COURSE

DISSERTATION

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ABSTRACT

The researcher sought to understand the experiences of underrepresented students in introductory statistics courses. This research considered the burdens of race and culture from the effects of history, societal perceptions, and inadequate preparation on underrepresented (African American and Latino) students inside the classroom. Finally, the research considered the important influences and predictors of underrepresented students achieving statistics performance.

Using a conceptual framework consisting of Critical Theory, Critical Race Theory, Ogbu's Cultural-ecological theory, and social constructivism, this research used a mixed methodology consisting of a grounded theory approach and exploratory multiple linear regression models. The researcher conducted a comparative qualitative study of five underrepresented and seven represented students in two introductory statistics courses at a predominantly White university. The researcher also conducted a survey of 52 underrepresented and 389 represented students in the courses. Furthermore using an autoethnographic representation, the researcher used his lived experiences considering himself as a participant to provide further insight and richness of the data.

Findings from this research for underrepresented students were (a) The burdens of race from negative societal stereotypes and poor mathematical foundations accentuated by poor graph comprehension and lack of interest in mathematics/statistics that challenge statistics conceptualization, (b) the importance of positive support networks, (c) lack of participation in their statistics course, (d) many come from discouraging backgrounds with a lack of opportunities and resources non-conducive to a learning environment, and (e) the important qualities of effective teachers of underrepresented students. Finally, the data suggested that underrepresented students believed the race and cultural competence of the teacher was important.

Recommendations from this research for underrepresented students suggest (a) teachers stressing studying details to understand statistical concepts, (b) teachers providing interesting examples of which some should include social issues (c) influential people encouraging positive support networks (d) teachers continually practicing their communication skills, (e) universities hiring more underrepresented statistics teachers, and (f) teachers becoming more culturally competent.

Dedicated to my positive support network of family, friends, instructors, and colleagues

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LIST OF SYMBOLS AND ABBREVIATIONS

Symbol or Abbreviation	Description
ACT	American College Test
CEO	Chief Executive Officer
CFO	Chief Financial Officer
CGI	Cognitively Guided Instruction
CRT	Critical Race Theory
CT	Critical Theory
EEO	Equal Employment Opportunity
GED	General Education Diploma
GPA	Grade Point Average
MBA	Master of Business Administration
NAEP	National Assessment of Educational Progress
OSU	The Ohio State University
QUAL	Qualitative
quan	Quantitative
SAT	Scholastic Aptitude Tests
SES	Socioeconomic Status

t	Computed value of t test
TSU	Tennessee State University
X^2	Computed value of a chi-square test
z	A standard score; difference between one value in a distribution and the mean of the distribution and the mean of the distribution divided by the standard deviation

CHAPTER 1

INTRODUCTION

Statistics is a relatively new and modern mathematical science. As actions are increasingly taken and decisions are increasingly made on the basis of statistical information, it has gained increased attention in industry, business, and government (Shaughnessy & Zawojewski, 1999). Furthermore, journals, magazines, newspapers, and various other media outlets, use the subject frequently. Skills in statistics are essential in the everyday lives of informed citizens and in the roles in the workplace (Shaughnessy & Zawojewski, 1999). Furthermore, statistics assists in obtaining advanced degrees which ultimately leads to high status employment (Parker, Keillor, & Pettijohn, 1999).

Many researchers of mathematics education have focused on the achievement gap between underrepresented minorities such as African Americans and Latinos and their represented counterparts, Whites and Asians. These researchers have explored such topics as the inferiority complex that underrepresented students endure in the classroom, the struggles of underrepresented students against "acting White," the response to racism and its effect on academics, and the effects of negative stereotypes on academics.

Unfortunately, statistics education researchers have not established nearly as rich and in-depth look into understanding the academic statistics performance of underrepresented students. A gap in the literature has been that there is little research regarding underrepresented students' statistical performance.

Because of the importance of such a topic, this research investigates the burdens associated with underrepresented students' statistical performance in a predominantly White university. These burdens have their basis in history of ongoing racism and negative stereotypes that raise questions about underrepresented groups' value in society and also the relatively weaker, K-12 mathematics preparation. Furthermore, these burdens serve a negative force in the classroom as underrepresented students question their abilities to achieve statistical excellence due to poor mathematical foundations often found in under-resourced schools.

This study considers the issues, factors and experiences that contribute to the exacerbation of these burdens, and how these burdens may be eased. It considers the effects of race in society and the classroom; as well as considers the role that influential support networks and teachers play. Last, it explores the role of general education and specifically mathematics in order to help understand how to help underrepresented students achieve in statistics performance.

Problem Statement

Due to advancements in technology, statistics has increasingly become more important in a variety of disciplines, fields, and careers. Because of its prevalence in our society, a substantial number of universities have required that all students take an introductory statistics course. Research has shown a substantial achievement gap between some ethnic groups and their underrepresented minority counterparts in mathematics. Because of the opportunities and the significance of understanding the

subject in order to understand media outlets and research, it is important that there is not a gap in statistics achievement between underrepresented minorities and represented.

Research Purposes

The study set out with 3 purposes: (a) To explore, describe, and determine the influential factors that are involved in the success and failure of underrepresented minority students in an introductory college level statistics course; (b) To generate findings that can assist education professionals pedagogically when instructing underrepresented minority students; (c) To serve as a catalyst in developing an awareness of statistics related careers amongst underrepresented minority students.

The study will describe underrepresented minority college students' experience in an introductory statistics course and it will set forth to determine within and between group differences based on gender, race and statistics academic achievement.

The primary questions that the study will address are:

1. What are the burdens of race on underrepresented students in a predominantly White university?
2. What are the burdens of race in an introductory statistics course?
3. How can the burdens of race be eased in an introductory statistics course?
4. In comparing underrepresented and represented students, what are the differences in influences and predictors of determining statistics performance?

Rationale

In recent years, standardized tests have shown that many students of color have not been successful in mathematics (Rousseau & Tate, 2003). "Across many national

surveys of student achievement, African American and Hispanic students remain largely over-represented in the lower tails of achievement distributions and underrepresented in the upper tails of these distributions" (Rousseau & Tate, 2003). Unfortunately, this trend does not appear to be changing. In the 1983 National Assessment of Educational Progress, results indicated that 17-year-old Hispanic and African American students were below the national average whereas the White students scored above the national average on four types of mathematics exercises (House, 1993). Rousseau and Tate reported that many students of color were not performing at acceptable levels in school mathematics (House, 1993).

Because of the increased usage of statistics, more organizations are requiring that the student understand introductory statistics concepts. "The Curriculum and Evaluation Standards for School Mathematics has echoed the increased attention to statistics in society by recommending a prominent role for applications of data and chance in school mathematics" (Shaughnessy & Zawojewski, 1999). A study of The American Assembly of Collegiate Schools of Business schools found that at the undergraduate level 72.8% of the schools required two semesters of statistics and 69.3% provided graduate level courses in statistics (Parker et al., 1999). Ninety percent of the schools required a core-level course in statistical methods at the MBA level (Parker et al., 1999). At the same time, the National Assessment of Educational Progress (NAEP) (National Science Foundation, 2002) has increased the number of items on data analysis, probability and statistics. Furthermore, the results of NAEP indicate that more institutions are emphasizing the learning of the statistics (Parker et al., 1999).

Besides addressing the achievement gap in probability and statistics, rationale for conducting this research concerns the need for more people of color that call for knowledge of statistical careers in the United States, future opportunities awaiting underrepresented students, receiving assistance from universities, and encouraging knowledge of statistics in avoiding institutional discrimination.

The Need for Underrepresented People of Color in Statistics

Part of the researcher's rationale in conducting this study is to increase awareness and interest about career opportunities in the field. African Americans and Latinos remain largely underrepresented in mathematics intensive careers (Gainor & Lent, 1998; Miller, 1995). In 1979 and 1989, African Americans and Latinos accounted for 6.2% and 8.3% of the Bachelor's degrees in the natural sciences, computer/informational sciences, and engineering degrees respectively. Furthermore, in the same years, these two groups accounted for only 2.7% and 3.3% of the doctoral degrees in these fields.

In a study of 164 first-year 17 – 22 year-old African-American college students attending a predominantly White university, Gainor and Lent (1998) used a modified version of Bandura's social cognitive theory to analyze racial identity attitudes to predict the mathematics career choice intentions of African-American students. In their study of first year African-American students, Post, Stewart, and Smith (1991) found that self-efficacy and interests significantly contributed to men's consideration of careers in mathematics and science. Gainor and Lent (1998) similarly found relations between gender and math self-efficacy where the men tended to report higher efficacy expectations in comparison to the women. They also found that interest alone predicted

women's consideration of such careers (Gainor & Lent, 1998). Coupled with this research, Anderson cited that out of 341 United States citizens who received a Ph.D. in mathematics in 1988, three went to Latinos and one to an African-American (S. E. Anderson, 1990). From 1979 – 1990, 78 African Americans and 97 Latinos received doctorates in physics and/or astronomy. In 1999, the mathematical sciences consisted of approximately 6% African American and Hispanics made up approximately 2% - 4% (National Science Foundation, 2002). In 1999, the National Science Foundation reported that African-Americans and Hispanics each comprised approximately 3% of the science and engineering occupations (National Science Foundation, 2002). These statistics suggest that African-Americans and Hispanics are underrepresented in the statistics related occupations.

Future Opportunities Exist for Underrepresented Groups in Statistics Related Fields

This body of research has far-ranging implications. Anderson (S. E. Anderson, 1990 p. 291) states a prediction generated from the Commission on Professionals in Science and Technology report that says by the year 2010 at least 33% of 18-year-olds in the United States will be African-American or Latino. In the same article, it was said that by the year 2000, Blacks, Latinos, and women would be 85% of the United States' workforce. Contrary to predictions, in December 2000, and June 2005, the Bureau of Labor Statistics reported that 59% of the workforce was Black, Latino, and women (Bureau of Labor Statistics, 2000, 2005). Regardless a large percentage of Black,

Latinos, and women comprise a large part of the workforce. These statistics suggest there will be opportunities for underrepresented groups in fields that require statistical understanding.

The Need for Universities to Provide Assistance

Students often take statistics courses in colleges and universities. This study suggests that to assist underrepresented students in statistics performance, universities need to understand underrepresented students' background and culture. Therefore this research will give educators insight into ways to approach teaching statistics to underrepresented students. It will also offer suggestions to universities and colleges on how to help underrepresented students achieve in college. It is the hope of the researcher that a residual affect of this research will occur that will encourage underrepresented minority students to consider and pursue careers in this field thereby contributing to a much more diverse workplace.

Avoiding Statistical Misrepresentation

The word statistics has its origin in German but "was coined from new Latin, with specific reference to the public domain, as a 'science dealing with the facts of a state'"(Woolf, 1989). Statistics was an established normality in the academic preparation of public administrators in the late eighteenth century. During that time period, one of the views about the subject was that it was "an inquiry for the purpose of ascertaining the political strength of a country, or questions respecting matters of State" (Woolf, 1989 p. 591).

Germany was not the only country using statistics to question matters of the state. During the 1800s, France used the departmental statistics to understand the irrational and ungrateful reactions of their people for their self-evident benefits of the Revolution (Woolf, 1989). Philanthropists and criminologists with the Restoration and July monarchy applied statistics to "discover," understand, and control "unpredictable" lower classes (Woolf, 1989). Furthermore, anthropology used statistics as its tool for analyzing social data (Woolf, 1989). Statistics was being used to control and direct the lives of society, and it was "indelibly marked with the imprint of Authority" (Woolf, 1989p. 599).

To keep from repeating history, it is important that educated members of society understand basic statistics. Woolf (1989) mentioned the use of statistics in modern Western society by governments. By having an understanding of statistics, we are becoming informed citizens which will help keep governments from deceiving us.

Considering that some minority groups are underrepresented in statistics related fields, it is possible that this group of people will lack the understanding and knowledge needed to question statistical research results. Coupled with the need to be able to question the government's decisions based on statistics, this provides further validation for the need of more underrepresented groups to understand statistics. To illustrate, Navarro (1991, p. 436) discusses an example of the misuse of statistics by the government.

> The U.S. government rarely collects health data broken down by social class. When it did do this in 1986 for heart and cerebrovascular disease, enormous gaps were found: 'The death rate from heart disease, for example, was 2.3 times higher among unskilled blue collar operators than among managers and professionals. By contrast, the mortality rate from heart disease in 1986 for

> blacks was 1.3 times higher than for whites…' The way in which statistics are kept does not help to make white and black workers aware of the commonality of their predicament.

Chapter Descriptions

The dissertation is organized as follows. Chapter 2 provides the conceptual framework for the research providing a synthesis of four theories contributing to the explanation of how societal factors influence the introductory statistics learner. Chapter 3 reviews the related literature pertaining to influences on underrepresented students performing poorly or successfully in mathematics and statistics courses. Chapter 4 provides the methodological approach. Chapter 5 discusses some of the major findings relating to the burdens of race that are influenced by multiple sources such as society and positive and negative networks. Chapter 6 provides further findings associated with the students' perspectives into pedagogical influences in underrepresented students understanding introductory statistics. These findings are related to qualities of effective teachers and burdens associated with the fear of poor mathematical preparation and coming from disadvantaged backgrounds. Finally, chapter 7 recommends ways of helping underrepresented students perform better in introductory statistics courses. It suggests teachers stressing studying details, providing good examples, encouraging support networks, and being culturally competent.

CHAPTER 2

CONCEPTUAL FRAMEWORK

Chapter 2 will describe the conceptual framework for this research. This conceptual framework consists of a synthesis of four theories: (a) Critical theory (CT), (b) Critical Race Theory (CRT), (c) Ogbu's cultural-ecological theory of minority school performance, and (d) social constructivism that will be used as a lens in gathering, analyzing, and interpreting the data in this research. Critical theory is used as a lens to confront hegemonic forces in our society. Critical race theory (CRT) which was generated from scholars of color who studied law (Howard-Hamilton, 2003) begins with the idea that racism in American society is not aberrant but normal (Howard-Hamilton, ; Ladson-Billings, 2000; Rolon-Dow, 2005). CRT describes how race influences individuals from a societal perspective. Cultural-ecological theory discusses involuntary minorities' response to their history in the United States and how their responses to that history influence their perceptions and responses to school (J. U. Ogbu & Simons, 1998). Finally, social constructivism states that knowledge is not an individual experience, but one that is shared and constructed by the learners using previous skills, history, culture, and experiences (Prawat & Floden, 1994).

Critical Theory

Historically, critical theory (CT) originated from the theories developed by a group of writers from the Frankfurt school and associated with the Institute of Social Research at the University of Frankfurt (Kincheloe & McLaren, 1994). The writers were influenced by the aftermath of World War I. The unemployment rate, devastation, failed strikes, inflation, and economic depression marked these influences (Kincheloe & McLaren, 1994). At this time period, it was believed that the world was in need of reinterpretation. These writers' concerns defied Marxist orthodoxy and deepened their own philosophies that injustices and subjugation shaped the world (Gibson, 1986).

Critical theory provided the voice of concern geared toward the politics of psychological and cultural revolution with an overtone of political emancipation from a historical, cultural context (Gibson, 1986). The theory stood as a guide for confronting hegemonic forces (Kincheloe & McLaren, 1994). It analyzes interests of competing powers - the oppressed versus the oppressor - to understand who gains and lose in society. Critical theory considers the status quo of the privileged and how their privileges are contained. It provides an analytical lens for discerning and exposing those groups that prevent others from establishing and shaping their lives autonomously. It addressed the idea that since the 1960s people in society had become accustomed to being dominated and had lost their zeal for equality and independence (Kincheloe & McLaren, 1994). Furthermore, critical theorists understood the power of language and how it was used as a tool of domination. "Discursive practices are defined as a set of tacit rules that

regulate what can and cannot be said, who can speak with the blessings of authority and who must listen, whose social constructions are valid and whose are erroneous and unimportant" (Kincheloe & McLaren, 1994).

Some theorists developed the critical theory into an educational framework. Giroux (1988) believed that schools could become institutions where different forms of knowledge, values, and social relations could be taught for the purpose of critical empowerment as opposed to subjugation. School should be used for understanding why things are and how those things became that way (Clifford & Marcus, 1986; H Giroux & Simons, 1989). Critical theory recognizes that dominant power consists of many forms. One of those forms was social psychology used to win people's consent to domination through cultural institutions such as the media, schools, family, and churches (Kincheloe & McLaren, 1994). This domination could entail educators promoting what belief system and views of success could be taught (Kincheloe & McLaren, 1994). Critical theorists suggest that school is used as a tool for socializing people into a capitalist society (Bowles & Gintis, 1976). It is a structure devoted to maintaining and regenerating the business elitists', or privileged cultural capital of ruling-class group's way of life (H Giroux & Simons, 1989). Schools reproduce and support the division of labor, mediation of mobility and job selection. Students from different social classes are prepared differently in society (H. Giroux & Purpel, 1983). The current school system eludes topics of conflict, domination, and subordinate power relations society (Apple, 1979). The system often does not introduce the student to topics relating to their experiences and interests (L. A. Bell & Schniedewind, 1987). In summary, critical theory is particularly concerned with issues of power and injustice and the ways that the economy, matters of

race, class, and gender, ideologies, discourses, education, religion and other social institutions, and cultural dynamics interact to construct a social system (Kincheloe & McLaren, 1994).

Critical Race Theory

According to Delgado (1995), Critical Race Theory (CRT) arose in the 1970s as a result of the work of Derrick Bell and Alan Freeman who were both distressed over the slow pace of racial reform in the U.S. They both believed that the methods of filing amicus briefs, conducting protests and marches, and appealing to the moral sensibilities of decent citizens were no longer producing the gains of previous times.

Ladson-Billings and Tate (1995) began their discussion on CRT by referring to three central propositions of social inequity: (a) Race is a continuously significant factor in determining inequity in the United States, (b) the United States' society is based on property rights, (c) the intersection of property and race creates an analytical tool through which we can better understand social inequity. The same educational process that elevates the oppressor while depressing the oppressed demonstrates this social inequity (Woodson, 2000). For the oppressor, the process inspires and stimulates their thoughts that they are everything and have accomplished anything worthwhile; for the oppressed, however, the process works oppositely (Woodson, 2000). The oppressed are made to feel as if their race amounts to nothing and will never amount to anything (Woodson, 2000). In an effort to change society, critical race theorists attempt to inject the cultural viewpoints of people of color stemming from a common history of oppression and racial

hegemony (Barnes, 1980). CRT also strives to understand the contemporary, contextualized ways in which race operates in society in order to understand both individual experiences and outcomes (Rolon-Dow, 2005).

Ladson-Billings and Tate (1995) explain that the meta-proposition used to support the first proposition is that class and gender do not have enough explanatory power to understand all of the differences in the school experience and performance. Neither class nor gender is able to stand alone as variables that can explain the educational achievement differences between African-Americans and Whites (Ladson-Billings & Tate IV). For example, class and gender alone cannot account for the extraordinarily high dropout rates, suspension, expulsion, and failure among African-Americans (Ladson-Billings & Tate IV).

The second proposition, that the U.S. society is situated in property rights, is important to CRT. A precursor to CRT, critical race legal scholarship was developed in the 1970s partially because minority scholars felt as though they were being overlooked in critical legal studies (Monaghan, 1993). The theory is an outgrowth of both a separate entity for a legal movement that challenged the traditional legal scholarship that focused on doctrinal and policy analysis (Gordan, 1990) in favor of a form of law that spoke to the specificity of individuals and groups in social and cultural context (Monaghan). While there are differences in CRT and its precursor, Delgado (1995) argues that there are shared similarities:

1. There is the assumption that racism is not just individual acts but is a contagious, deeply ingrained, cultural, and psychological way of life in America.

2. There is a need for a reinterpretation of civil-rights laws. Some of the laws are often undermined before fulfilling their promise.
3. The traditional claims of legal neutrality, objectivity, color-blindness, and meritocracy as camouflage for the self-interest of the dominant culture in America need to be challenged (Howard-Hamilton, 2003).
4. There needs to be an insistence on the reformulation of legal doctrine and subjectivity to reflect the perspectives of those who have been victimized by racism and experienced it firsthand.
5. Stories of first-person accounts should be used.

Throughout the relatively young history of the U.S., there have been many struggles and tensions connected to the issue of property rights in its multiple forms (Ladson-Billings & Tate IV, 1995). These struggles occurred with the Native Americans and Japanese Americans in the form of property (Takaki, 1993) and continued with the Africans as property (Franklin, 1988). It is a central feature of America to be able to define, possess, and own property.

Part of the CRT as explained by Ladson-Billings and Tate (1995) suggests that the cause of the poverty of African-Americans in conjunction with the condition of their schools and schooling is due to institutional and structural racism. The researchers make the point that if racism were merely isolated, individualized acts, we would expect to see some examples of educational excellence and equity in the public schools and not just the non-public schools. CRT addresses and challenges the ideas that the American educational system operates to "ensure objective, meritocracy, neutrality, and equal opportunity" (Howard-Hamilton, , 2003; Solorzano, 1997). Furthermore, CRT

recognizes that people of color have been treated as if being all the same with disregard for regional, socioeconomic, and gender differences that may contribute to the way the person experiences the world (Peterson, 1999). This notion has failed in eliminating social, economic and political disparities between races.

This type of racism is so complex that even when people recognize its failures to make sense, they continue to employ and deploy it (Ladson-Billings, 1998). Because of the secretiveness and structure of this type of racism, new terminology is adopted. Terms such as "school achievement," "middle-classness," "beauty," and "intelligence," are all normative categories of whiteness while terms such as "gangs," "welfare recipients," and "basketball players" become the marginalized and de-legitimated categories of blackness (Ladson-Billings, 1998). Furthermore, CRT argues that institutional and structural racism is the cause of inequity in school funding (Ladson-Billings, 1998). The vast majority of the states fund their schools based on property taxes. Thus, the areas that have wealthier property typically have better-funded schools (Ladson-Billings, 1998).

One of the "strengths" of CRT is the way it is represented. Critical race theorists often "use parables, chronicles, stories, counter-stories, poetry, fiction, and revisionist histories to illustrate the false necessity and irony of much of current civil rights doctrine" (Ladson-Billings & Tate IV, 1995). Narratives are used primarily in CRT because they add the contextual contours to the seeming "objectivity" of the positivist perspective (Ladson-Billings, 1998). Critical race theorists integrate their experiential knowledge with their history of racism and sexism to transfer a world deteriorating with racial hegemony (Barnes, 1980). Delgado (1989b) explains three reasons for representing scholarly ideas in this manner: (a) Much of reality is socially constructed; (b) through

stories, members of outgroups are provided a vehicle for psychic self-preservation; and (c) exchanging stories from the teller to the listener can help overcome ethnocentrism and the dysconscious conviction of viewing the world in one way. Delgado (1989a) states, that most oppression does not seem like oppression to the perpetrator. The dominant group of society justifies its power with stock stories. These stories construct reality in ways to legitimize privilege. Stories by people of color can counter the stories of the oppressor.

Through their discussion on CRT, Ladson-Billings and Tate (1995) discuss the concept of reputation as property. Reputation is oftentimes demonstrated in legal cases. Thus, they make the points that calling a white person "black" is defaming. Similarly, calling a school any word other than White diminishes its reputation or status (Ladson-Billings & Tate IV). An example that they give is of how an urban school has come to be recognized as a Black school; however, a suburban school is a "positive" connotation of being White. However, if the urban school students ever begin to attend the suburban school, the suburban school loses its reputation.

CRT hypothesizes that "Whiteness" is constructed in this society as the absence of the 'contaminating' influence of blackness (Ladson-Billings & Tate IV, 1995). In other words, one drop of Black blood makes one Black (D. A. Bell, 1980). This idea allows the dominant culture the power to exclude absolutely. Absolute rights allow the schooling systems the power to re-segregate via tracking and the institution of honors programs and advanced placement classes (Ladson-Billings & Tate IV, 1995). This exclusion can be so powerful that African-Americans can attend a university in the role of an intruder who has been given special permission to be there.

Three ways that CRT affects our school system is through the curriculum, instruction, and assessment (Ladson-Billings, 1998). CRT questions the role, processes, and structures of schools in maintaining racial, ethnic, and gender subordination (Lynn, 1999). From a CRT perspective, the school curriculum is a culturally specific artifact used for the purpose of maintaining a White supremacist master script (Ladson-Billings, 1998). Swartz (1992) says that the master script is used to silence multiple voices and perspectives while legitimizing the dominant male culture as the "standard" voice of knowledge. "The master script deletes or distorts the stories" of people of color, "especially those who challenge the power and authority of the dominant culture" (Peterson, 1999 p. 6). Only those differing accounts and perspective that may be disempowered through misrepresentation are allowed (Swartz).

Critical race theorists believe that the current pedagogy presumes that African-Americans and Latinos are deficient. Thus instructors are in a constant never ending quest for the "right strategy or technique" to control African American students (Ladson-Billings, 1998, 2000). Deficiencies in individual performances are not seen using this race-neutral perspective. As a consequence, when these instructional strategies fail, it is not the strategy that is blamed, but it is the student (Ladson-Billings, 1998).

Finally, critical race theorists believe that intelligence assessment has been a means to legitimize African-American students' deficiency under the guise of scientific rationalism (Alienikoff, 1991). One purpose of the African-American is to serve as a symbolic index of poor Whites (Marable, 1983). Thus the working class White is able to feel relatively superior to the African American. However, this allows the Whites with real power to exploit both groups. Throughout the U.S. history, "scientific" theories (e.g.

intelligence assessment) have been a means of de-legitimizing African Americans' (intelligence) ability (Marable, 1983). Crenshaw (1988) says that stereotypes of inferiority are no longer used to merely rationalize the oppression of African-Americans, but rather to serve the hegemonic function by perpetuating a mythology about both Whites and African-Americans that reinforce an illusion of the White community cutting across ethnicity, gender, and class lines.

John Ogbu's Cultural-ecological Theory

John Ogbu (1997) explains his Cultural-ecological Theory as a minority's response to the educational system as a consequence of racism. He explains that in order to understand this response, we must understand minorities' "response to their history of incorporation into U.S society and their subsequent mistreatment by White America" and how that response to history affects their perceptions of and responses to school (J. U. Ogbu & Simons, 1998 p. 158). The theory also focuses on the differences between Ogbu's classifications of minorities.

Minority Classifications

Ogbu (1997) defines minority status in relation to power between groups. A group is considered to be a minority if it is dominated by a group in relationship to positions of power within the same country or society. He focuses on two types of minorities in which he calls voluntary and involuntary. The theory provides a framework for understanding the behaviors, beliefs, and attitudes of minority groups (J. U. Ogbu & Simons, 1998).

Voluntary Minorities

Ogbu (1997) defines voluntary minorities as those groups who willingly moved from their country to the United States in search of better opportunities. Those opportunities encompass job, political, and/or religious freedom. The main difference with this group versus the majority is that they voluntarily move to the United States and they do not perceive that they were forcibly entered into the United States. Voluntary minorities are characterized by differences that existed within the group before leaving their country and becoming a minority which Ogbu calls primary cultural differences (J. U. Ogbu, 1990). Typically, they face discrimination due to either cultural and/or language differences (J. U. Ogbu, 1990; John U. Ogbu, 1997).

Involuntary Minorities

Involuntary minorities are describes as those groups who were brought to the United States by force, conquered, or colonized (1997). Unlike voluntary minorities, this group became part of the United States society against their wills. This group typically interprets their presence in the United States as forced upon them by the majority. Similar to the voluntary minorities, this group typically brings its own culture and language. They are characterized by having arose after becoming minorities that Ogbu call secondary cultural differences (J. U. Ogbu, 1990).

Cultural Model Differences

Cultural models are models that explain how members of a minority group interpret, understand, and guides their actions in the world (J. U. Ogbu & Simons, 1998). Ogbu suggests that minorities have different cultural models in the United States' society. He describes four understandings that minorities possess: (a) frames of reference, (b) folk theories and role models, (c) degree of trust of the majority and their institutions, and (d) beliefs about the effect of adopting majority ways on minority identity.

Frames of Reference

The way a person or group looks at a situation is described as a frame of reference (J. U. Ogbu & Simons, 1998). Ogbu (1998) suggests that voluntary and involuntary minorities have different frames of reference which give insight to the difference in attitude and behaviors. Voluntary minorities typically have a "positive" frame of reference while involuntary minorities typically have a "negative" frame of reference. Voluntary minorities have a frame of reference that is based on the opportunities in the United States as opposed to those in their home country. Because of this frame of reference, this group is willing to accommodate and be discriminated against for the "promise" of economic gain and success. However involuntary minorities see their economic, educational, and social conditions as inferior to the majority. This group resents that the majority has greater opportunities and does not accept the idea that the United States is a land of great opportunity where education promises success (J. U. Ogbu & Simons, 1998).

Folk Theory and Role Models

Folk theory has to do with the ideas and stories passed down from different generations that suggest that the United States is the land of opportunity. Voluntary minorities' folk theory suggests that working hard, obeying the rules, and getting a good education will lead to good employment and success (J. U. Ogbu & Simons, 1998). The community, family, and students believe that they can achieve what White America has attained.

On the other hand, involuntary minorities have a different folk theory. Their theory is an ambivalent form of succeeding (J. U. Ogbu & Simons, 1998). While they believe that education is the pathway to success, history contradicts their notion. This group believes that institutionalized racism exists in the job market and education and thus individual effort, education, and hard work is futile. While their community tells their children that education is the way to success, this group believes that education is not necessarily a guarantee for being a success (J. U. Ogbu & Simons, 1998).

These two minority groups have differences in their role models. Voluntary minorities typically have fully acculturated, possess high degrees, and have achieved financial success. The role models have worked hard and played by the rules. Because voluntary minorities are not as resentful about adapting to the majorities' culture, their role models are typically people who have learned the culture of the majority. Involuntary minorities have a different concept of who a role model is. Their role models typically are entertainers, athletes, professionals, the wealthy, the courageous, and rebels against White society (J. U. Ogbu & Simons, 1998). These role models are viewed as people who worked twice as hard, were twice as smart, and/or twice as strong.

Furthermore, professional minorities who have succeeded as politicians, businessmen, etc…are not typically role models because involuntary minorities believe that they have reformed to 'acting White.'

Trust of the Majority and Their Institutions

Voluntary minorities view the institutions optimistically (J. U. Ogbu & Simons, 1998). They do not normally question the authorities of the schools and conform to the rules of the schools. However, involuntary minorities do not trust the institutions. Racism and history has led to this distrust of White controlled institutions. Furthermore, they do not believe that White institutions will teach their students appropriately.

Adopting Majority Ways

Because voluntary minorities have the belief that they will have a better life upon entering the United States and they want to learn the culture and language of the society, they are willing to conform to the rules (J. U. Ogbu & Simons, 1998). They view the understanding of the different language and culture as a barrier to future success. This group does not view learning a new language and culture as a threat to their group identity. Involuntary minorities on the other hand, do not possess the positive attitude about learning the majorities' culture and language. They believe in education as a prerequisite for success; however, they struggle in overcoming their differences between their group and the majority group; because, they feel that these differences are being

imposed on them and by reforming to these differences, they are losing their identity. This group struggles with the dilemma of conforming to White ways for future employment or displacing their minority identity.

Social Constructivism

Social constructivism is a pluralist ontological paradigm based on the idea that knowledge is a shared experience as opposed to an individual experience (Clark, 1998; Gergen, 1994; Prawat & Floden, 1994; Schwandt, 2000; Stetsenko & Arievitch, 1997). Knowledge is negotiated by many discourse communities and is influenced by cultural (Gergen, 1994; Prawat & Floden, 1994; Schwandt, 2000), historical (Prawat & Floden, 1994), political (Lee & Green, 1999; Rouse, 1996), economical (Lee & Green, 1999), and contextual factors (Stetsenko & Arievitch, 1997).

Cultural background is a critical factor in the co-construction of knowledge (Gergen, 1994) and can influence how an individual defines their problems, goals, and solutions (J. Green, 1982; Pinderhughes, 1989). 'Real relations' of a society can not be experienced without cultural and ideological context (Schwandt, 2000). Since each learner brings their own shared meaning, culture, and experience, differences between two or more learners can create miscommunication or misunderstanding of issues (Protor & Davis, 1994). This suggests that people of different cultures view and construct knowledge differently (i.e. Knowledge is dependent on the contextual meaning, beliefs, values, practices, and philosophies of others) (Schwandt, 2000).

Social constructivists view the learner as being an active receptor of external influences as opposed to a passive receptor (Stetsenko & Arievitch, 1997). The

individual is a constant, active participator in developing his or her course through the experiential world (Schwandt, 2000; Stetsenko & Arievitch). All cognition has been created through a realm of practical inter-action (Stetsenko & Arievitch, 1997).

Considering that social constructivism assumes that knowledge is created through social, historic, cultural, and contextual forces, it seems to be a natural progression that social constructivist theorists develop ideas about language. "It is human interchange that gives language its capacity to mean, and it must stand as the critical locus of concern" (Gergen, 1994). Language is assumed to be a cultural mediator of the learner's development (Lee & Green, 1999; Stetsenko & Arievitch, 1997). It provides the ability to transmit knowledge from previous and future generations. It is also a powerful tool for dissecting new forms of transmission and representation (Stetsenko & Arievitch, 1997). Language in conjunction with cultural semiotic systems provide a relatively easy way to understand historical and cultural perspectives (Stetsenko & Arievitch, 1997).

Because knowledge is socially embedded and society is constantly changing, social constructivists do not believe in a presumed knowledge (Stetsenko & Arievitch, 1997). Knowledge is relative to the experiences, culture, and history. In order to make sense of their experiences, the learner invents models, schemes, and concepts which are continuously being tested and modified in light of new experiences (Schwandt ,2000).

Because of the knowledge, skills, expectations, memories, and misconceptions a person brings, Clark (1998) suggests the learner in a new situation is uncomfortable and views the situation as a risky ordeal(Clark, 1998). Representing knowledge in various ways such as stories, pictures, music, poetry, diagrams, and videos can enhance understanding and memorization (Clark, 1998). Lastly, learning can be fun and exciting

when we approach old information in new ways. Learning is the continuous process of making sense of an individual's experience. Thus the learner will interpret what they read, write, see, hear, and feel using pre-existing personal sense-making frameworks. Thus each individual will possibly take away something different from the same experience.

Social constructivist theorists view the classroom as a learning community. Clark (1998) says that each learner must get to know one another. "A community of strangers is a contradiction" (Clark, p. 93). The community must share the same purpose of learning by all. The community must be willing to cooperate for the greater good of all. Learning must be relevant to the entire group. Lastly, there must be a learning environment conducive to all.

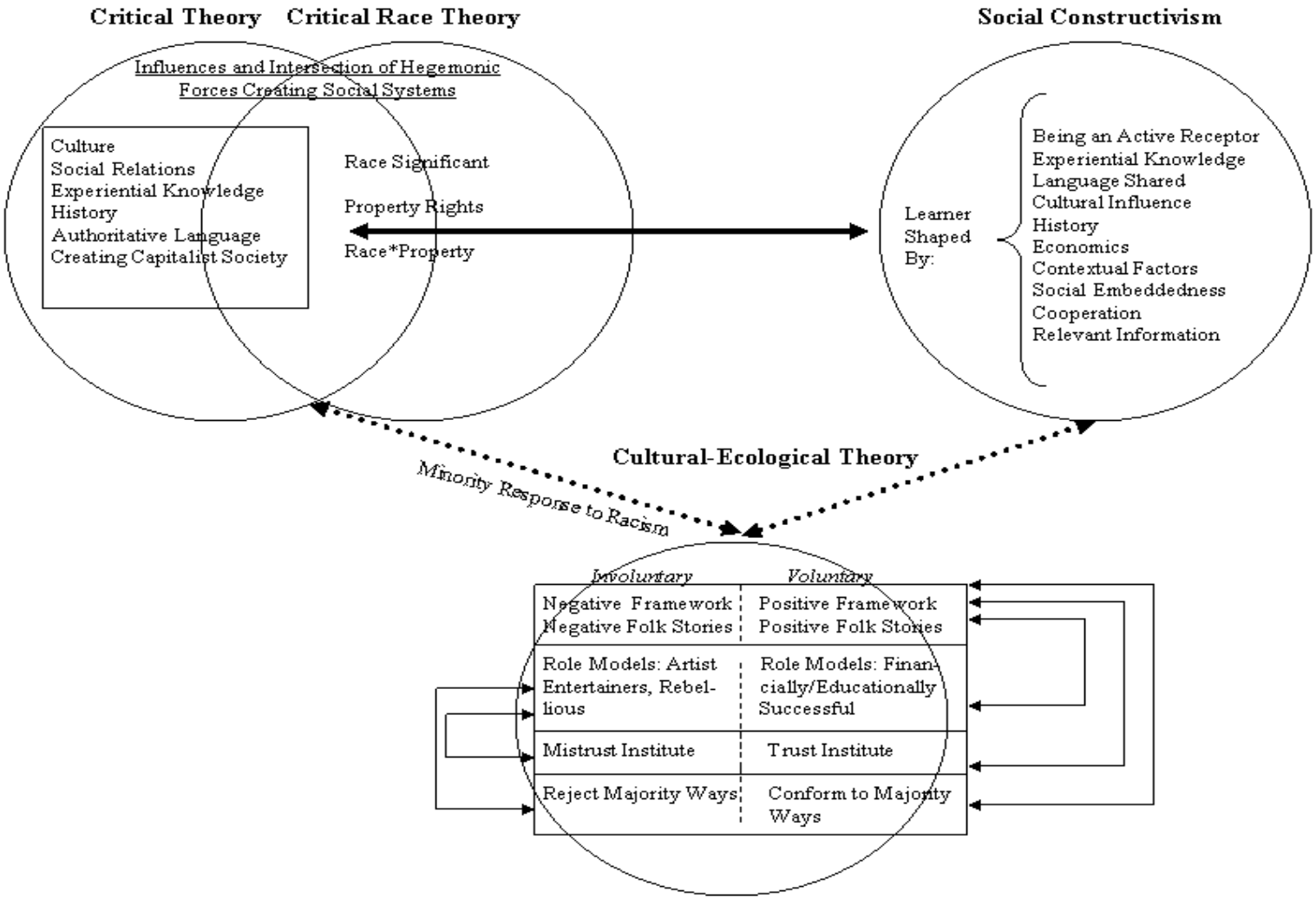

Figure 1: Conceptual Model of Societal Influences on Statistics Students as Learners

Underlying Influences of the Conceptual Model on the Research

The conceptual model synthesizes four theories: (a) Critical Theory, (b) Critical Race Theory, (c) Cultural-ecological Theory, and (d) Social Constructivism. The premise of the model begins with the intersection of Critical Theory and Critical Race Theory (Figure 1). The intersection describes how hegemonic forces influence and have influenced our social system permeating our culture, social relations, experiential knowledge, and history through authoritative language. These influences help to maintain a capitalist society whereby the individual's place in the social system are intertwined with society's perspective and imposition on the importance of race, property rights, and the intersection of the two propositions.

The intersection of these two theories influence and are influenced by the response of minorities to racism. The four understandings that Ogbu describes as responses of minorities to racism are: (a) frame of reference, (b) folk theory and role models, (c) trust of the majority and their institutions, and (d) adapting the majority ways. Each understanding is influenced by the other understandings whereby the involuntary minorities' understandings coincide with other involuntary minorities' understandings and likewise for voluntary minorities. For example, the model assumes that if an involuntary minority group has a negative framework, the group is less willing to accept the majority's ways. These understandings affect how minorities perceive themselves, other minorities, and the majority, which in turn cause the minorities to form a persona that either is valued or devalued in the social system. This persona influences the capacity that the dominant accepts the minority group in the social system thereby

contributing further to the minority's response. This constant exchange of influences leads to a to and fro causal and affect relation whereby each group feeds off of the other groups' response.

In his letter from the Birmingham jail, Dr. Martin Luther King stated, "Whatever affects one directly, affects all indirectly (King, 1963; Why We Can't Wait)." As previously discussed, minorities respond to racism. Due to their response, they form a valued or devalued persona. If the persona is "socially acceptable" the dominant culture accepts the minority group; the minority group may be respected as knowledge providers. Thus a minority teacher or student with a "socially acceptable" persona may be perceived as a contributable person of knowledge; however, a "socially unacceptable" persona may reflect in the opposite manner. Even without the presence of minority groups in the school setting, the reactions to minorities' responses influence how those of the dominant culture views themselves and others as learners.

The response to racism and hegemonic forces influencing our society infiltrates the classroom whereby the students are shaped by: (a) being active receptors of knowledge, (b) their experiential knowledge, (c) shared languages, (d) cultural influences, (e) history, (f) economics, (g) contextual factors, (h) social embeddedness, (i) cooperation, and (j) relevant information. Knowledge obtained contributes to the intersection of components involved in hegemonic forces creating social systems and responses to racism.

This conceptual model has explanatory power for the phenomena at hand. Critical Theory is a useful lens that makes one question the influence of the dominant on schooling. It gives the researcher insight into how some groups are treated as subservient

and ignorant while other groups are considered dominant and the knowledge givers. Culture is viewed as a domain of struggle and the production and transmission of knowledge is a continually contested process. The theory contributes knowledge and insight to how the powerful impose which textbooks to use, the proper instructional methods, acceptable belief systems, and views of success (Kincheloe & McLaren, 1994). In school, meaning is produced through forms of power, experience, and identities that need to be analyzed for political and cultural significance (Giroux & Simon, 1988).

Even though Critical Theory presents a powerful lens that allows the researcher to view themes from perspectives of the "haves" and the "have nots," it is critical race theory that incorporates the ideas of race having a constant and overwhelming effect on our society. Critical Race Theory provides a lens that allows the researcher to explore the importance of race in a statistics course. Are the teachings promoting Eurocentric ideas? Do the instructors have lower expectations for underrepresented students? Are underrepresented students' opinions valued by the dominant culture? Are there issues of institutional racism? These types of questions are at the center of the present research.

Through Ogbu's Cultural-ecological Theory the conceptual model is strengthened by questioning the effect of being an involuntary versus voluntary minority. It also introduces the idea of culture affecting one's education. Considering Ogbu's theory, one could be led to question whether statistics is being taught in a manner conducive to underrepresented group's learning style. One could question the terminology and language used in the course. It could be questioned whether or not underrepresented minorities feel that the course is useful in their culture, or is it another form of

conforming to the majority's culture. Is learning statistics a way of 'acting White?' Thus, are underrepresented minorities struggling in the course due to their response to Eurocentric views of the course or 'opposition' dictated from their personal cultural frame of reference? Ogbu captures the ideas and importance of community, role models, trust, language, expectations, patience, teacher support, and self-esteem.

Finally, Social Constructivism provides a lens for understanding the pedagogical ideas needed to inform this research. Combined with the other theories in the conceptual framework, it stresses the ideas of the importance of language, history, politics, context, and culture. Social constructivism also strengthens the idea of providing feedback and students discussing ideas and content. Considering that social constructivist theorists view the instructors and students as knowledge carriers, everyone is responsible for giving feedback. It provides the ideas that people of different cultures learning from one another can be the source of misunderstanding and/or misrepresentation. It also suggests that meaning is relative to the learner shaped by their culture, history, and experiences. Considering that a learner comes to every new scene with previous experiences, this idea can help us understand why underrepresented minorities often struggle in statistics courses. Lastly, social constructivism relies on many forms of representing ideas. Thus for maximum learning, there must be a variety of representations such as graphs, pictures, music, diagrams, videos, and stories to name a few.

CHAPTER 3

LITERATURE REVIEW

While statistics uses mathematics as its foundation, the two subjects require different types of thinking. Typically mathematics requires deductive reasoning; however, statistics uses inductive reasoning. Mathematics is typically a precise reasoning discipline; however, statistics requires inferences and is a study of random variation. Because of the advanced mathematics required to create a statistics structure, the discipline can be called a mathematical science similar to subjects such as economics, financing, and physics. Considering the limited research conducted on underrepresented minorities and statistics, and the idea that statistics is a mathematical science, the researcher found justification in using mathematics as the underlying reference with little concern of disturbing the integrity of the research. Chapter 3 will explore existing literature that contributes to the phenomenon at hand by first discussing the concept of race; the history of underrepresented groups in mathematics; and influences on mathematics and statistics achievement.

Defining and Understanding "Race"

Because the underlined focus of this study is race, it is important to understand that many assumptions are made. For example, this research assumes that African Americans and Latinos have similar cultures and experiences that reflect on the students'

academic performance as it assumes similarly for Asians and Whites who are of a represented status. There is also an assumption that biracial students are of a minority and/or underrepresented status. While these assumptions of race have been made in much of the existing literature, it does not provide the researcher an irresponsible free pen to interpret any races' actions and experiences. However, considering that many people of similar "races" often share similar cultural beliefs, these assumptions assist the researcher in generalizing peoples' experiences.

Because of these assumptions, it is important to understand and contextualize "race." The definition and concept of race have proven to be elusive throughout history. It has been widely debated by numerous professionals without resolve. Race has been defined in biological, genetic, social, economical, cultural, geographical, and political terms (Williams, 1997). The term has evolved with some professionals arguing that it is not definable and non-existent. Because of the ambiguity of the term, reproducibility has proven to be difficult; however, researchers, politicians, and society have continued to operationalize it.

The Evolution of the Term Race

Nobles (2000) considered four periods in United States history in which the definition of race evolved: (a)1790 – 1840, (b)1850 – 1920, (c) 1930 – 1960, and (d) 1970 – the present. The researcher categorized these periods as a reflection of the impact of the government censuses, societal wishes, and researcher contention. During the 1790 – 1840 period, racial categorization was salient and politicized. Race was considered to be a self-evident component of human identity (Nobles, 2000). This ideology aligned

with thinking of the European Enlightenment era; however, it succumbed to theories of polygenesis and beliefs of inferior and superior races. Society recognized physical and cultural differences in race due to natural environmental differences (Horsman, 1981). Race was defined by skin color, texture and color of hair, stature, eye color, size and shape of the head and facial features with special attention paid to the nose (J. M. Jones, 1991; Zuckerman, 1990).

In the 1850 – 1920 span, the term "mulatto" was introduced as a result of race scientists lobbying towards willing senators (Nobles, 2000). Before agreeing on the term, politicians considered using "degree of removal from pure white and black race" on the census (Nobles, 2000). The church held the position that races were created together as a species with clear distinctive subspecies (Goodman, 2000); however the stance of researchers, that human races were distinct and unequal species prevailed (Goodman, 2000; Gould, 1996; Stanton, 1968).

By 1890, the census had eight categories of race: (a) White, (b) Black, (c) Mulatto, (d) Chinese, (e) Japanese, (f) Indian, (g) quadroon, and (h) octoroon (Census, 1973). Race was considered to be an irrefutable truth. During the early 1900s, the ideas that races possessed distinctive cultures, intelligence, and moral capacities began to crystallize (Nobles, 2000). The "one drop" rule of non-White blood was widely accepted – especially in Southern law – as classifying a person's race (Nobles, 2000).

By 1930, the census was no longer using the category mulatto (Nobles, 2000). Southern states that defined race in terms of specific blood quantum now defined human variation broadly (Nobles, 2000). If a person had any Black blood in them, they were considered Black. People mixed with White and non-White were considered, "Other

Mixed Races" and reported according to the non-White parent (Nobles, 2000). Often there was no definition of White, or it was defined in terms of the absence of Negro blood in one's lineage (Murray, 1951). Anthropologist, Franz Boas and Montagu challenged the tenets of racial discourse (Montagu, 1941, 1942; Nobles, 2000). In 1912, Boas published research that helped diffuse the idea of using cranial (biological) measures to assist in determining race (Boas, 1912) for his future research (Boas, 1928). Using the "new evolutionary synthesis," Montagu argued that race was a biological myth.

During this period, race was defined in numerous ways:

1. A major division of mankind with distinctive, hereditarily transmissible physical characteristics (Winick, 1969).
2. Those divisions of the human family which are, biologically considered, varieties (Baldwin, 1960).
3. An interbreeding population whose gene pool is different from all other populations (Birdsell, 1951).
4. An anthropological classification dividing mankind into several divisions and subdividsions…based essentially on physical characteristics…the awareness and relevance of racial distinctions found in any part of the world is related to the social and cultural history of the society (Theodorson & Theodorson, 1969).

In the period from 1970 until the present the Statistical Directive Number 15 was established by the United States Office of Management and Budget (OMB) (Nobles, 2000). The directive provoked opposition with concerns that it was incapable of accurately categorizing new immigrants and interracial offspring. Organizations lobbied

for and against major changes to the directive. Concerned that the "one drop rule" no longer applied, multiracial organizations requested an additional category (Nobles, 2000). Initially the directive recognized four racial categories and two ethnicities respectively: (a) American Indian or Alaskan Native, (b) Asian or Pacific Islander, (c) Black, (d) White, (e) Hispanic, and (f) not of Hispanic origin (H. P. Freeman, 1998). However, in recent years, it has been mandated that there must be a minimum of five categories. The directive no longer recognizes Asian or Pacific Islander as one category; the category is split between Far Eastern, Southeastern and Indian Asians and Native Hawaiian or Other Pacific Islanders (Bennett, 2000). The directive also allows people to identify themselves as more than one race.

Most experts have agreed that the only species of humans living in the world are Homo sapiens. Human biological variation has been described as being complex, continuous, and progressive; a symbolic and structural relation with various meaning for various groups at various times (Goodman, 2000). Biologists have defined race as an inbreeding, geographically isolated population that differs in distinguishable physical traits from other members of the species (Zuckerman, 1990). People are described as being relatively homogenous with respect to biological inheritance (Last, 1995).

More recently, race has been defined in genetic terms. Geneticists have measured the differential distribution of blood types or antigens to categorize people (Zuckerman, 1990). They focus on clines or patterns of distribution of specific genes as opposed to racial categories (Seymour-Smith, 1986). Others have defined race as an inbreeding group of individuals with a specific geographic locus (Zuckerman, 1990) or within a species (Reber, 1985). Race has been defined as a class of individuals having common

genetically transmitted physical characteristics (*Melloni's illustrated medical dictionary*, 1985); a population within a species that is genetically distinct in some way often geographically separate (P. M. B. Walker, 1989); a local geographic or global human population distinguished as a more or less distinct group by genetically transmitted physical characteristics (*Stedman's medical dictionary*, 1995).

While some cling to the term race, others reject it, describing it as an unscientifically discredited term (Jary & Jary, 1991; *Longman dictionary of psychology and psychiatry*, 1984). The term is considered ambiguous and dependent upon social, cultural, and political identification (Reber, 1985). Race has been described as being a vague term for the grouping of genetically related people who share certain physical characteristics (*Melloni's illustrated medical dictionary*, 1985; *Mosby's medical, nursing, and allied health dictionary*, 1994).

The Validity and Reproducibility of Race

One reason why the definition of race has remained vague and constantly transformative is because experts have not been able to discover one meaning that was able to categorize all human variation. Many researchers and theorists have attempted to encapsulate clarity; however, their efforts have been refuted thus demonstrating the complexity, murkiness, and possible existence of the term.

Many experts defined race in terms of physical traits; however, it was found that there was little if any correlation between traits such as head shape and size and eye color (Hogben, 1931). Even characteristics like skin color which could be measured were useless (Zuckerman, 1990) Characterizing race through physical traits was criticized as

being arbitrary which suggested searching for differences in human variation was dubious at best (Brace, 1964; Zuckerman, 1990). It was found that the skin color within and between races varied greatly (Zuckerman, 1990). Another problem with traits is that they tend to vary independently of other traits; therefore, racial categories would vary by the traits used in the categorizations (Goodman, 2000). Thus categorizing race by physical traits proved to be indisputable.

Biologically speaking, one is incapable of measuring race as a static and typological concept. The term is complex and continuously evolving (Brues, 1993; Gill, 1996; Goodman, 2000). No biological measurement will categorize all people. Some argue that when used in science race is flexible, dynamic, and evolutionary (Brues, 1993; Goodman, 2000). It is impossible to define race in a stable and universal way because race-as-biology varies with the time and place (Goodman, 2000). Most human variation is dictated by geographical distance (i.e., individuals tend to be similar to people whom they live close to as opposed to those who are far away) (Brues, 1993; Gill, 1996). According to James Davis, a professor of sociology, racial groups are at best, overlapping statistical groups based on combinations of visible anatomical, biological, superficial traits that vary independently rather than being transmitted as genetic clusters (H. P. Freeman, 1998).

Geneticists' efforts to use blood types extensively also proved to be inadequate because all of the types of bloods were found in all groups; thus only the relative population statistic could be used to distinguish among groups (Mourant, 1983). The study of distribution of blood also proved to be ineffective because it was found that

people with similar distributions did not have similar physical traits. Genetically, intragroup variance was found to be statistically greater in Caucasoids, Negroids, and Mongoloids than intergroup variance (Lewontin, 1972; Zuckerman, 1990). Boas (1928) found the diversity of the individual and family types, and the multitude of genealogical lines of race too great to be considered as a unit.

In his study, Lewontin (1972) found blood group variation only accounted for approximately 6% of the total variation in explaining race. This implies that in order to adopt a racial paradigm, the researcher should acknowledge that statistically, blood is not a strong predictor of race. So defining race in terms of the physical characteristics and genetic traits showed little promise (Zuckerman, 1990). Because of these discoveries, population geneticists raised many questions regarding the concept of race based on phenotypes (Goodman, 2000). Furthermore, because of the tendency of alleles to vary gradually, some argue that there are no clear boundaries for where race begins or ends (Goodman, 2000).

Cultural based definitions in conjunction with physical characteristics of race proved to be inadequate as well. The early research viewed race as a valid concept for the description of human variation; however, in later years cultural and physical anthropologists no longer utilized the term as existent (Bower, 1991; Littlefield, Lieberman, & Reynolds, 1982; Williams, Lavizzo-Mourey, & Warren, 1994). Cultural anthropologists exhausted the literature with findings suggesting differences in culture coexisting with physical similarities (Zuckerman, 1990). They argued that culturally defined categories could not be translated into objective, clear biological categories (Weitz, 1979).

Other researchers such as Cohen (1998) suggests that researchers should not consider race, but culture. More importantly the researcher suggests using cultural relativism whereby each person's experiences and behaviors are judged in context to their cultural meaning. Cultural relativism also suggest that we examine our own choices and decisions and are willing to reexamine them based on our evaluations of the choices others people have made. The researcher argues that because of human variation within a "race," biological definitions fail. Thus using "race" as a measure of intelligence and behavior is invalid. Furthermore, Cohen suggests that it is important not to uniformly assess people from different cultural backgrounds.

Because experts have not agreed upon a definition of race, it is difficult to categorize people. There are inconsistent measures of race that have changed over time and not been reproducible (Williams et al., 1994). These measurement tools need to be consistent over time, allow comparisons across populations and surveys, and use widely accepted terms by the survey taker (Sawyer, 1998). Not only are measurements inaccurate, but so is assessment. Self-assessment of race has been shown to differ from observer assessment (Williams et al., 1994). Furthermore, key terms measuring race have proven to be just as disputable (Zuckerman, 1990) Terms such as socioeconomic status and culture - two often defining terms of race – have been inconsistently defined.

Because of concerns and ambiguities of the term race presented in this section, the President's Cancer Panel posed six questions for researchers to consider before conducting research:

1. To what extent is race being used as a biological classification in science?

2. What assumptions do scientists make when they compare races, and how do these assumptions affect scientific conclusions?
3. To what extent do societal and institutional values related to race shape the approach to scientific investigation in terms of the selection of problems considered worthy of research and the development of hypotheses to be tested?
4. Should race be used as a scientific variable in biologic studies?
5. In an increasingly mixed-race society, how is multiracial identity accounted for in the design interpretation, and application of scientific research?
6. How can race be applied validly to research studies that, in many cases, are designed to improve health conditions for specific populations (H. P. Freeman, 1998)?

The History of Mathematical Performance of African Americans and Latinos

Numerous researchers have explored the African-American and Latino history of education (J. D. Anderson, 1988; H. M. Bond, 1934, 1966; Carter, 1970; McMillen & Project, 1990, c1989; Morgan, 1995; Woodson, 1968); however, prior to Woodson, there is little research that has been conducted on these groups' mathematical performance history (Woodson, 2000). A possible reason for this lack of research may be because of the focus on literacy. Another possibility is because of lack of assessment (Woodson, 2000) on the national level. Historically, African-Americans and Latinos have scored lower than Whites on standardized tests (Aguirre Jr. & Martinez, 1993; Ikpa, 2003; Miller, 1995). Typically, African-Americans score below 75% of Whites on standardized tests (Jencks & Phillips, 1998).

While there are many defining events that occurred during the history of mathematics for African-Americans and Latinos (e.g. Slavery, Civil War, Reconstruction, Segregation, Industrial Revolution, World War II, Darwinism, Plessy v. Fergusson, Brown v. the Board of Education, Integration, New Mathematics Era, and the era of standardized tests), albeit some overlap, the author has decided to discuss four periods: (a) Slavery, (b) The Years Following the Reconstruction Era, (c) Segregation, and (d) The Age of Standardized Test - Integration. Part of the rationale for dividing the topic in this manner is based on the idea that during slavery, African-Americans were not legally allowed to be educated, a vast amount of literature regarding the mathematical performance of African-Americans and Latinos is based on segregation (views) and integration, and the current period which the author has decided to call 'The Age of Standardized Testing' has changed the way data are collected and presented on the topic.

Contextually speaking, it important that we consider the performance of African-Americans and Latinos during these periods because many of the published results did not take these events into account. One must question the validity and/or bias of these results with a critical eye. Furthermore, one must consider the idea that many of the articles published compare the mathematical performance of African-American and Latino students to White students. Thus the scholars have created an image of the African-American and Latino that cannot stand alone.

Mathematics Education Prior to the Civil War – Slavery (Before 1865)

While there is no helpful written account of the mathematical performance of African-Americans and Latinos during this period (Aguirre Jr. & Martinez, 1993;

Woodson, 2000), there are scant pieces of literature that allow one to piece together parts of the puzzle. Woodson (2000) says that some African-Americans ambitiously flocked to rudimentary education as a stepping stone to higher attainments. Some not only learned to appreciate and write poetry, but they contributed to mathematics, science, and philosophy. Gregoire (1858) found the African-American to be so impressive that he wrote an essay to leading slave owners to prove that African-Americans had intellectual power. Furthermore, Benezet (1871) refuted the notion that African-Americans were inferior in their capacities. He believed that their "inferiority" was a vulgar prejudice founded on the pride or ignorance of masters who were blind and unable to form unbiased judgments.

Even though African-Americans were deprived of educational opportunities, there were some who surpassed in intellect a large number of White men of their time (Woodson, 2000). There were a great number of African-Americans who, though illiterate, were able to do arithmetic (Woodson, 2000). Woodson gives an example of a native Virginian African-American who startled the students of his time with his unique mathematical ability – even though he was unable to read. Using the powers of numbers that he acquired by counting the hairs on the tail of a horse, he devised processes for shortening his modes of calculation with high skill and accuracy. He was able to solve some of the most difficult problems of the time. Furthermore, he was able to mentally compute arithmetic as accurately and quickly as the noted calculator of the time, Mr. Zerah Colburn, who tested the man (Woodson, 2000).

Similar to the African-American, many Mexicans were not educated prior to 1821 – the year that Mexico gained independence from Spain (Cockcroft, 1995). Education

was typically reserved for the elite who were typically White. After gaining independence a social order was maintained. The darker the person's skin was, the lower they were considered to be by White society (Cockcroft, 1995). Thus Latinos were considered just above African-Americans and Native Americans (Cockcroft, 1995).

The Years Following the Reconstruction Period (1876 – 1954)

The Reconstruction Period was between the years of 1865 and 1876 (Jordan, Greenblatt, & Bowes, 1985). The Civil War had put an end to slavery and there were four million African-Americans who had no land, jobs, or skills outside of farming (Jordan et al., 1985). Latinos were subjugated to racism as "racially inferior" to Whites (Cockcroft, 1995). By the late 1870s and early 1880s the Southern Whites began shifting their attitude of acceptance of universal education especially for African-Americans (J. D. Anderson, 1988). One of the reasons for this attitude shift was spawned from the notion that the wheels of time would not be turned back (J. D. Anderson, 1988). That is, it was inevitable that African-Americans would receive an education. Thus a small group of White Southerners began to speak out for universal education for the laboring classes which included the African-Americans (J. D. Anderson, 1988). It was finally recognized that Mexican descendents were in America to stay (Carter, 1970). During this period, the Latino community was rapidly growing in the Southwestern United States (Carter, 1970). Despite the growth, schools were only allowed to teach in English until the Supreme Court overturned the laws banning any other language in 1923 (Cockcroft, 1995).

In the 1880s the African-American leaders of that time adopted the New England classical liberal curriculum (J. D. Anderson, 1988). So the curriculum for the African

American schools, which included elementary, normal, and collegiate schools, was nearly the same as the Northern White schools. The elementary schools taught reading, writing, spelling, grammar, diction, history, geography, arithmetic, and music (J. D. Anderson). The normal schools taught Standard English, orthography, map drawing, physiology, algebra, and geometry (J. D. Anderson, 1988). The college curriculum usually consisted of Latin, Greek, mathematics, science, philosophy, and one modern language (J. D. Anderson). The African-American leaders saw this type of curriculum as a means to best understand their own historical development and sociological uniqueness (J. D. Anderson). However, this curriculum did not do anything to convince African-Americans that they were not inferior (J. D. Anderson). Similarly, during this period, Latinos were being neglected educationally and looked upon as being inferior to Whites (Carter, 1970; Cockcroft, 1995). The low scores of Latinos on IQ tests were used as supporting evidence for Latinos "innate inferiority" in comparison to Whites (Carter). In the early 1900s, fewer than one out of five Mexicans attended school (Cockcroft). Many Latino groups rarely attended school past the primary grades (Carter).

No history of the education of African-Americans and Latinos would be complete without mentioning the works of Samuel C. Armstrong and Booker T. Washington. Between the years of 1865 and 1915, Armstrong, a Yankee, devised the Hampton model. With the assistance and leadership of his prize pupil, Washington, this model became the "outstanding" model of its day for the African-American and the White (J. D. Anderson, 1988). This model was founded on pedagogy that stressed the importance of the African-American adapting to society and being "good" Christians. This model was also well

received by many for the reason that it did not challenge the lifestyles and ideologies of the wealthy and powerful (E. Anderson & Moss, 1999; J. D. Anderson, 1988; McMillen & Project, 1990, c1989).

Armstrong's model was designed to teach African-Americans steady work habits, practical knowledge, and Christian morals. However, the model did not stress an education with mathematics beyond a practical knowledge (J. D. Anderson, 1988). The Hampton model was based on Armstrong's belief that the ideal African-American was a hard worker with an elementary education and an industrial training (J. D. Anderson, 1988). This model was also popular with the handling of Latinos. It was said that the model was useful for the thorough and complete solution to the Mexican problem; because, Mexicans were a child-race without the generations of civilization and culture necessary to function as a people of the United States (Carter, 1970). Armstrong also believed that over-education of African-Americans was a bad idea (J. D. Anderson). Once he was quoted as saying, "One who shirks labor may be [*sic*] a fine mathematician, but, the blockhead at the black board may be a shining example in the cornfield" (J. D. Anderson, p. 49).

This idea similarly resonated with the reason why some Latinos were afraid to receive too much education. Latinos were believed to only be capable of manual labor. During this period, one Texas Anglo said, "I am for education and educating my own children, but the Mexicans, like some whites, get some education and then they can't labor" (Carter, 1970). The Hampton model routinely taught elementary mathematics (J. D. Anderson, 1988). Schools for Latinos emphasized vocational and manual-art training (Carter, 1970; Gonzales, 1990). The theory behind vocational education stipulated for

the most part, that those identified as intellectually slower should be placed so that in a "normal" population only approximately 20% would be labeled slow to mentally retarded (Gonzales, 1990). However there was a disproportionate number of Mexicans performing vocational courses (Gonzales). Considering the acceptance of the Hampton model by philanthropists who contributed to the survival of a lot of the schools – especially those using the Hampton model – and colleges (E. Anderson & Moss, 1999), it can easily be inferred that during these years, most of the educational systems of these two minority groups taught elementary mathematics.

In the beginning of this era, only a few schools such as Fisk and Howard, that followed the philosophies of DuBois (1904), taught algebra and geometry (Fisk Curriculum, Howard Curriculum). While records of mathematical performance were not kept to justify the following statement, the author infers that African Americans and Latinos did not have a strong mathematical performance relative to the period. This inference comes from the fact that so many of the schools did not teach advanced mathematics as well as the fact that many students for one reason or another did not attend regularly (Gonzales, 1990).

Segregation (1865 – 1954)

Prior to the 1900s there was approximately a ten-year period in American history where African-Americans were allowed to vote and were occasionally elected to public office (Jordan et al., 1985). There were both African-American and White policemen serving (Jordan et al., 1985). However around 1890, Southern states began segregation

tactics (Jordan et al.). The Jim Crow (segregation) era began. Even though Latinos were not segregated by the "black codes" and "Jim Crow laws," they were segregated by custom, language, voting laws, and residence (Cockcroft, 1995).

Similar to the previous eras discussed in this paper, there was little documentation on the mathematical performance of African-Americans and Latinos (Woodson, 2000). The history of African-Americans was generally accepted as being the same as Latinos (Valverde, 2004). Around the 1920s and 1930s, the state of Alabama conducted a study of the education of its students (H. M. Bond, 1934). The study found that there was a higher degree of over-age students among African-Americans. The study also found that the rate of retardation among African-Americans far exceeded that of Whites. Although no definition of retardation was given, in Gonzalez's (1990) study of Chicanos, under the subheading, "Slow and Mentally Retarded Pupil," the author says, "…the very same scheme for segregating the mentally retarded in 1919 in Los Angeles became the state of California's general policy in the 1940s. Any child who scored below 70 on the IQ test qualified for admission to either a development room, or a development center, thereby designating each child as incapable of normal educational development" (Gonzales, 1990 p. 90). Wilkerson (1934) found that approximately 20% percent more African-Americans were retarded in comparison to Whites. Bonds noted that if comparisons had been restricted to comparable economic and social groups, it would have been clear that African-Americans suffered from retardation to the extent that they were identifiable by the lower economic stratification. This same issue was considered by Gonzales who says that even considering learning, language, social environment, and culture, it would have been difficult to scientifically measure Mexicans abilities. Bonds also noted that African-

American schools had short terms, poor teachers, and poor accommodations. "To the inferior schools come children with inferior social backgrounds" (H. M. Bond, p. 302). Furthermore, Bonds discussed how a rural school would be able to decrease the level of retardation; however, "true" education would rely on the students who were "enmeshed in the general cultural pattern of the community" (H. M. Bond, p. 303).

When superintendents of North Carolina were asked whether African-Americans were capable of learning to the capacity of the White students, 85/104 answered a resounding "No" (H. M. Bond, 1934)! Others discussed the "inferiority" of African-Americans. Jefferson Davis went so far as to discuss the "inferiority" from a spiritual standpoint. He argued against educating African-Americans, enforcing his argument by quoting the Bible. He stated that those arguing to limit the education of African-Americans based on intelligence tests were the spiritual descendants of the President of the Southern Confederacy (H. M. Bond). This same attitude was reflected for Latino groups. One superintendent of a segregated school in Texas said, "It is up to the white population to keep the Mexican on his knees in an onion patch or in new ground. This does not mix very well with education" (Cockcroft, 1995 p. 14). In the Southwest during this period, Mexican children were considered to be intellectually inferior and thus placed in segregated and inferior facilities where the children were taught vocational subjects (Gonzales, 1990).

Numerous studies were conducted to assess the intellect of African-Americans (Brigham, 1922; Mayo, 1913; Pressey & Teter, ; Pyle, 1915; Wilkerson, 1934; Witty, 1927). Mayo (1913) found that African-Americans were 75% as effective as Whites. Pyle (Pyle, 1915), who studied rural White students and rural African-American students,

conducted similar studies, and found that the urban Whites were far in advance of the African-Americans. Pressey and Teter found that African-Americans were inferior by 15% when compared to intelligence quotient of the White children. Brigham (1922) found that the average mental age of the African-American recruits for the study was that of a ten-year-old, which was three years less than that of the White recruits. Witty (1927) studied the results of the Stanford achievement test – which measured arithmetic as one of its components - given to 1,725 White and 220 African-American students. An average subject age difference on the arithmetic portion between Whites and African-Americans was 14.4 points favoring the White students. One finding that Witty (1927) stated was that there are other sources of the educational status of African-Americans other than mental inferiority. Because of the results of these numerous intelligence tests, many writers suggested modifying the curriculum of African-Americans (H. M. Bond, 1934).

Studies of Latinos were conducted as well to assess their intellect in comparison to Whites (Gonzales, 1990). IQ tests were being used as a single measure to assess the intellect of individuals. During the segregation period, Mexican children consistently scored less than their White counterparts. No fewer than 16 authors between the years of 1915 and 1950 concluded that Mexicans were made handicapped intellectually through heredity (Gonzales, 1990). However, it should be noted that during every intelligence study conducted on Mexicans, the researchers focused on the poorest working class. Furthermore, psychological tests rarely took the language barrier into account. Thus in effect, Mexicans were penalized for their culture (Gonzales, 1990).

In his study of the racial differences in scholastic achievement, Wilkerson sought to find the answer to whether there was a difference in intellectual ability between African-Americans and Whites. Specifically he sought to critically view the research on the subject and interpret their findings. He conducted his study using a meta-analysis approach. In one of the analyses in his study consisting of students from Baltimore, Virginia, West Virginia, and a Southern school system, he found that, based on median scores of arithmetic, African-Americans performed anywhere from 30% to 99% lower than White students. The biggest difference was in Baltimore. The scores were calculated as ratios of African-American and White students' scores.

In another analysis that Wilkerson (1934) studied in 1918, he found that African-American students performed anywhere between 25% and 70% less than Whites in elementary algebra. Lastly, he reported that in 1927 – 1928, African-Americans were performing 10% less than Whites in mathematics. He found that there were no consistent disparities between the two races. He also found data that suggested that some African-Americans achieved as high or higher grades of White children.

While the intelligence tests described in the previous paragraphs do not all specifically give results stratified by subject, one can infer from the combined published results and analyses that the researchers, scholars, and educators of the time thought that the African-American and Latinos were not "up to standard" in comparison to the White student. These intelligence tests typically contained a mathematical measurement. Around the 1950s, it was said that African-Americans were handicapped by their inferior educational background (Ashmore, 1954); however, many faculty members did not attribute African-American students' "inferiority" with race as much as they did their

background and previous experience. From the published research, it appeared to be a general consensus that the African-American and Latino student was below average in this period.

The Age of Standardized Testing – Integration (1954 – Present)

On May 17, 1954, the Supreme Court decided on a landmark case, Brown versus the Board of Education of Topeka, Kansas (Mickelson & Heath, 2001; Garibaldi, 1998; Ikpa, 2003; Button, 1973). This case allowed integration to be a reality in the U.S. (Mickelson & Heath, 1999). In the report written by Coleman et. al (1966), it was stated that integration would have a positive effect on African-American achievement. Partially because of the League of United Latin American Citizens' victory of defining Latinos as "White" or "other White" Latinos were not helped by the Brown decision (Cockcroft, 1995). It was not until 1970 that the courts mandated desegregation for Latinos (Cockcroft, 1995). At about the same time, 1965, national standardized testing became a measuring stick of the educational assessment of students (Button, 1973; Hedges & Nowell, 1999; Hoff, 2000). In 1976, the first breakdown of SAT scores by ethnicity was published (Herrnstein & Murray, 1994).

In their study on the achievement gap, Hedges and Nowell (1999) conducted a meta-analysis. The researchers investigated the differences in the distributions of achievement scores between African-American and White senior students. They investigated how social class influenced the gap, how the gaps changed over time, and whether the portion of the gap independent from social class changed over time. The authors examined NAEP, an Equal Employment Opportunity (EEO) survey, High School

and Beyond survey, the National Longitudinal Study of Youth (NLSY), and the National Longitudinal Study of the High School Class of 1972 (NLS: 72). These tests spanned from 1965 – 1992.

The researchers (Hedges & Nowell, 1999) found considerable differences for each of the tests. All of the tests showed an achievement gap in mathematics that favored White students. However, when adjusting for socioeconomic status (SES) in the model, the gap decreased slightly. The gap diminished even further when adjusting for family and community.

Coleman et al. (1966) found that Latinos scored lower than Whites on achievement tests. The results showed that Mexican Americans ranked fourth ahead of Puerto Ricans and African Americans who scored less. If Mexican Americans were compared against Whites, it would be found that 85% would fall below (Carter, 1970). Even though society generally no longer ascribed lower innate ability of Latinos, there remained to be those who believed otherwise. One particular California principal said, "Given time and library resources, it would be possible to make a strong case that racially these people are inferior" (Carter, 1970).

From 1973-1978, the NAEP mathematics scores declined for 17-year-old African-American students (Garibaldi, 1997). However from 1978 – 1996, their scores increased (Garibaldi, 1997; Ikpa, 2003). In fact, African-Americans showed the most growth of any group (Garibaldi, 1997). Similar results were true for 9-year-old and 13-year-old African American students; however, the scores of African-Americans were 25 points

less than the White students (Garibaldi, 1997). In this period of gain, African-Americans showed mastery over basic mathematical skills such as addition and subtraction, but there were also signs that the gap was increasing again (Hoff, 2000).

The academic achievement of Latinos during this period was not particularly comforting either. The average mathematics scores for Chicanos on the SAT in 1975, 1980, 1984, and 1988 school years were 410, 415, 426, and 430 respectively in comparison to Asians whose lowest average score in this period was 513 and Whites whose lowest average score was 483 (Aguirre Jr. & Martinez, 1993). For NAEP, 17 year olds had an average mathematics score of 277, 276, 277, 283, and 284 in 1973, 1978, 1982, 1986, and 1990 respectively in comparison to Whites who had average scores of 310, 306, 304, 308, and 310 respectively (Miller, 1995). Similar disparities occurred on the 1981 and 1990 mathematical section of the SAT. In 1981, Latinos averaged approximately 407 in comparison to 513 and 483 for Asians and Whites respectively. In 1990, Latinos averaged 423 in comparison to Asians and Whites who respectively obtained average scores of 528 and 491.

In 1963, Bradley (1967) conducted a study that considered selected characteristics, academic performance, personal problems, and successes of African-Americans at seven formerly White universities in Tennessee (Bradley, 1967). The researcher gathered data from the complete high school and college records of the African-American participants, interviewed the participants, and mailed questionnaires.

Some of the key findings were that the American College Test (ACT) average mathematical score of African-Americans was 13.6. On average, African-Americans scores were below the 50^{th} percentile for national twelfth grade students and below the

20% percentile for national college-bound students (Bradley, 1967). Also, the study found that 52% of the faculty did not feel that the African-American students were academically competent to do the work required of them (Bradley, 1967). Nor did they feel that African-Americans were capable of thinking abstractly enough to succeed in mathematics.

In 1967 and 1968, Davis, Loeb, and Robinson (1970) compared the characteristics of African-Americans and White college freshmen at a predominantly White university, University of Illinois. The authors also studied the academic background differences between African-Americans who attended predominantly African-American high schools and those who did not attend predominantly African-American high schools.

The study (Davis et al., 1970) used a sample size of 152 freshmen African-Americans from the University of Illinois. Information about their high school percentile rank (HSPR), number of high school units completed in mathematics, sciences, and social sciences, ACT scores, first term grade point averages, and academic status at the end of the first semester. The researchers used a chi-squared analysis and a two-sample z-test to compare the group characteristics.

Davis et al. (1970) found a significant difference on the HSPR average scores for the inner-city students, 19.56, compared to a 21.74 average score for non-inner-city students. There was also a significant difference in the number of high school mathematics units taken. The inner-city students took an average of 2.87 mathematics courses in comparison to the non-inner-city students who took an average of 3.23 mathematics courses. The study also found that in the 1966 class, 47% were in good

academic standing at the university while 40% were on probation. Similar results occurred in the 1967 class. Forty-nine percent were in good academic standing versus 44% who were on probation.

Finally, what has been described as the most comprehensive study of its time on ethnic differences in achievement (Epstein, 1972; Fisher, 1981), Coleman et al (1966) studied 625,000 students of various races. The results showed that, on average, African-Americans scored less than Whites on every level on the battery of standardized tests administered. Furthermore, they found the achievement gap increased as a function of age (Coleman, 1966).

No other era has explored the mathematical performance of African-Americans as extensively as the present. A large number of the studies find the same results, that there is an achievement gap between African-Americans and their White counterparts (Crain & Mahard, 1978; Garibaldi, 1997; Musgrove, 1972; W. Walker & Plata, 2000). Furthermore, some of the studies show a large percentage of African-Americans not succeeding in college (Davis et al., 1970; W. Walker & Plata, 2000).

Adjustments in an Educational Setting are Influenced by Race and Culture

Much of the background and experience that students bring to the classroom are based on differences from other students. These differences may hurt or help depending on the frame of mind of the student and the people the student comes into contact with. Oftentimes these differences may be gender, religion, and/or sexual orientation. The

underlined focus of this study though is about race and culture. Because of a student's race or culture, they are faced with expectations, burdens, and/or discrimination from others in their surroundings that may influence their academic experience.

Race Can be a Burden on Academic Achievement

While in college, minority students face different challenges from their White counterparts. One of those challenges is the burden of being a minority student. Many underrepresented students carry the "baggage" of negative perceptions of their academic ability which may hinder their ability and/or willingness to learn (Steele, 1992). Both Steele (1992) and Allen (1988) found that African American students have feelings of isolation and incongruence because they are devalued by the American school system. This same idea was expressed by Latino students in Hurtado and Carter (1996) who believed that many of the White students felt Latinos were special admits to the college; an attitude they found to be racist. In a study by Terenzini (1992) shaking the feeling of being a perceived "special admit" was difficult for many of the African Americans.

Teacher's Race and Culture

For many underrepresented students, having people around them that are their race and/or understand their culture may help to foster learning. As of now, the majority of teachers are predominantly white, which is not reflective of the diverse student population (Neil, 1997). During her conversation with John O'Neil, Tatum suggested that lack of cultural diversity and understanding of students of color may be a potential

barrier to underrepresented groups' education. Tatum suggested that this lack of cultural awareness may be a result of White teachers growing up in predominantly White suburban neighborhoods.

Other authors support the idea of having more people of color as role models for underrepresented students. In Moody's qualitative study of two African American women it was found that having female, African American mathematics teachers demonstrated to the participants that they could achieve in mathematics. These teachers were role models (Moody, 2004).

Similarly, Martin who studied African American parents (but suggested similar results for other ethnic groups to be published in future research) said that his participants had a difficult time internalizing mathematics as "their own" because of lack of representation in the field (Martin, 2006). The researcher went on to insinuate that one brilliant African American tutor who did not fit the stereotypical mathematics genius attracted numerous African American students due to his understanding of African American culture. However, a White instructor who entered an African American school setting and did not understand the culture did not appear to be embraced by the parents of the study. One parent made the comment, "Still it was like he came in and was still basically a White guy coming into a Black school doing magic…. He's from over there and that's what they do. It's not what we do." Finally, the researcher made the point that a disservice was being given to the children by not having instructors who understood their culture, beliefs, or abilities to succeed. This idea of underrepresented students needing instructors who understood their culture has been supported by numerous researchers (Ladson-Billings, 1995; Villegas, 1991).

Language is a Barrier in Academics

As cited in Lynda Jones' article, "Why Jamal Still Can't Read," Janice E. Hale, an early childhood education professor at Wayne State University explained that, "One of the main reasons African-American youngsters do poorly in school is because of language differences between black and white children" (L. Jones, 2002; Philips, 1976). "Our culture emphasizes the oral transmission of information," explains Hale. "White people emphasize literacy, and their children are immersed in literacy at a younger age." Research shows that children who are unable to read at grade level by fourth grade face a downward spiral. They won't be able to complete reading and writing assignments or pass tests that help them move onto higher grades or high school. These kids often end up in special education, a road that, for many, leads to a life of under-achievement. Eleanor Wilson Orr believes that "Black English" leads to misunderstanding of word problems ("Does Black English hamper African-American students in the study of mathematics?," 1998). Considering that the present trend in mathematics emphasizes more problem solving and word problems, it is imperative that students are literate. This is the case possibly even more so in the subject of statistics where solving problems requires a substantial amount of reading relative to the traditional mathematics courses.

Influential People are Needed in Underrepresented Students' Education

The importance of influential people in underrepresented students' education has been widely researched. Many have found the significance of having active parents partaking in the student's academic well-being. Others have suggested the importance of having supportive family, friends, teachers, and role models.

Parents

Because of the achievement gap and the basic need to achieve academic success, it is imperative that parents of minority students are involved in their children's education. Cunningham et al. (2002) found that parental monitoring associated with the high-risk neighborhood underscore the pertinence of parents and significant others in the lives of adolescents which help to ensure resilient outcomes. The authors also found that those students of high-risk neighborhoods who planned to attend college and had academic success resulted from parental monitoring.

Even though parental monitoring is important, some children are inadequately receiving parental monitoring from both parents. There are a large number of single parent homes. "Since the 1960s … the percentage of African American children living with one parent has risen to 63 percent, with 92 percent of these families headed by a female" (Battle & Scott, 2000). In Battle and Scott's study, they found that African American males do better academically in mother-only households; however, it was also found that as grade level and socioeconomic status increased, achievement increased

more with father-only households (Battle & Scott, 2000). However, Whitmore (1999) found that "higher school grades significantly correlate with closeness to biological fathers (whether in or out of the home)."

Socioeconomic status, has proven to be a major factor in the academic success of minorities (Battle & Scott, 2000). Bond concluded that the achievement gap stems from minorities lower socioeconomic status (G. C. Bond, 1981). Battle and Scott found that the primary key to successful parenting in regard to academics is the availability/accessibility or possession of economic resources. This fact transcends the gender of the single head of household parent. After looking at data two years after graduation, they found that in the presence of socioeconomic status, parental configuration did not matter (Battle & Scott).

Family, Friends, and Support Networks are Important for Adjusting to College

Considering the burdens that an underrepresented college student has that are different from Whites, it is important that they have a mechanism of coping with their issues. It has been found in numerous studies that both African Americans and Latinos rely on family and friends for a support network. These groups help acclimate the student to college life and academia (Feenstra, Banyard, Rines, & Hopkins, 2001). Some researchers have found that many minority groups rely more on family than Whites who rely more on friends (Schneider & Ward, 2003).

In their study of 130 underrepresented college students, Lilian Chiang, Hunter, and Yeh (2004), found that the students relied primarily on family and support networks to cope with the life of being a student. However, the researchers had reason to believe

that Latinos relied more on their families than African Americans. The researcher found that Latinos and African Americans coped by using interdependent support networks.

Contrary to the Chiang et al belief, Rodriguez et al. (2003) who believed that family and support groups were important for Latinos, found non-family support groups to be more important. The researchers analyzed data from 338 Latinos college students using multiple regression models while controlling for gender, SES, acculturation level, and stress. These findings suggest that underrepresented students may adjust to college better if others of their race are present to form social networks.

Role Models can Motivate Underrepresented Students in Academics

Another common problem in the life of minorities is the lack of role models (Dunbar, 1999). Role models are an important source of motivation for students (J. U. Ogbu & Simons, 1998). Freeman (1999), who studied African-American students, stated that those students who lacked mentors would be impeded in their acquisition of academic competence. Freeman goes on to say that role models are important to those students in an environment with students culturally different from their own. Also role models are the single most commonly identified factor on resilience (Becker & Luthar, 2002).

Possible explanations for this lack of role models include high incarceration rates, single parent households, and lack of representation in high-positioned jobs (J. U. Ogbu & Simons, 1998). This is even more prevalent with the young male minorities. Because of a lack of men in education in the primary schools, Black boys can "… go from kindergarten through sixth grade and not have a black male teacher…. The only black

male role models they are most likely to see, says Kunjufu, an education consultant, publisher, and author , are the custodian, security guard, or physical education teacher" (L. Jones, 2002). Considering the difficulties in the behaviors of boys, it cannot be emphasized enough that these young men need good, strong role models. The lack of role models for minorities is not only displayed in the school system but it is displayed in politics, companies, and organizations, etc… as well. "Ogbu theorizes that many African Americans have become disillusioned about their future job prospects and the actual value of schooling and have developed a disinterested attitude leading to depressed cognitive performance and scholastic underachievement" (Chapell & Overton, 1998). While more minorities are gaining these positions, there is still a lot of ground to be covered.

Teacher Support is Important for Underrepresented Students

It is important that minorities receive support from their teachers. In an article by Honora (2003), the author discusses Steele's view on African Americans having the support of their teachers.

> Steele suggested that academic success among African American students is nurtured by teacher support. However, too often African American students receive neither the quality nor the quantity of support needed to develop a positive identification with the academic culture of school. According to Steele, the devalued status and overarching presumption of inferiority that society holds regarding African Americans permeates the walls of academia, often limiting teachers' support for and expectations of African American students (Honora, 2003).

In her study of high achieving African Americans, Freeman (1999) discusses the importance of tailoring each student's need for nurturing, encouragement, and support.

Many studies have suggested the importance of student's perception of teacher support as an indicator of achievement motivation and academic success (Becker & Luthar, 2002; Goodenow, 1993; McAllister & Irvine, 2002; Willie, 2003). Students who feel encouraged by their teachers are more committed to learn and are more academically successful (Becker & Luthar, 2002). Lastly, Becker and Luthar (2002) state that underrepresented minorities will benefit greatly from access to supportive teachers within the context of a rich and challenging curriculum (Becker & Luthar, 2002 p. 202). This support will help students feel comfortable with their differences instead of ostracized and frustrated (McAllister & Irvine).

Trusting the Teacher is Desirable

In an article by Detris Honora (2003), the researcher conducted a qualitative study on 16 low-income, urban high school African Americans. During the study, the researcher found that the students did not trust the teachers, and furthermore did not believe that the teachers trusted them. "Boys, in particular, spoke of their distrust for teachers and called attention to the social hierarchies existing in some classes" (p. 68). One child even went so far as to say, "It's not their [teachers] job to really care about people" (p. 69). Due to lack of trust in the White institutions, trust should be the number one priority for teachers (J. U. Ogbu & Simons, 1998). This trust however only comes by having the student's best interest at heart and helping the students to realize that they will not have to compromise their identity or self-esteem (Erickson, 1987).

Freeman (1999) researched a number of academically successful African Americans and found that most of the students believed in the importance of trust in a

mentoring, student relationship. Trust was described in the article as being acquired by spending time with the student without imposing expectations and devoting time to the student. Furthermore, there must be a willingness to understand the student's needs, while encouraging, nurturing, and supporting. By demonstrating to the student that the mentor is "there for them," trust will begin to be established.

Patience is an Important Characteristic of the Teacher

Underrepresented minorities often need teachers who are willing to be patient (McAllister & Irvine, 2002). Patience is often important because students come from different backgrounds in which some have not been prepared as well as others. In their study of 34 teachers, McAllister and Irvine found that patience was one of the characteristics that the teachers thought was important in leading to a caring relationship with the student. Patience, empathy, and caring are linked to high academic achievement, especially with students of culturally diverse backgrounds (McAllister & Irvine, 2002).

A participant in Moody's (2004) article said in reference to her mathematics teacher, "He was a wonderful teacher…. He could explain and he would not stop until you understood" (Moody). Patience was also one of the characteristics of the good mathematics teachers in an article by Powell-Mikle (2003).

Teacher Feedback is Helpful

Feedback is a generic term used to describe a variety of procedures used to inform an individual about their performance (L. T. Green, 1990). Teachers use feedback by

providing students with the correctness or incorrectness of their response which can range from a simple “right” or “wrong” to a presentation of substantial corrective or remedial information (Kulhavy, 1977).

In a study conducted by Powell-Mikle (2003), the participants all commented that good mathematics teachers encouraged the students and created an environment where the students feel comfortable asking questions and responding. “For instance, Ashley [mathematics major] believed that her seventh-grade mathematics teacher made special efforts to help her succeed in mathematics by pushing her to take the algebra placement test” (Moody, 2004).

Green (1990) used a repeated measures analysis of variance design to test if there was a difference in test performance of students in a remedial math class at Howard University – a historically Black College –over time as a result of teacher feedback. The researcher used free comments, specified comments, and no comments as their treatment. The free comments were personalized by the instructor and may have said something like, “You are progressing well”(L. T. Green, 1990). The specified comments were given by the researcher and consisted of remarks such as, “Excellent! Keep it up!” and “Let’s raise this grade!” (L. T. Green, p. 327). The researcher found that informative and encouraging feedback increased motivation and subsequent test performance. He also found that both free and specified comments were more facilitative of test performance versus no comments. Positive role models who give supportive feedback promote social-emotional growth as well as a more nurturing classroom environment (Becker & Luthar, 2002).

Underrepresented Students Must Feel Motivated to Achieve

For many underrepresented students, they do not feel motivated to achieve in the current school system. Some do not believe the same level of achievement is expected of them as by their represented counterparts. Many may feel that school is futile since they have little chance of obtaining successful careers, and thus have lowered self esteem in the academic abilities.

Expectations are Lowered for Underrepresented Students

In an article by Jones (2002), the author discusses the low expectations that some teachers have toward minorities. “Teachers should have clearly stated high standards and expect students to meet these standards. By doing so the teacher will build trust by conveying the message that he or she believes students have the intellectual ability to do well and that he or she does not share racist stereotypes about the inferior intellectual ability of minorities” (J. U. Ogbu, 1990; J. U. Ogbu & Simons, 1998).

Not only do some teachers have low expectations toward minorities, but also some minorities have low expectations of themselves. “Regardless of gender, white teachers in both public and private schools often have low expectations of black children and may be biased in their thinking about what black students are capable of achieving academically. That attitude is based on a host of negative stereotypes that they buy into, mainly that blacks are inherently intellectually inferior, and therefore, won't be able to handle the schoolwork” (L. Jones). When some teachers were asked about the achievement gap, “They say it's genetics, low-income and fatherlessness…” (L. Jones).

Finally McGlamery and Mitchell (2000), found that teachers' expectations limited student's access to certain parts of the curriculum. Furthermore, the teachers evaluated the educability and ability of the students based on how minority children actually learned (McGlamery & Mitchell). To add to the problem, some minority students have family and friends who have low expectations of the students.

Academic Futility

In a study exploring achievement motivation and identity development variables conducted by Hinson, Spradlin, and Welsh (2000), it was found that African Americans had high levels of academic futility. It was also found that for African American males, futility and salience were good predictors of GPA. "African American males' strong sense of futility seems to weigh in so heavily that it negatively affects their salience" (2000). In this study, it was found that African American males had the highest levels of academic futility. Furthermore, the students with the lowest GPA in the study had characteristics consistent with the Ogbu Factor. That is, they had an attitude that high achievement was associated with being White.

Self Esteem of Underrepresented Students Affects Academics

As mentioned previously, a problem that is believed to affect how students learn is negative self-esteem. "If children are treated in a way where they feel the teachers don't respect them, don't expect much of them, and treat them harshly, they may turn off, and might not have the self-confidence to successfully perform schoolwork" (L. Jones, 2002).

There are various issues and topics that are related to minorities' self-esteem: (a) Ogbu's Factor, (b) the role of the minority, (c) racial identity, (d) Steel's Stereotype threat, (e) self-efficacy, and (f) stress.

Ogbu argues that the two primary forces that contribute to the academic success or underachievement of minority students in the United States are the following: the initial terms of the minority group members' incorporation into American societies and the patterns of adaptive responses the minority groups exhibit in response to the discriminatory treatment that they receive (Hinson et al., 2000). In order to achieve in the society, Ogbu argues that African Americans have adopted five roles: (a) the assimilator role, which is adapted by academically successful African Americans who disassociate themselves from the African American culture; (b) the emissary role, which is adopted by those African Americans who debase their identity in order to adapt; (c) the alternator role, African Americans conduct themselves in a manner to fit into the dominant culture while at school, but participate in African American culture at home; (d) the regular role, utilized by accepted members of the street culture, but not abiding in all of the street culture norms; and (e) the ambivalent role, adopted by African Americans who achieved academic success at a high price.

To add to the low self-esteem problem, some African Americans associate being intelligent with "acting White." This ideology shows confusion about their racial identity. "Speaking standard English, taking math and science courses, studying hard and testing well are seen by African Americans as attempts to 'act White'" (Chapell & Overton, 1998). In order to fit into the African American culture, a lot of minority students feel that they cannot be intelligent; otherwise, they will be labeled a "sell-out."

They fail to realize that there have been numerous people of their own racial identity who have succeeded by being intelligent. Furthermore, they fail to realize that people around the world celebrate these successful individuals. Thus a lot of the Black students who achieve are alienated and rejected within their own race (Hinson et al., 2000). It has been theorized that the importance of racial identity or socialization is associated with a positive self-esteem (Cunningham et al., 2002). In Hinson, Spradlin and Welsh's study they found that the African American males had a strong racial identity, but coupled with high levels of the Ogbu Factor and futility resulted in low GPAs. Similarly, African American females also had high levels of racial identity and the Ogbu Factor; however, they had low levels of futility and high levels of salience which resulted in academic achievement (Hinson et al., 2000).

Besides dealing with the Ogbu Factor, Steele's stereotype threat theorizes that cognition of African American adolescents are negatively influenced by a history of racial discrimination and prejudice. Whenever these students perform well academically, the threat of confirming or being judged by a negative societal stereotype about their group's intellectual ability and competence occurs. The threat can negatively influence the student's academic performance. Furthermore, the student may increasingly devalue school performance and underperform (Chapell & Overton, 1998). In a study conducted by Chapell and Overton testing the Steele stereotype threat, it was found that there was a negative correlation between GPA and self-esteem from 6th graders to 8th graders consistent with the disidentification stereotype.

Along with the Ogbu Factor, the role of the minority, racial identity, and Steele's stereotype threat, two additional factors associated with self-esteem are self-efficacy and

stress. Due to the fact that a lot of minorities are poor, they live in high-risk neighborhoods. According to Spencer, Cole, Dupree, Glymph, and Pierre (1993), this state of condition is linked to self-efficacy. These children are commonly products of their environments. Their self-efficacy is linked to their perception of high-risk neighborhoods and academic outcomes within those high-risk neighborhoods (Cunningham et al., 2002). Furthermore, prostitution, violence, depression, illegal drug activity, and murder surround these high-risk neighborhoods. These types of neighborhoods are stressful and play a role in the attitudes and perceptions of young residents who are attending school. The researchers discovered that contextual stress influences self-esteem, which is related to academic outcomes (Cunningham et al.).

Indicators to Achieve in Statistics

In order to perform well in statistics, it has been found that mathematics proficiency is important. A student should take an adequate number of mathematical courses. It is also important that the student is introduced to topics that will pique their interest outside of the traditional. Such topics that should be encountered may be social issues or community based examples.

Mathematics Proficiency is Important for Understanding Statistics

As it was hinted earlier, to be successful in statistics, a student must be proficient in mathematics; however, many minorities are not enrolling in the higher-level mathematics courses. “The course taking patterns show a disproportionate number of African American students taking lower level mathematics classes as compared to their

white peers (Dossey, Lindquist, Mullis, & Prichard, 1989). While the students make these choices, they are often the result of other forces at work. Most districts will find serious problems regarding the recruitment and retention of African American students in upper level mathematics" (McGlamery & Mitchell, 2000).

There are many possible explanations as to why minorities are disproportionately enrolled in the lower-level mathematics courses versus the higher-level mathematics courses. McGlamery and Mitchell (2000) refer to the idea that in the past, higher-level mathematics was promoted towards a Eurocentric view of elitism and social stratification. Other reasons include "1) teacher expectations, 2) course taking and curriculum, 3) tracking, 4) teaching methods, and 5) isolation from other minorities" (McGlamery & Mitchell).

With the concept of statistics being a mathematical science, people encounter numerous difficulties. In a study conducted by Johnson and Kuennen (2006), the researchers found the strongest predictor of statistics performance was a student's GPA. The researchers also found that their ACT science reasoning, mathematical skills quiz, and gender was significant. Along with these skills and attributes, it is important for students to be able to translate abstract ideas, correct misperceptions of the topic, and reduce fear of statistics.

First of all, one of the mathematical skills that students have problems with is rational numbers. In the article "Difficulties in Learning Basic Concepts in Probability and Statistics: Implications for Research" by Garfield and Ahlgren (1988), the authors discuss that students often "have an underlying difficulty with rational number concepts and proportional reasoning which are used in calculating, reporting, and interpreting

probabilities" (pg. 47). In the second and third mathematics NAEP, students were found to have difficulties with basic skills commonly used in statistics such as fractions, decimals, and percentages.

Second, as with common word problems, students often have difficulties translating verbal problems into mathematical models and statistical models (Garfield & Ahlgren, 1988). For minorities, the issues of "Black English," language barriers, or English as a second language may create difficulties that are difficult to overcome. Green reports that the verbal ability of pupils is often inadequate for accurately describing probabilistic situations. Oftentimes, translation and categorization are more difficult for story problems than for formula problems (Myers, Hansen, & Robson, 1983). Coupled with the language problem "an important factor in misjudgement is a misperception of the question being asked" (Garfield & Ahlgren, 1988).

Thirdly, because of previous exposure to statistics, many students have developed a fear and distaste for the subject. In statistics, like so many other mathematics courses, students often arrive at their first or second exposures with fears and anxieties, which are often more exaggerated than in relation to the true difficulty of the subject matter (Roberts & Bilderback, 1980; Roberts & Saxe, 1982). Roberts and Saxe have found supporting evidence that too much anxiety can interfere with cognitive functioning. The authors found this after studying 132 students from an introductory statistics course at The Pennsylvania State University. Because of students' distaste, Freudenthal cautioned against teaching techniques of mathematical statistics to even college freshmen (Garfield & Ahlgren, 1988). One of the factors in this fear comes from students' misunderstanding of complex and abstract ideas. It has been suggested that half of the

students in senior high school cannot think on a formal operation level. Thus, teachers may need to forego abstract ideas and instead convey statistical ideas in more simple and concrete terms (Garfield & Ahlgren, 1988).

Because of the difficulties that minorities face in taking statistics courses, teachers must use a variety of teaching methods. McGlamery and Mitchell (2000) found that "cognitively guided instruction (CGI) which links mathematics concepts to the thinking and experiences of the student is successful." This method provides a strategy that engages minorities in mathematical learning. Another method that African Americans learn well from is cooperative learning (Watkins, 2002). In their study of students in a conceptual statistics course for students in the humanities and social sciences, Keeler and Steinhorst (1994) found that students participating in a cooperative learning methodology performed better than those students who were taught in a more traditional method.

Because misjudgment plays a role in misperception, an advantage in comprehension of statistics may be to pose questions carefully (Garfield & Ahlgren, 1988). Teaching may be more effective if teachers understand what misconceptions the students have. By understanding students' preconceived ideas, teachers may be able to show the students where their misconceptions conflict with the definitions of probability (Madsen, 1995). Along with posing careful questions, Myers, et al.(Myers et al., 1983) hint that placing keywords and removing irrelevant information will aide in the understanding of statistics.

Other solutions for enhancing the teaching of statistics are presented by Garfield and Ahlgren (1988). They give eight recommendations:

1. Introduce topics through activities and simulations, not abstractions;

2. Try to arouse in students the feeling that mathematics relates usefully to reality and is not just symbols, rules, and conventions;
3. Use visual illustration and emphasize exploratory data methods;
4. Teach descriptive statistics alone without relating it to probability;
5. Point out to students common misuses of statistics (say, in news stories and advertisements);
6. Use strategies to improve students' rational number concepts before approaching proportional reasoning;
7. Recognize and confront common errors in students' probabilistic thinking;
8. Create situations requiring probabilistic reasoning that correspond to the students' views of the world.

In conclusion, it is imperative that the achievement gap is reduced. It is not only vital to minority groups, but it is vital to our society as a whole. This growth can occur by setting high expectations, encouraging minorities to enroll in higher-level mathematics courses, retaining and aiding the target group in these courses, and changing our methods of teaching these individuals. By doing these things, it is likely that increased enrollment and achievement in statistics will occur.

Standardized Tests Indicate Poor Mathematics Foundation

There has been an overwhelming abundance of literature regarding the achievement gap between Blacks and Whites. Along with GPAs, a common method of assessing the gap is standardized tests. In 1998, a report published stated that the average mathematics score on the American College Test (ACT) for African Americans, Native

Americans, and Mexican Americans was respectively 16.9, 18.6, and 18.6. In comparison, their Caucasian and Asian counterparts scored 21.4 and 23.4, respectively. This group of minorities all averaged between 8.2 and 10 on the individual parts of the mathematics portion: (a) pre-elementary algebra, (b) algebra coordinate geometry, and (c) plane geometry and trigonometry. However, the Caucasians and Asians averaged between 10.5 and 12.3 ("Bi the numbers: Despite modest gains, Blacks and Latinos still lag in ACT scores," 1998).

Similar results for the 2000-2001 Standard Achievement Test (SAT) showed a serious achievement gap between minorities and their Caucasian and Asian counterparts. It was reported that out of the 1.3 million first-time freshmen taking the exam, 34% were minority. A large number of the minorities were first-generation college attendees. The national average for the math portion was 514, the highest average in three years. Unfortunately, the African American's average decreased one point to 426. The score gaps for different racial, ethnic and socioeconomic groups that we see on the SAT also appear on virtually every measure of achievement, including other standardized tests and classroom grades, and they show up as early as fourth grade (Roach, 2001).

Social Examples are Useful for Learning Statistics

Many researchers have suggested that learning statistics using social issues and examples will foster learning. The American Statistical Association recommended using statistics to enhance human welfare (Lesser, 2007). Not only are these illustrations practical, but they provide interesting topics that may motivate the students even though Schumm et al (Schumm et al., 2002) did not endorse just using social issues and

examples to teach statistics. However, they did provide a historical example that used a social aspect. The example encouraged the students to consider the impact of social class on Titanic data.

The authors recommended six criteria for having a successful statistics project:

1. The examples should involve historical, concrete events.
2. Important life or death situations should be used.
3. The example should be appealing and familiar to those students who do not plan to use statistics.
4. Multiple statistical concepts should be able to be utilized.
5. The data should be a reasonable size.
6. The examples should provide an opportunity for role playing in a professional manner.

Other examples where the researcher used social issues to foster learning were while discussing the difference between constants and variables. Poter (1995) suggested asking whether the number of labor strikes per year in the United States since 1975 or the murder rate in Dallas last year was a constant or variable. Brzuzy and Segal (1996) suggest projects that stress service-learning and practicality could enhance comprehension (Brzuzy & Segal, 1996). Furthermore, Strand et al support practical, community-based learning to deepen the students understanding (Strand, Marullo, Cutforth, Stoecker, & Donohue, 2003).

CHAPTER 4

APPROACH TO METHODOLOGY

This chapter describes the methodology for this research. Using methods described by Tashakkori and Teddlie (2003), this research used a mixed method QUALITATIVE + quantitative design (Morse, 2003). The approach stresses both components as stand alone projects with the qualitative component being the leading method for making findings. This method allows the qualitative component to be the guiding source of data collection, analysis and reporting; while the quantitative component is used to enhance the qualitative findings. The researcher chose to allow the qualitative component to be the guiding source in order to have more rich descriptions of the phenomenon that otherwise are difficult (if possible) to quantify.

In an attempt to let the two components be stand-alones the researcher analyzed the quantitative data after the vast majority of the qualitative data were analyzed. Thus the qualitative data had its own emerging themes without influence from the results of the quantitative data.

The participants were chosen using purposeful sampling for the qualitative and quantitative component. Because of relatively small sample size for the underrepresented population, randomization was not feasible. Participants were chosen from two introductory statistics courses at a large Midwestern university. One of the statistics

courses was for the general student body and the other statistics course was more targeted toward majors that require more mathematical understanding. The mathematical prerequisites for the courses do not go beyond basic algebra.

The researcher used various qualitative and quantitative methodologies to test theories, discover emerging themes, and confirm generalizations. The analysis was conducted using SAS, Minitab 15, and NUD-IST software.

Mixed Methodology Rationale Design

Mixed method designs are used when there are a series of interrelated projects within a broad topic designed to address an overall research problem (Morse, 2003). This method is also useful for evaluating the "goodness" of the findings (Teddlie & Tashakkori, 2003). Stronger inferences can be made using this methodology and a greater opportunity for presenting divergent views is possible (Teddlie & Tashakkori). Both confirmatory and exploratory questions can be answered using this methodology which can help verify and generate theory for the same study. Brewer and Hunter (1989) believe that mixed method research is superior to a monomethod due to the idea that mixed method research provides grounds for data triangulation.

Mixed methodology has its share of criticism. Similar to the monomethod designs, mixed methods face criticism about the paradigms used to support its structure. There are some scholars who believe that methods and paradigms are independent of

each other and thus, the epistemological method link is not an issue (Teddlie & Tashakkori, 2003). Others believe the method is impossible due to the tenets of the incompatibility thesis. Then there are some who believe that there should be one paradigm used as the foundation of mixed methods (Teddlie & Tashakkori, 2003).

While the researcher believes that these are warranted criticisms, his beliefs are more aligned with advocates of pragmatism. Pragmatism should serve as a foundation for mixed methods (Teddlie & Tashakkori, 2003). Furthermore, the researcher followed the suggestions of Brewer and Hunter (1989) who believe that the method is possible, but the two components must be kept separate as to realize the strengths of both paradigmatic positions.

As stated in the previous section, this study used a mixed method QUALITATIVE + quantitative design. This type of design uses both qualitative and quantitative methods simultaneously with an inductive theoretical thrust (Morse, 2003). This design has an exploratory sequence (Teddlie & Tashakkori, 2003). The researcher chose to use this method because it allows the study to be run as two separate components which can be used for comparison of findings. Also this method can be used to gain new insight into existing theories.

Site and Setting

The university is a large public Midwestern land grant-research institute that offers approximately 12,000 classes on five campuses. It has a diverse population of

approximately 52,000 undergraduate and graduate students on its main campus. There are 3,941 African-Americans, 1,034 Hispanics, and 233 American Indians. Because of its diversity and large population, this university is an ideal site for research.

The institute offers a relatively large number of statistics courses each quarter – both at the undergraduate and graduate levels. Participants were chosen from two introductory statistics courses. Both Statistics 135 and Statistics 145 have approximately the same content; however, Statistics 145 has a greater emphasis on computation while Statistics 135 has a greater emphasis on conceptual understanding. During the academic school year (September – June), a typical lecture may contain up to 200 individuals per class. Lectures are typically taught by professors and laboratories are taught by graduate level statistics students.

Introductory statistics courses consists of an introduction to statistics, experiments, sampling, data analysis, and interpretation. The most important prerequisite of the course entails having taken basic algebra. Neither course is a prerequisite of future courses; however, most students must take one of the courses as a requirement for graduation. In a typical course, there is a mixture of traditional and non-traditional students.

The courses have numerous lectures and are combined with a statistics lab. For Statistics 135 there are typically 7 lecturers and for Statistics 145 there are typically 2-3 lecturers each term. A lecture may have up to 200 students. The lecture is typically a traditional style of teaching where the instructor does most of the talking. For Statistics 135, there is however a class that is more interactive and has problem solving once a week. This particular course also attempts to match each student to a particular learning

style and tailor the course to that learning style. The lab typically has roughly between 15 and 25 students. The labs consist of computers for each student and allow the students to work together in groups as well as individually. In an Autumn quarter there are typically 700 students enrolled in Statistics 135. There is a large variety of students from many cultures. The statistics course coordinator for Statistics 135 estimates that there are approximately 10% underrepresented minorities enrolled in the course.

Researcher's Role

Because the researcher is a former student and teacher's associate of the statistics program, entry for conducting the research was relatively easy. The researcher addressed matters with the coordinator of both introductory statistics courses. Students for the general statistics course were contacted via an e-mail distribution list given courtesy of the course coordinator. An announcement was made in the lecture discussing the confidentiality of the study. It was discussed in the lecture that the student's participation was voluntary and would not be a reflection in their course grades. Furthermore, the lecturers explained to the student that their participation was anonymous to the course coordinator, lecturer, and teachers' assistants.

In a written letter, the researcher explained the purpose and rationale of the study (See Appendix A). In addition, the letter emphasized that participation was voluntary and would not influence their grade. It was explained that by completing the questionnaire, the students were giving the researcher consent to use information from their questionnaire for research purposes only and to obtain information pertaining to their age, high school GPA, college GPA, ACT score, SAT score, and course grades via

the university's data warehouse. When using an electronic consent for the general statistics course, students were sent a follow-up e-mail from the university registrar verifying their consent to confidential data. Finally, as an incentive for participation, the letter explained that all participants would be entered into a random drawing for four prizes of $25.

Finding and establishing rapport with the qualitative cohort did not prove to be very difficult. The researcher offered occasional free tutoring in the subject and a contest where three of the students won $50 cash rewards. In the letter that was e-mailed discussed in the previous paragraph, it was explained about the possibility of winning a separate monetary prize for participating in the study. The cohort was purposely chosen from those who demonstrated interest in participating in the qualitative study (See Appendix A). The pros about offering tutoring are that the researcher will have an opportunity to observe and gather more data. This method was useful in helping to establish rapport with the students. However, the cons are that by offering tutoring the researcher may bias the end results of their academic performance in the course. The pros about offering a contest are that they may be influenced to continue the research in its entirety. However, the cons are that a cash award may unduly influence their motivation for participating in the study which may affect the way that they respond to the questions. Another con may be that only people who are interested in the cash prize may be willing to participate and thus may not be a "typical" participant.

Besides addressing the issues of establishing rapport, it was important that the research was conducted ethically. All of the participants were told the purpose of the research, none of the true names of the participants have been disclosed, and all confidential data has not been reported.

The researcher dealt with issues of trustworthiness, validity, credibility, and reliability of the study. The researcher used participant observation, journal entries, examinations, homework, textbooks, the literature, analytical modeling, quantitative testing, and interviews in order to establish triangulation. Established professionals in the field of research advised the researcher.

Qualitative Component - Grounded Theory Approach

Because the researcher is interested in understanding the lived experience of participants and expanding on theoretical frameworks, he has chosen to use a grounded theory approach for the qualitative component of the research. Methods of grounded theory consist of "systematic inductive guidelines for collecting and analyzing data to build middle-range theoretical frameworks that explain the collected data" (Charmaz, 2000p. 509). This approach allows for varied fundamental assumptions, data gathering techniques, analytic emphases, and theoretical levels (Charmaz, 2000).

The approach consists of a) collecting and analyzing data simultaneously, b) a two-step data coding process, c) comparative methods, d) the construction of conceptual analysis through memo writing, e) refining the researcher's emerging theoretical ideas through sampling, and f) integration of the theoretical framework (Charmaz, 2000). It

consists of a set of explicit strategies that provides a systematic analytic approach to qualitative analysis. Because of small sample sizes it was not feasible to refine the researcher's emerging theoretical ideas through sampling.

Sample

The qualitative component consisted of a cohort of 12 individuals from a purposeful sample. There was one African American male, two African American females, two Latinas, one Asian female, four White females, and two White males. Underrepresented groups consisted of African Americans and Latinas. The researcher was unable to recruit any Latino students. Represented groups consisted of Whites and Asians. The researcher was unable to recruit any male Asian students. These groups were compared for emerging themes. One African American female, Asharii and one White female, Hetty, did not complete both interviews.

Data Collection

The conceptual framework for this research, critical theory, critical race theory, Ogbu's cultural-ecological theory, and social constructivism were used as an initial and continuing guide in data collection. The researcher attempted to understand the students' beliefs in how race influences learning from a societal and individual perspective. He also attempted to understand if these racial issues contributed to or detracted from the students' schooling experiences; learning experiences, aspirations, and understanding of statistics.

The Statistics 135 students were interviewed during the fall of 2005 and the Statistics 145 students were interviewed and observed during the winter of 2006 quarter (See Appendix B). Each cohort participant was formally interviewed at the beginning and middle of the school quarter in one of the campus libraries or the researcher's campus office for a period of approximately 30 – 45 minutes. When possible, informal interviews were conducted during tutoring sessions. These interviews typically consisted of looking at the person's homework and quiz scores, asking the ease or difficulty of the course, the students' thoughts on the instructors and teacher's associates, and their awareness about cultural issues in and outside of the classroom. All structured interviews were recorded on a tape recorder and transcribed by the researcher.

In order to gain additional insight other than knowledge suggested from theory, participant observations were conducted during normal class lectures and recitations as a form of triangulation. During observations, the researcher attempted to determine the attitudes reflected, gestures or body language, and interest in the subject. The researcher observed the students' line of communication with others in the classroom. Style of teaching and facilitating were also observed. Class materials including handouts, homework assignments, and the textbook were observed and analyzed. Finally, as part of the grounded method approach, participant observation was used to focus and enhance the questioning for future interviews.

Also a reflection journal was kept which expressed the ideas, biases, and beliefs of the researcher. This journal was used to inspect whether or not the researcher was viewing the data prejudicially. The researcher read this journal in an attempt to remove personal biases and subjectivity. The journal was used to investigate possible themes that

the researcher may have not thought of prior to participant observation and/or interviews. These data gathering techniques were used in an effort to provide a "thick description" of the participants and their experiences.

Trustworthiness Criteria

In order to establish trustworthiness criteria, many efforts were made to triangulate. As stated earlier, participants were interviewed and observed during the course. Textbooks, supplementary material, and redirection of questions to the interviewee were all used as methods of analysis. The researcher also maintained a journal that expressed his personal biases and judgments.

Interpretation

"A student (or colleague) without a theory is in a far better position to discover (and eventually even appreciate) how theory serves than someone who has been "given" a theory by someone else… (Wolcott, 1995 p. 188)."

This quote from Wolcott is debatable. In discussing how fieldwork should be conducted, he de-emphasizes the importance of theory. Not to say that he does not find theory important; to the contraire, he gives a variety of reasons as to the importance of theory, but his point that he makes is that often, researchers place too much emphasis on theory (Wolcott, p. 188). He explains to the reader that those researchers who are strongly drawn to theory will have a short lived life as a fieldworker, and those

researchers who are drawn to fieldwork will more than likely not look to theory for explanation or orientation (Wolcott, 1995). His position on research guided by discovery is that it is better not to be guided by theory.

The researcher conducted a mixed methodology study and has expressed his belief in pragmatism aligned with Wolcott's philosophy on conducting research (See the Mixed methodology Rationale Section). It should come as no surprise that he believes in pro-longed engagement and multiple sources of data gathering techniques. It is his belief that before research is conducted one should have prior personal thoughts and beliefs about the phenomenon to be researched. These personal theories should be used as a beacon upon initial engagements of the participants. After "superficially" familiarizing oneself with the phenomenon, one should consider scholarly work created by others. In the researcher's opinion, Wolcott's idea of finding balance between theory and fieldwork is important (Wolcott, 1995). The researcher strove to allow the field observations to reveal themes without prematurely superimposing a structure on it (Wolcott, 1995).

The researcher clearly recognizes the importance and value of theory. As Wolcott (1995) expresses, theory addresses the issue of sense making, and prohibits researchers from getting caught up in writing personal diaries or rendering accounts dismissed as travelogues. Furthermore, he gives five reasons as to the importance of theory (Wolcott, 1995):

1. It provides the convenience of labels that allow past and present researchers to communicate effectively.
2. It provides a way of gaining a broader perspective or providing a broader application to the single case,

3. The dilemma of generalization of qualitative work is addressed through theory. Theory allows the researcher to join his or her work to a larger issue or accumulating body of data.
4. It provides a critical perspective by "calling up previous dialogues in which certain aspects of a problem may have been singled out because they have been inadequately attended to or have raised new doubts or concerns."
5. It provides a useful way of disproof. That is, researchers can find negative instances.

Because the researcher conducted relatively extensive research on his topic before conducting the actual study, he was familiar with a few of the theories that other scholars had produced. Thus contrary to the beliefs expressed above about engaging the phenomenon and participants dressed with only his personal thoughts and beliefs, these ideas proved to be difficult to adhere. However, as previously discussed, the researcher strove to document his personal feelings and beliefs in a journal, and allow the data to evolve "naturally."

It is the belief of the researcher that there are four major components that are involved in learning statistics. First of all, each learner brings his or her own cultural beliefs into a classroom environment. Thus a learner and their classroom environment must learn to respond to and accept issues surrounding their multiculturalism. Second, reading ability, which is not limited to just reading comprehension, but includes the ability to absorb fairly large amounts of material in a short period of time is important. There is a substantial amount of reading and comprehension that must take place in order for a student to perform well in a college level introductory statistics course. Thirdly, it is

imperative that the student has good graph and table comprehension. Introductory statistics courses use a substantial amount of graphs and tables to display and organize data. Lastly, because statistics is an inductive reasoning mathematical science, a student should have good inductive reasoning skills.

Qualitative Data Analysis

As previously stated, the researcher conducted the study as two simultaneous components, qualitative and quantitative. Because this methodology was a QUAL + quan design, the primary findings result from the qualitative research; however, the quantitative results were useful in strengthening the findings. In an attempt to not let the quantitative component influence the qualitative, the researcher analyzed the quantitative data after the majority of the qualitative data were analyzed. Thus the qualitative data had its own emerging themes without influence from the quantitative data.

For the qualitative component, data analysis was an ongoing process throughout the study. The researcher analyzed the data using the software NVivo. NVivo is qualitative software which allows the researcher to code the data and conduct searches and comparisons. It also has capabilities of creating matrix relationships. Using the matrix capabilities, the researcher stratified the data by various characteristics such as gender and race comparing emergent themes for various groups. After the data were coded, the researcher conducted frequency counts to determine "salient" factors. The researcher compared common themes from the researcher's journal, interviews, tests, quizzes, and textbooks as a form of triangulation. The researcher used an inductive approach that consisted of five steps as explained by Moustakis (1990). For this method,

the researcher must first immerse themselves in the setting. Then an incubation process must occur where the researcher becomes aware of nuances and meanings in the setting to capture intuitive insights for the purpose of understanding. Third, the research must detail understandings of the setting. Fourth, comes a phase of explication that includes description and explanation to capture the experience of the participants. Last, through creative synthesis, the researcher should synthesize the participants' whole story and lived experience.

Quantitative Component Design

The quantitative component consisted of a sample size of n_1= 52 underrepresented minority students and n_2 = 389 represented students from the combined statistics courses. Each student was required to complete a questionnaire (See Appendix A). Each student of the cohort studied in the qualitative component was included in the data analysis of the quantitative component. This questionnaire was an instrument used to determine influences of researcher interested factors. The primary analysis was an exploratory multiple regression model controlling for underrepresented/represented status. Descriptive statistics such as proportions, means, and frequencies, were gathered and analyzed using corresponding two proportion tests, two-sample t-tests, and chi-squares. Because this component is an exploratory, non-random observational study, there can be no cause and effect interpretations; however, results from hypothesis tests will be used as indicators and/or plausible factors that should serve for future research.

Data Analysis

The researcher used SAS and Minitab 15 to conduct the analysis. SAS and Minitab 15 are statistical software that allow a variety of data manipulation techniques and statistical analyses. These software provide tools for obtaining graphs and descriptive statistics. The software also provides a host of tools for reporting and analyzing data.

A multivariate regression analysis was conducted using the statistics achievement indicator, final numerical grade in the statistics course, as the response variable and the questionnaire variables along with confidential, university provided data as the explanatory variables in order to determine how the explanatory variables affect the response variable. The primary explanatory analysis was conducted controlling for underrepresented and represented status. Secondary models included exploratory multivariate regression analysis on underrepresented students and comparative models in which those significant predictors were analyzed on represented students.

See Appendix C for a list of the variables used in the exploratory analysis. There were two variables that merit further discussion. Because all students did not take both the SAT and ACT standardized tests, the first variable, standardized test score was constructed. The researcher standardized the overall test scores and took the highest score of the two as the value. The second variable, number of mathematics classes, was constructed as an ordinal variable with order from lowest to highest ranked as arithmetic, Algebra I, geometry/trigonometry, Algebra II, Calculus I, Calculus II, and beyond Calculus II. So the analysis implied that a participant, who had a ranking of four, took arithmetic, Algebra I, geometry and/or trigonometry and Algebra II.

Furthermore, two-sample t-tests, two-sample proportion tests, and chi-square tests were conducted to determine differences between means when comparing continuous variables, differences between proportions when comparing categorical variables, and differences in categorical variables when analyzing contingency tables respectively. A combination of different types of groups such as gender, high GPA students/low GPA students, high SES student/low SES students, etc… was analyzed using these methods. The analysis includes descriptive statistics of various groups.

Representation

Currently, representation remains to be an issue. After defining irony as an unsettling, self-conscious mode that senses all sophisticated conceptualizations and employ rhetorical devices that centers on problems of language and revels in satirical techniques, Marcus and Fischer (Marcus & Fischer, 1999) discuss the task at hand. They say that it should not be so much escaping the ironic mode, as much as it should be combining and embracing a variety of strategies for producing realist descriptions of society. Because all representations are subject to critical review, it is their belief that representation should be left as multiple and open-ended alternatives. Furthermore they go on to say that the problem of the moment is how to represent the data in innovative ways (Marcus & Fischer).

Marcus and Fischer (1999) give good rationale as to why the researcher should explore new and innovative ways of representing the data. Using their philosophy, the

researcher represented the data using autoethnographic and positivist techniques of displaying data. That is, the researcher incorporated his personal experiences as phenomenon, combined with tabular and significant variables.

Autoethnography, as explained by Ellis and Bochner (2000), is an autobiographical genre of writing and research that displays multiple layers of the conscience while connecting the personal to the cultural. Autoethnographers gaze, through an ethnographic wide-angle lens, focusing outward on social and cultural aspects of their personal experience. Afterwards, they look inward, exposing a vulnerable self that is moved by and may move through, refract, and resist cultural interpretations. This form is usually written in a first-person voice and appears in many textual forms (Ellis & Bochner, 2000). In these texts, concrete action, dialogue, emotion, embodiment, spirituality, and self-consciousness are featured, appearing as relational and institutional stories affected by history, social structure, and culture, which themselves are dialectically revealed through action, feeling, thought, and language (Ellis & Bochner, 2000).

The researcher chose to represent the data using a form of autoethnography called complete-member researcher. In this form of representation, the researcher explores a group, in which he or she is a member, or has become a member with complete identification and acceptance during their research (Ellis & Bochner, 2000). This form of ethnography is a coined phrase from Adler and Adler to refer to researchers who are immersed and fully committed to the studied group. The researcher is not merely a researcher but he or she is the subject and becomes the phenomenon (Ellis & Bochner, 2000).

In this representation, in-text references will be used to establish the participant who made a quote or if the observations were from participant observations and field notes. The use of italics refers to the researcher's personal views and experiences.

Introduction to the Qualitative Participants

The qualitative component consisted of five underrepresented (African American or Latino) students and seven represented (White or Asian) students. All of the underrepresented participants were enrolled in Statistics 145 excluding Raquel. All of the represented participants were enrolled in Statistics 135. Also, even though the researcher was not enrolled in an introductory statistics course, he will provide rationale and perspective as to why he considers himself a participant in the study.

Delores is an African American biology student from Florida in her mid twenties. She comes from a middle-class family where her mother has a PhD and her father is in the process of obtaining a PhD. Not only is Delores' immediate family highly educated but so are many of her extended family members such as her grandfather who has a PhD and her uncles who have Doctors of Jurisprudence. Unlike the other individuals in this study, Delores has obtained a Bachelor's degree and is taking this course as a general requirement for a medical field program (Delores Interview I).

Jerry is a fourth-year, African American, psychology major. He is in his early twenties. Jerry is from a small town in Ohio that has a decent mixture of Blacks and Whites; however, the two races do not appear to mix socially. Being a fourth-year student, Jerry has waited a while before taking his only statistics requirement, Statistics

145. His father works as a laundry coordinator at a correctional facility; his step mother is a secretary and delivery person; and his biological mother is a domestic engineer. Jerry's family income is a little bit above $50,000 (Jerry Interview I).

Raquel is from a relatively small city in Ohio. Her father is White and her mother is Hispanic. Raquel considers herself to be Hispanic; she speaks some Spanish but is not fluent; however, she is taking Spanish as a class. Both of her parents have Master's degrees, and are considered middle-class.

Asharii is a second-year, undecided major from a moderate sized town in western Ohio. Asharii is in her late teens. She is an African American who grew up primarily amongst other African Americans in a poor neighborhood. She most likely plans to major in a health care field. Most of her life she grew up in a one parent home until the last four years where her mother married. Her mother makes less than $30,000 and has a high school diploma. Her stepfather has a degree in accounting. Asharii's biological father has not been involved much in her life. Asharii is uncertain whether her biological father received a high school diploma or a GED and is currently unemployed. (Note: Unfortunately, Asharii did not complete the interviews nor did she attend class often, so the data gathered from her is sparse.)

Lona is a first-year, Hispanic, English major from a large city in Illinois. Lona is in her late teens. She speaks Spanish and English fluently. Her parents are from Puerto Rico. Her father is bilingual as well, but her mother primarily speaks Spanish. While growing up, Lona lived in a predominantly Hispanic neighborhood. She made it clear that her family lived right on the border between the Mexican and Puerto Rican people. Lona's family had a modest income.

Akira is a 19 year-old, second-year, biracial, undecided major leaning toward majoring in allied medicine. She is from a large southern city in Ohio and grew up in a segregated area of primarily Whites. Her mother is White and her father is Japanese. When discussing her race she described herself as "American," a word she frequently interchanged with White saying that she did not consider herself, "Asian, Asian," but American (Akira Interview I). When saying "Asian, Asian," I interpreted that to mean that she was not the stereotypical Asian or perhaps the Asian who understands and knows Asian culture. She also used this terminology when discussing her father's race – who is "100% Japanese." Both of her parents – who have been married multiple times– have masters degrees. She comes from a middle-class divorced family.

Dana is a White, third-year, nursing major in her early twenties. She has had the fortune of studying abroad and because of this exposure, knows how to speak German. In fact, in her family, it is expected that each child will study abroad and learn the language. Her parents are married and make around $60,000. She described her family as upper middle-class. Both her parents have Bachelor's degrees. Her father works as a computer programmer and her mother is a domestic engineer.

Hetty is a White, second-year, communications major from a relatively large city in Northeastern Ohio. She is in her early twenties. Her parents are married and make somewhere between $60,000 and $150,000. Her father is an engineer and her mother is a former English teacher. (Note: Hetty did not complete the second interview.)

Jade is a White, second-year, elementary education major from a small city in Northwest Ohio. Jade is in her early twenties. Her parents are married and make around

$150,000 per year. Both her parents have college degrees. Her father has at least a Bachelor's degree in civil engineering and her mother has a Master's in education and is currently a teacher.

Jacqueline is a White, fourth year, journalism major from a large city in Southern California who moved to a large city in Southern Ohio in her freshman year. She is in her early twenties. Jacqueline's father died when she was approximately seven years old. Her mother raised her by herself until remarrying when Jacqueline was a teenager. She sees her stepfather more as a "brother" instead of a father figure. Jacqueline's mother has an Associate's degree and her stepfather has a Bachelor's degree.

Nathan is a White, pre-athletic training and physical therapy major from a small city in Southwestern Ohio. He is in his early twenties. His parents are married and make a total income of between $30,000 and $60,000. Nathan's father has a Bachelor's degree and his mother has an associates degree and works as a teacher.

Nate is a White, non-traditional student that goes to the university part-time and has enough credits to be considered a junior. Nate is from a large city in southern California. He is in his early thirties and majors in family resources management and human ecology. Nate's parents are divorced and both finished high school but never attended college. He stayed primarily with his mother and does not seem to have much respect for his father.

My Personal Insight as to why I am a Participant and Researcher in this Research: A Case for an Autoethnographic Representation

In order to understand why I feel that I am a participant and researcher in this research, I believe it is important that the reader gets a glimpse into my life. I was born in East Saint Louis, IL, a predominantly African American, poverty stricken city. While the city definitely had (and still has) its bright spots, such as being home of Jackie Joyner-Kersee, Al Joyner, Miles Davis, LaPhonso Ellis, a host of high school national championships and awards, and schools that produced students going to an array of colleges around the nation, during the time I was growing up, it was probably better known for its crime rate which fostered a high number of gangs and one of the leading homicide rates in the nation.

Even though, I considered my family middle-class considering that we seemed to pretty much always have what we needed, the reality is that we were most likely considered upper lower class by the national standard. To this day, I've never asked my parents what our income was and probably won't. What's the purpose? I had a pretty wonderful home; a family of four with a father, mother, and sister. Unlike so many in my community, I had the wisdom and examples of good, God fearing parents, grandparents, uncles, and aunts. I was a student of mostly African American teachers who challenged and cared about me and my peers. I was taught good morals. I was exposed to a variety of experiences.

I will always believe that my interest in statistics stemmed from experiences with my father. He did not necessarily like mathematics; however, he loved sports and was the local newspaper's sports editor and journalist; so I often had the opportunity to travel

with him to numerous sporting events at all different levels. Even though I knew nothing about statistics at the time, I found myself being fascinated by one of the "perks" of sports journalism, the stat sheets. Don't get me wrong, I enjoyed the game much more, but it was kind of a game within itself predicting who would score what after each quarter, the tendencies of coaches' play calling, and the number of failed attempts. The programs would regularly tell players' statistics; so before the game began, I had an idea of which players were good and which one were not.

While growing up, I studied fairly hard and participated in a number of activities, such as music, track and field, church plays, honor societies, basketball, and baseball to name a few. I always achieved in school making mostly As and Bs. I continuously stayed on the honor roll. Upon graduating from high school, I was one of the top ranking students.

As I prepared for my journey to college, like so many others, I had not the slightest idea of what I wanted to major in. Fortunately, I had the opportunity to attend a seminar on finding a career. After the presentation, I went to the speaker with the statement, "I don't know what I want to do." After asking me a few questions about my interests, he asked me whether I was familiar with a career named actuary. I couldn't say that I had ever heard the word before, so he quickly filled me in. He described it as a career that used mathematics and statistics to help insurance companies make decisions. He told me that it was a high paying, in-demand job. Well, I was sold!

I began attending college in the fall of 1991 as a mathematics major at Tennessee State University (TSU) on a partial band scholarship. TSU is a moderately sized, liberal

arts, historically black college in Nashville, TN with a student population of roughly 7,000. Of course with it being historically black, most of its faculty and students were black as well, so I felt right at home.

Around my third year, I was introduced to my first statistics course. It was the first mathematics course that I did not have to ask the question, "So what?" or "What's the point?" In other words, how would I be able to use this in my life other than to pass a test? Statistics was clearly practical. While so many of my fellow students struggled and complained about the complexity of the material, I was laying on the beach with a cool breeze, drinking sweet tea. Statistics was fascinating! I ended up taking a few more courses, but unfortunately it was a one-on-one independent study course (There were no other statistics courses available at the university.) that proved not to be nearly as structured so I found myself being sometimes confused but yet eager to learn.

After graduating and working as a software quality engineer for a couple of years, I pursued a graduate level degree at The Ohio State University, a land grant university, where I majored in statistics. OSU is a predominantly White university, but because of its large student body, it cultivates a wide variety of races. The university has one of the top two largest student populations in the country. Needless to say, I was somewhat in awe of its magnitude and resources.

One disconcerting idea that I arrived to the university with was being the only African American in the department. I knew with 90% certainty that there would be an entire faculty of older White males. I was apprehensive of encountering racism, not receiving social support, and not being able to make the grades. For the first time in my

life, I would not be the majority in my educational community and it was intimidating! I believe my apprehension would prove to be a burden during my tenure in the department.

Fortunately, I did not experience any racism (that I know of) and for the most part, I received a lot of support from some wonderful faculty members to which I will always be in gratitude. Unfortunately, some of my other apprehensions were relatively true. There were only two White female professors and there were no African American professors. There were only a few professors of color from foreign countries. There was one African American male, doctoral candidate, and one Black female that arrived the same time that I arrived. The majority of the students were White or Chinese (some of the finest students from the United States and China). For the first time, I was a small fish in a large pond.

When I look back on my experience, I placed a huge, new burden on my shoulders to not fit the stereotype of being an underachieving African American. OK, to be blunt, besides wanting to achieve high grades as I was accustomed, I had fears of being the dumb Black who couldn't cut it amongst the Asians and Whites, so there was an enormous burden; a burden about my mathematical foundation and a burden about not fitting the stereotypes. I studied hard and long; however, I struggled almost the entire time not being able to conceptualize and make the connections necessary to solve difficult problems on homework and tests effectively and efficiently. My lack of experience in statistics courses and my mastery of detailed mathematical mechanics were cancerous to my statistical pursuit. Even the rare exams were I thought I "blew it out of

the water" with a score of about a 92, I found myself only being roughly in the top 85th percentile or so. The transition from the semester to the quarter system was difficult. Everything was fast paced, graded on the curve, and challenging to say the least.

I was fortunate to have peers from different cultures who worked closely with me. I was also fortunate to have two professors, an older White male and White female, whom I have considered my statistics parents. These people held my hand in times of need, encouraged me, and provided greatly needed insight to understanding this complex yet beautiful language. With prayer and help from my academic, social, and family support groups, I graduated in May of 2002 with a Masters of Science. It is one of my most cherished degrees.

Shortly afterwards, I began pursuing my doctorate in Mathematics/Statistics Education. I learned about various learning theories and ways of implementing the theories in classroom settings. I questioned how a person with my background could research an interesting, unique, yet meaningful topic that would contribute to the existing literature. I delved into topics regarding the achievement gap between underrepresented minorities and their counterparts. I began to think about why there was an achievement gap, refusing to believe that underrepresented minorities could not achieve. I also searched myself, questioning why I struggled so much in the statistics department. Could I have done something better to achieve or was my mathematics foundation Swiss cheese?

So why study influences involved in underrepresented students learning statistics? It's because I am (not to infer in a Godly sense). I am a representative of a group of people who have not been embraced and/or ventured much into this field. Can you

imagine if there had been no Jackie Robinson? I am the underrepresented minority who struggled to understand statistics at the graduate level. I am one of the voices who wants to promote well paying careers in statistics to a group that is unaware of the financial rewards in promising careers. I am the person who wants underrepresented minorities to understand the importance of statistics to succeed in many disciplines in graduate school (I would guess from my unscientific conversations with graduate students that statistics is a stumbling block for many trying to become doctors, psychologists, epidemiologists, MBA's, etc….). I am someone who wants statistics teachers to have a better way of reaching underrepresented minorities. Lastly, I am "obligated" to help my community in ways that others have not. As expressed by Ellis & Bochner (2000), this research is as much me as it is those whom I interviewed and observed.

CHAPTER 5

THE BURDENS OF RACE ARE INFLUENCED BY MULTIPLE SOURCES

While Some Things Have Changed, Race Relations Still Need Improvement

Chapter 5 will explore the societal pressures that create the burden of race and the multiple sources that contribute to its existence. Our country has a long history of racism. As will be shown in this study, despite overcoming many challenges, there is still a need for improvement in racial equality and racial relations. Regardless of race, all of the participating introductory statistics students believed that racism is a presence in our society. The underrepresented students keep racial atrocities in the background and/or foreground of their minds. Many represented students connected the stereotypes of Southern people, predominantly White area residents, and/or Republican Party members as being racist by affiliation. There was also a belief that all races are equal, and having diversity in our society is good. Data from this study suggest that students of introductory statistics courses bring their own perspective of race relations which may affect their ability to learn from instructors and other classmates. Furthermore these perceptions may contribute to a negative assessment of their own ability.

Racism is Alive in Our Present Day Society

> I remember a kid in my high school saying they were glad that only there was one Black kid in our school because they didn't think Black people belonged there. I thought that was very inappropriate (Raquel Interview I, October 29, 2006; 2005, October 29).

While all of the underrepresented participants could not give specific examples of overt racism, it was apparent that they believed racism was an infestation in our society. There were experiences of classroom racism where students overtly expressed dislike for different racial groups, and feelings of racism from teachers.

"I had a teacher who I had obviously received an 'A'; it was a French class. I had obviously earned an 'A', and I had every single paper to substantiate that I had earned an 'A', and this teacher said to me, 'You have a 'B', and I'm not discussing it with you.' And that was blatantly racist; because, I don't think if I was White she would have done that" (Delores Interview I, January 6, 2006). Delores showed visible anger as she spoke of her experience that led to her parent's correcting the teacher's "oversight." She believed that she had done 'A' work, understood the material, and deserved an 'A.' She seemed to believe that because the instructor refused to discuss the matter with her; it was an indication of a racist attitude. In Delores' opinion, the teacher expected her to accept her grade without further discussion.

This racist treatment was not merely confined to educational settings, but there were stories of racism in places of employment. "They were talking about how Mexicans was workin' in McDonald's and stuff and how when you go to McDonald's now you can't speak Englisé. It's like; a lot of people are against it. Nobody wants to work in those places because that's where the Mexicans work" (Raquel Interview I, October 29,

2006). Meanwhile Delores said, "At my work, the job I had when I was in high school, they had the White students or White Hispanics – I guess they call them – working upstairs and the African Americans working downstairs, and the African Americans they wanted us to do more um janitorial errand kind of stuff. Where as they had the White kids doing things that were more um…you know I guess secretarial and I guess, more, I guess…" "White collared?" I said. "White collared, yeah, versus blue collared" (Delores Interview I, January 6, 2006), she ended. These experiences seemed to justly agitate both participants when they discussed these matters. Justly because they felt that either they or people of their race were being unfairly discriminated against or provided fewer opportunities.

While all of the represented participants believed racism was present in our society, in comparison, only one gave an actual example. Most of them discussed the ideas of hypothetical comments that could have been said or done. Represented students said, "There were probably three African Americans and four Asian descent people" (Akira Interview I, November 3, 2005) in my high school. "So like, yeah there are going to be things being said, but I mean, I'm not racist" (Akira Interview 1). "Racism is…. I believe it's prevalent everywhere in the world and that every race is racist toward every other race" (Dana Interview I, November 1, 2005). "I know some people that might be so naive or they might get so wrapped up in, 'We're not a racist country,' and so they'll say that they don't see differences. Like they just kind of see everybody" (Jerry Interview I, January 18, 2006), but "of course there's still racism involved in America.

Sadly I don't think it's ever going to end" (Nathan Interview 1). Most of the participants expressed their opinion to the question, "Does race exist in America?" as an "of course it exists," statement.

There are numerous examples of discrimination and racism that I could talk about: (a) the justice system, (b) housing, (c) education, etc…. How about the plastering of faces of underrepresented minorities in media outlets pertaining to crime? Perhaps I have been sensitized when a former White coworker tells me that her grandmother who lived in the New England area and never met an African American feared us. Why? Because we were always on her local news. I'm guessing we weren't the anchor person. Maybe I should discuss how every time ESPN discussed Barry Bond's personal trainer, Greg what's-a-name-a (Anderson), and his guilty plea to the BALCO steroid scandal, they often solely put a picture of Barry Bonds up (This was reported before it was leaked that Mr. Bonds had unknowingly taken present day illegal substances.) I can't tell you what what's-a-name-a looks like.

Instead of discussing those issues that have been exhausted, I want to talk about a subtle, but rarely explored topic of who's important. Every year people turn up missing. Some have been kidnapped, some stranded in the woods or mountains, others are runaways, and many are killed never to be found. For the "fortunate" missing, there is national television exposure which leads to search and rescue missions, manhunts, a minimum of tens of thousands of dollars and more being spent in man hours and rewards. Some have become household names: (a) JonBenet Ramsey, (b) Natalee

Holloway, (c) Elizabeth Smart, (d) Chandra Levy, (e) Laci Peterson, and (f) yes, our runaway bride, Jennifer Wilbanks. The results are often successful, reuniting the missing person with their loved ones. This is a noble and heroic effort that is well justified!

"Fortunately" for many underrepresented people, we don't get kidnapped, stranded, or runaway. At least if we do, I rarely hear or see it in the national news. For example Alex Peterson, a seven year-old African American was kidnapped on May 3, 2002 approximately a month before Elizabeth Smart, a fourteen year-old White girl kidnapped June 5th. The Tri-state Defender reported that 67 national stories were written about Peterson. In comparison 400 were written about Smart. By June 21st the comparison was approximately 900 for Smart and 79 for Peterson; a staggering difference (Carpenter, 2002). In my unofficial analysis, I suppose pretty White women are the highest at risk to have one of these conditions occur, followed by White men and/or White children. I suppose those would be the important people to focus our national media attention.

Past Racial Atrocities Remain a Haunting Presence in the Minds of Underrepresented Groups

"I just, I think they (underrepresented groups) think that we (represented groups) owe them [*sic*]…. You know" (Akira Interview II, November 17, 2005)? Akira asked me as if trying to convince me that present day represented groups had nothing to do with slavery. "My mom was not racist! Obviously… she married an Asian" (Akira Interview II, November 17, 2005). This was an opinion believed by Jacqueline as well who said, "I think that there is obviously…I mean, there's differences in everyone, but I don't think

that it's something that necessarily need to be hit on as much as it is in our society" (Jacqueline Interview II, December 5, 2005). Both participants had the opinion that racism exists with clarification that they were not racist; however, they appeared to believe that racism is discussed too much in our society and (I would infer) detracts from race relation building. Akira and Jacqueline expressed a comment that I have heard too often when an underrepresented person screams racism, "Can we just move on and let… it… die?"

While the majority of represented people may not have this attitude and the majority of the represented participants did not appear to have this attitude, I believe there are quite a few represented people who think this way. Many of the underrepresented participants believed that historical atrocities have had an influence on our present day society.

"Just looking into history how, you know, many races they just did their best to keep Black people down; you know what I'm saying - almost shaking his head with a sarcastic laughter? Like, just doing all kinds of stuff just overtly; just killing, lynching" (Jerry Interview I, January 18, 2006). *Vivid, grotesque images of underrepresented people oftentimes unjustly permanently losing their breath at the hands of finely braided fiber swinging from a large piece of wood all to the enjoyment of gladiator audiences screaming, "Finish him!" The local store clerk yelling, "Get your popcorn. Get your souvenirs. Take a picture with this trophy mantled animal on display; only 5 cents. Get your memorabilia; show your kids that you were there." If only the wide world of sports news network, ESPN, could have been around. I can only imagine. These are the images haunting underrepresented people's minds.*

The slavery of underrepresented groups is over; the effect is not. "The older people, you know, they're set in their thinking. They're oppressive; they have an oppressed brain" (Delores Interview I, February 9, 2006). *Because of our history, many underrepresented groups mistrust and dislike represented groups. Father Time has allowed us to be severed with the sword of Lady Justice and measured with false weights of her scale. Unduly have we been touched by the thumb print of discrimination.*

As any good parent will do, they will teach their children; help them not repeat their mistakes. Unfortunately while these teachings have helped many of us keep our history in the passenger's seat, it has also allowed many of us to let our history take the steering wheel. Many of us have not taken advantage or been able to take advantage of educational opportunities. Some of us have ceded our place amongst the affluent all in the name of "The White man is keepin' me down." Our racial history has unequivocally been a deterrent – an understatement at minimum – but we must use our history to jump, not stumble or fall on the hurdles in front of us.

On the other hand, for the present represented groups, no, you did not enslave underrepresented minorities, but you have been given a five lap head start that has resulted in economic, educational, societal, political, cultural, psychological, and judicial prosperity. Is there an easy fix? No. What more can you do or should you do? That's debatable. When will the bleeding stop? I don't believe anyone can answer this question definitively; however, I will say that I support those states that are at least admitting regret for the institution of slavery. If you ask me, an "I'm sorry," is long overdue – after all, that's what we tell our kids to say when they've done wrong. Furthermore, even though it is unrealistic to believe this will occur, as just, fair parents,

many of us would not only make our children return rewards accepted and gained through false pretense, immoral actions, and illegal occurrences, but we would take away additional privileges.

A Person's Geographical, Political Affiliation is an Indicator of a Racist

> "When I graduated, I would say we had about 30 Black students; somewhere in there. It was mostly like a farm town when I was coming up. So that explained it….. So I grew up around more Black students and I was used to that and going from that to Mason where there's a lot racist White kids that had grown up on the country, it was really hard to go from that, and I hated Mason like my first three years because of that" (Nathan Interview I, November 8, 2005).

Nathan who is pretty reserved made this quote in much that manner. I was unable to determine from his tone or body motion whether this state of his new environment caused him grief. However, his words spoke volumes, and he mentioned his discontent for the town a few times during our conversations.

Many of the represented group associated being a racist with the geographical area that a person was from or their political affiliation. If a person came from a town with little diversity as discussed in the previous quote by Nathan, it appeared to constitute a racist. A few of the participants seemed to believe that a person from the South was more than likely to be a racist.

While discussing an associate's comments on White racists' views on interracial couples in different places, many of the represented said things like, "She's from Texas and I hate to…. I don't think it's fair to stereotype" (Jade Interview I, November 8, 2005), but "I mean, look at the entire South practically. There's like all sorts of places there that I'm sure it's totally evident. I mean even in Ohio, there's a lot I think" (Jacqueline Interview 1). "It's kind of like upper middle-class, White, Republican

county, and like there if you have an interracial relationship, they'll definitely like look at you. It just seems like they see life as like one way and it's like, there's a lot more to it than that" (Nate Interview I, October 29, 2005).

This idea of a racist Southerner was exacerbated when the person spoke in a "Southern dialect." "Well actually I do know a hard core racist. I wasn't good with him; I thought he was stupid anyways. Well, he had that like country like…like you know twang" (Akira Interview II, November 17, 2005).

While there was mention of White Republicans being racist by Raquel who was from a predominantly White city, none of the other underrepresented participants said anything regarding this topic. However the strength of her comments should not be diminished.

> I had a government class that I hated. Everybody in there was Republican and then there was me and my one friend that were liberal; three of us. Three of us were liberal…. He (fellow White student) said, "One flag, one something, and one language," because he thinks that we should wipe out everything that's like Span… that has Spanish words on it. Like, they shouldn't be there because people that …of that kind of rapport don't belong in America. "Cause Hispanics don't belong here. It's for the White people" (Raquel Interview I; 2005 October 29).

Her comments demonstrated a disdain for her racist classmates, infuriating her and some of her liberal friends to the point that she was unable to listen to the remainder of lecture, and one of her friends ended up leaving the room.

All Races are Equal

> I think anybody can do anything. I mean it's just, just like we're all the same. I don't understand how one person, one group could be smarter than the other group. I mean it's just outside appearances. Everything on the inside's the same. In my

> mind, it seems really hard to believe for me. Like I feel like everyone should be able to learn the same. I mean, different people have different learning styles. I don't think it's a racial thing, but… (Jacqueline Interview I, November 12, 2005).

Most of the participants, underrepresented and represented, believed that all races had equal abilities. "If you have the potential, then you can do it. You know? It doesn't matter what race you are" (Lona Interview I). "Students can come in any type they are and can be a genius" (Delores Interview I, January 6, 2006). They found it difficult to believe that a person could not accomplish things they put their minds to because of their racial makeup.

Because I am the son of a sports writer and newspaper editor, I have enjoyed sports for years, so it will come as no surprise that I am well informed of quite a lot of probably useless sports facts that will not help me win any game shows any time soon. This information, however, is a tool for analogies, metaphors, and microcosms of our society. With that said, I'll talk a little bit about the Olympics.

For as far back as I can remember, people of color have dominated the track and field speed events. Countries such as the United States, Jamaica, and Canada have sent some of the finest athletes that we have been graced to witness: (a) Carl Lewis, (b) Jessie Owens, (c) Wilma Rudolph, (d) Asafa Powell,(e) Gail Devers, (f) Michael Williams, (g) Donavan Bailey, and (h)Marion Jones to name a few. In my eyes, the speed races of track and field have become as much of a Black man's event as hockey has been a White man's sport.

However something happened in the 2004 games about which I was excited, thrilled, amused, shocked, and in some ways left dumbfounded. A Chinese man by the name of Liu Xiang lined up against world class 110 meter hurdlers. If my memory serves me correctly, the commentators, while discussing the favorites to win mentioned some of the African descent runners. Perhaps they mentioned him as a possible chance, but surely he couldn't have been taken seriously. Heck, I couldn't recall a recent time that a

non-African descent obtained even a bronze. My last recollection of a non-African finishing with a medal came from images before my time of a White man, Peter Norman, standing among two proud silent African American protestors of civil rights, Tommy Smith and John Carlos.

The gun fired starting the race, I focused my attention on the expert's projected winners not really knowing any of the racers names. However, before I knew it, I began to recognize that Liu Xiang was winning the race. This was almost unrealistic; after all, one of my native Chinese friends had already told me that the Chinese had no chance of winning a race. Surely his views represented the billion plus people of his country. By the exciting conclusion of the race, Liu Xiang finished with a world record of 12.91 seconds; an amazing feat that probably shocked the world. He proved once again what Jackie Robinson knew in baseball; why Rocky Marciano kept punching; the reason why Tiger Woods keeps driving; why Arthur Ashe's continuously had zeal to return serve; and why Larry Bird knew he would be able to shoot incredible shot after incredible shot; that regardless of race, when a person allows their focused mind, trained body, and illuminating spirit to intertwine, there are no unobtainable goals in sight. By the way, Xing Huina of China won the gold in the 10,000 meter women's final of the same games followed by Ethiopian runners, Ejegayehu Dibaba and Derartu Tulu respectively.

Diversity to Make Society a Better Place

"The reason that America was here was for diversifying…you know making a place of freedom. And if one person, and if a certain people can't have freedom in one place then America is not doing its duty as a country" (Raquel Interview 1), Raquel said vehemently as she discussed the importance of having diverse cultures mixed together as a salad as opposed to a melting pot in order to make this country great.

The majority of the participants expressed that it was important to have diversity in the country. A few even mentioned that part of the reason they attended the university was to broaden their horizons, affording "the kind of experience like to really be around other cultures; because" they had come from a segregated community. The university offered them an opportunity to "have like White roommates, Japanese roommates" and not only have homosexual roommates (Jerry Interview I) but believe in "gay rights; because, I have gay friends and I accept that" (Lona Interview I).

Some felt like it was important to have diversity in the workplace in order to represent an increasingly diverse society. "I think that we do need to have affirmative action [*sic*] to give people more opportunities;" otherwise, "you'd have a totally White bureaucrat type of set up and you know that… I don't think that would be [*sic*] good either; because that's…. I don't want all old White men in one area! You know? That's not good" (Jacqueline Interview I, November 12, 2005), Jacqueline laughed, as if she had transitioned from discussing a cultural diverse workforce to a gender diverse work force.

As far as my own beliefs, I would have to agree that diversity is not only "a good thing," but considering the constantly changing climate connected by technological advances, it is a necessary thing. We live in an open market world where the isolationism that China kept for so long would endanger an economy relatively quickly. In order to maximize profits, companies must be willing to sell to diverse populations which means they must understand those populations and cultures; which means they must have diverse hiring practices.

Beyond just reflecting on the importance of diversity for making a profit, it is important because as many research proposals will suggest, corroboration from many

disciplines is welcomed. Diversity adds spice, it helps us evolve, think differently, get more than one perspective. Diversity gives us a telescopic lens to appreciate, accept, and/or disagree with people, ideas, and cultures.

Lastly, on a personal note, the university's diversity has allowed both my wife and I to make some wonderful friends. Some of my fondest times at the university have consisted of having numerous dinners with an African American and Grenadian couple, a Korean couple, White couples, a Singapore couple, and Chinese couples. We would sit around, talk issues, discuss family, culture, play games, and try new dishes. It is something that we will always cherish and are better people for participating in it.

Racial equality and racial relations have been an Achilles heel in our society far too long. Many of us try to ignore the color of skin as a barometer of a person, but there are constant setbacks experienced through the actions of people with racist mentalities. Thus we are constantly reminded of racial inequality and injustice which affect our racial relations. While there have been improvements in many areas, we would be naïve to believe that much work is not required by all people. It is important that we accept each other as equals for we all have a contribution to society not based on race but on intelligence, skills and perseverance. These contributions are magnified when we realize that working together is greater than working alone. To truly be great, we must be willing to be diverse in our thinking and thus diverse in our acceptance of culture. Hence, we are doing a disservice to all people when we do not accept others and degrade (or uplift for that matter) our fellow brothers and sisters by placing racial, stereotypical structures that stymie academic success and furthermore societal success.

Stereotypes of Being a Minority Affect Societal Expectations of Academic Performance

Many of the participants felt that society had lower intellectual expectations of underrepresented groups and higher expectations of represented minority groups. These expectations stemmed from stereotypical perceptions based on race. For some groups it was believed that negative stereotypes hurt the group that the negative stereotype pertained to. For others, it was believed that "positive" stereotypes were helpful in making the racial group that it pertained to more empowered; however, it was also found that these "positive" stereotypes could also have a negative effect on the individual causing the person to be pressured and rebel against being stigmatized.

Society has Low Intellectual Expectations of Underrepresented Groups

> White students majority attend outer city schools which have more money and um have better education than inner city schools which the majority of African American students attend. So they expect White students to perform better than the Black students. They don't know the um the ability or um they, they just don't, I guess they just don't understand that we, not we, but that African American students have, you know, the same learning abilities that other students have (Asharii Interview I, January 19, 2006).

Many of the participants from both groups felt that society often has lower expectations of underrepresented groups versus their represented counterparts. "Society is not expecting them to succeed" (Nate Interview II, November 21, 2005). For the teacher, these expectations result in not challenging the student accordingly and talking unfavorably to the student. However, for the underrepresented student, they find themselves feeling the need to prove themselves in a classroom setting.

"I could just tell that you know that Whites [*sic*] really don't talk to me the same ways that they talk to White students. They like – you know what I'm saying – talk to me sometimes like I'm slow and just like they're not expecting me to work at the same level as a White student" (Jerry Interview I, January 18, 2006). "You have to prove that

you are capable and just as intelligent and qualified to do well in a class; to be taken note of" (Delores Interview I, January 6, 2006); because they think, 'they're stupid so they can't be good at this; so they can't be good at that'" (Raquel Interview II, November 2, 2006).

Besides the mental anguish that accompanies these lowered expectations, some of the underrepresented group believes that society intentionally tries to keep underrepresented groups from succeeding in numerous ways. "To me, there feels like there's been like a plot just really like to keep Black people like down whether that be through economic housing or just the way that people have the opportunity to really be successful" (Jerry Interview I, January 18, 2006). Jerry mentioned this as if he found it to be shameful.

Delores added that society (or Whites) attempts to control and keep underrepresented groups from succeeding by constantly telling them that they are inferior. "If you deceive people into thinking that, you know you're just inferior period, then they, you know, their whole approach to things, you know, that I'm inferior and you can have control" (Delores Interview I, February 9, 2006). In her opinion this constant preaching of an inferiority complex discourages underrepresented groups from entering fields that they are "supposed" to do poorly in. "I think they're (underrepresented groups) discouraged from excelling in life, so a lot of people get discouraged, they feel like, 'I'm going to deal with so much discrimination. I'm going to deal with this and I'm going to deal with that,' so it's just, they get discouraged and a lot of times they go for things [*sic*] they may be able to handle better or find easier" (Delores Interview I, February 9, 2006).

Perhaps I am naïve or optimistic, but I do not believe that the majority of society wants underrepresented groups to fail. However, I do believe that there are enough racists in our society to warrant consideration that society as a whole wants the group to

fail. Unfortunately I do believe that there are enough racists interwoven in our society to restrict some underrepresented groups from obtaining all of the opportunities afforded to represented groups.

Now my beliefs concerning the question, "Does society have lowered expectations of underrepresented groups?" are much murkier. I would love to believe that the majority of society has the same expectations for underrepresented groups as they do for represented groups; however, as I will discuss in the following paragraphs, I believe society is taught to expect less from underrepresented groups. Overcoming this type of thinking requires a conscious effort.

There is a reason why jurors are encouraged not to watch television, listen to the radio, read publications or the Internet regarding the case for which they are considering a verdict. For the same reason, companies spend millions of dollars marketing through commercials and ads. One of the reasons why these things take place is because the visual images and discussions influence our decisions.

With these things in mind, I believe we all are taught to have low expectations of underrepresented groups; because, we are barraged with constant images and told through multiple media sources of underrepresented groups being arrested, standing trial, selling dope, drug trafficking, prostituting, being ignorant, homeless, and poor. Some of the prominent jobs for us, as displayed in these outlets, are as athletes and musicians, not lawyers, doctors, professors, CEOs, or CFOs. In fact, during one of our discussions, Akira, who by this time felt comfortable with me, flat out told me that she didn't expect me, a statistician, to be African American (Akira Interview II). After all statisticians and mathematicians are all old White men aren't they?

As the saying goes, "A picture is worth a thousand words." Three highly acclaimed pictures that appealed to mainstream audiences and had lead African American actors all portrayed main characters negatively throughout the film.

Dreamgirls portrayed Eddie Murphy doing drugs; Training Day portrayed Denzel Washington as a crooked narcotics cop and Pursuit of Happyness portrayed Will Smith as a father who couldn't take care of his family.

With all of this said, I believe it is tremendously difficult for society to not expect less from underrepresented groups. After all we are shown how inferior underrepresented groups are all of our lives. We are shown statistics supporting these images and discussions. The research "proves" it. Even though much of our logic suggests that these things are not true, we must make a conscious effort to abandon these negative trains of thoughts and reflect on the many underrepresented people who do not represent these negative stereotypes.

Race can be a Burden on the Academic Performance of Minority Students

"Even the I guess smartest person coming from an African American education, I don't think they would still be up to par coming to a predominantly White school, um but I don't, I don't put any added pressure on myself, but that plays a role in my competitor" (Asharii Interview I, January 19 2006). Out of all of the comments I heard, none disturbed me quite as much as this one. I would like to believe that we (underrepresented groups) all have progressed beyond the point of believing that some races are more qualified than others; however, as Delores alluded earlier, there are still some oppressed mentalities. While Asharii claims that she does not place any extra burden on herself, in my opinion, her pure mindset suggests otherwise.

While all of the minority students did not state that race was a burden, most did indicate that racial stereotypes created pressure to perform academically. One of the stereotypes was about underrepresented students not being as intelligent as their

represented counterparts. The other stereotype dealt with the perception that all Asians are smart. These stereotypes both motivated and discouraged the students to perform educationally.

> Sometimes I feel like – you know - being Black is a handicap. Like it's something that people that aren't Black, don't really understand what it means to be Black; because, it's a struggle to be Black everyday (sarcastic snicker). Man, it's just hard (sarcastic snicker) (Jerry Interview I; 2006, January 18).

Jerry snickered as in saying, "Whew, it is unbelievable how much you have to struggle. I'm lucky I haven't had a nervous breakdown." Jerry felt the pressure of being an underrepresented student at a White university. He and others believed that while the pressure motivated him to not meet the stereotype (the classes where he performed well), the pressure became burdensome in those classes where he performed poorly.

While underrepresented groups had to deal with negative stereotypes, most of the represented participants thought others believed the "positive" stereotype of Asians being smart and thus they were expected to perform well in education. "I'm sure that a lot of teachers see Asians and they think that they're going to be really smart because a lot of them are" (Jacqueline Interview II, December 5, 2005); "reading when they're two" (Nate Interview II, November 21, 2005). "The Asians are very good at math and science and things like that" (Jade Interview II, November 18, 2005). "I think that people perceive it as a cultural thing; the Asians excel in academics" (Nate Interview II, November 21, 2005). While these quotes were discussed as possible thoughts that others may feel about Asians, I couldn't help but wonder if a few of the participants felt that way themselves especially Nate who commented that Asians read by the time they are two years old. I could not determine if he was saying this statement or if he was imitating a teacher.

Even Akira seemed to believe the stereotype that Asians are smart saying, "I mean they're all smart…. Most (of) the Asians that I meet are extremely smart…. I'm sure they

stereotype me. They go, 'She'll probably do well in this class because she's Asian; because she's at the library on Friday nights doing nothing, you know; studying all the time" (Akira Interview I, November 3, 2005). Initially I thought Akira in her typical jovial voice sounded as if she was joking, laughing while claiming that the only two Asians she knew who were not smart were her brother and herself. However as she made mention of this topic a few more times, I began to believe that she was not joking. Furthermore, I couldn't help but notice that she called Asians "they" in her quote. Even though she claimed that she and her brother were the only two Asians she knew who were not (super) smart, she let me know that, "I don't consider myself like dumb as a rock, but I'm not pre-med" (Akira Interview I, November 3, 2005). My personal opinion is that she is a very intelligent person who is an underachiever. I'll address this more in the following paragraphs.

Although Akira seems to believe the stereotype that all Asians are smart, she does not appear to appreciate it. "It's harrrd! It's really hard to be Asian; 'cause, like they have all these…. They, they just have all these notions of you; it's kind of like…God, I wish they…. It's weird" (Akira Interview II, November 17, 2005)! sounding as if she was whining. Initially I was surprised by her statements until I considered the pressure placed on an individual when much is expected of them.

> "Like I'm not like your average university Asian – you know – that know three languages and is super smart and going to med school…. Why would I want to be in the library all the time (sounding as if she was appalled by 'those type of people')? And I think that kind of like prevented me from (very soft) learning well. 'Cause I'm just like, I don't care; like why would I want to be like that. Why?" "It's just like they (unsure who they was) want to push me to be like them, but I enjoy like my friends and my family, and I enjoy going out and having a good time, and I don't enjoy going to the library, and I don't enjoy studying" (Akira Interview II, November 17, 2005).

I would like to believe by her soft tone that Akira realized how the stereotype was preventing her from excelling. She seemed to come to an understanding of why she was

not committing to her studying. Similar to the idea that some African-Americans don't want to be labeled "acting White," Akira seems to be rejecting the stereotype of "acting Asian." Because she prefers to fit in with her family and friends, she stays away from the library. To be honest, she somewhat reminded me of the light skinned African American girl who could pass for White in the movie, Imitation of Life, who was constantly rejecting her racial makeup. Furthermore, she somewhat seems to reject her Asian heritage; a topic that will be elaborated on further in the next section.

As far as my experience, the burden of race came when I began to attend OSU. I was concerned about the racial distribution of students and teachers in the department. Doubting that there were many African Americans in the department, I feared the worst. I guessed that most of the professors would be older, White men. I was right. I guessed that there would be no African American students. I was wrong – barely wrong, but wrong; there was one other who was preparing to graduate with his doctorate. I feared racist teachers and students. To my knowledge, I can happily say that I did not experience either. What I found were many professors and students, who treated me fairly, expected the most out of me, helped, and encouraged me.

Along with the fears mentioned in the previous paragraph, I came with self doubt of not being prepared enough, not achieving academically, almost not reflecting well on my race. That is, I pretty much came with the burden of representing my race in a positive light!

You are the Whitest Asian I Know. But I am American…

Akira was the only participant that seemed to not identify with her ethnicity. When I would ask her about her Japanese heritage, she would refer to being an American. Akira took a Japanese culture course, but hated it due to the amount of work required. When I asked her why she took it, she frowned up like she was annoyed by the question

or the class, saying, “I have to take like a diverse culture class, and I’m like I might as well take Japanese. It’s a cult …like it’s not language. It’s a culture class” (Akira Interview I, November 3, 2005). I prodded by saying, “But why did you choose Japanese, though?” recognizing that she could have taken numerous other diversity courses that the university offered. “(Laughter) I’m like, I might as well. I should try to learn about it” (Akira Interview I, November 3, 2005), she said. “It,” she said, “I should try to learn about it,” as if she was learning to change a tire. It? Wow, I was simply fascinated at her disregard for knowledge about her heritage. Where I come from, your heritage is not an ‘it.’

> I’m very Americanized, and I don’t. I just think it’s just…my color of skin, the most dominant thing about me that’s Japanese. Like I don’t know anything. I don’t think I would want to. Like like, I guess I would want to, but I don’t think it would get me anywhere. Because I’m not over there (Japan). I don’t have the same beliefs as them (Akira Interview I; 2005, November 3).

She ended up telling me that when her grandparents moved to America from Japan, they made their children learn American culture. She also told me that her father was American – meaning not necessarily Japanese. Like her, she made sure to tell me that he did not know anything about his Japanese heritage and culture.

I found myself being constantly intrigued by Akira. Considering that my people have lost so much history due to slavery, I enjoy knowing the history and cultures of my descendents, so I tend to believe that others are the same. However Akira almost disregards her Japanese culture; all but deeming it useless in America. I didn’t find this shocking considering my understanding of Ogbu and his theory regarding immigrant minorities; however, to see the theory in practice left me perplexed and astounded.

Akira admitted that she had no Asian friends and it appeared that she hung primarily around Whites. Early in our first interview, she laughed jokingly that her friends called her, “The Whitest Asian” they knew. I was shocked how lightly she took

this "compliment," because I knew better than to recognize it as a compliment. However, as the interview process continued, she mentioned it again, but with what appeared to be an epiphany. "I mean all of my friends are like, 'You are the Whitest Asian I've ever met.' Because we're like…. I'm like, oh (as if she was shocked)…? OK (very softly)." But I don, I don't …. Well, I'm half (Asian/White) (Akira Interview I, November 3, 2005)!" as she quickly came back out of her shell. I believe that because of the questions that we had discussed earlier in the interview, she had become more aware that her friends were showing little regard for her heritage and in an African American terminology, calling her somewhat of an Uncle Tom. Furthermore, I think she demonstrated her awareness by no longer laughing when saying the statement and lowering her tone to an almost inquisitive whisper as in, "What do you mean, I'm the Whitest Asian you know?" However, she still justified who she was at the end by saying I'm half. My opinion from our interviews was that being White was synonymous with being American.

Racial stereotypes are harmful to all people, creating a burden on the victim and faulty expectations on the non-victim. For some, these stereotypes create expectations that some races cannot achieve success; for others the burden lies in having added expectations to perform well. In order to fight and disprove these stereotypes, influential people must motivate and take responsibility in educating students.

Influential People Can Motivate or Discourage Education

For many of the participants, there were numerous influential people in their lives; some were positive and others were negative. Often, it was a father, mother, or other family member. However there were also teachers, counselors, professors, and national figures that influenced the participant's educational goals and lives.

Paternal Figure was Motivational in Performing Well in Education

"Well my father, he graduated from Indiana University. Um, I feel like he really gave me a foundation as far as knowing that as I graduate – you know what I'm saying – college would be like the next step for me" (Jerry Interview I, January 18, 2006). Jerry showed so much admiration for his father bringing up his name many times throughout the interview.

For the majority of participants, their fathers played an intricate role in their education. They were role models, motivators, and teachers. This is important considering results from the surveyed students that suggested the average student whose father did not graduate from high school was expected to have a final statistics score 23 points lower than those whose fathers went to college. For those who did not know their father's education level, they were expected to do 7 points worse. Forty-five and thirty-eight percent of the underrepresented and represented students' fathers did not go to college, or it was unknown respectively; a difference that was not significant ($z = -1.01$; $p = .313$, two-tailed).

Even though most participants spoke of their fathers in a positive light, there were a few who didn't. Of the qualitative participants, there was a greater proportion of underrepresented who spoke of their fathers negatively (40%) as opposed to the represented (16.67%), but I am not sure that this is a finding because of the small number of participants. Based on the survey of underrepresented students, we expect the average statistics grade to be 9 points lower for those whose fathers did not attend college or it was unknown in comparison to those whose fathers did attend ($t(25) = -2.77$, $p = .01$).

The importance of fathers having a good education and focusing on mathematics appeared to be important in students achieving in statistics.

> It was all about math. My dad had spatial problems. I mean my parents expected me to go to school and none of this skipping school stuff and they expected me to

> do well in school… (Dana Interview I, November 1, 2005). I know that my dad was doing this stuff with us when we were two year olds. He called it cookie problems. 'You have two kids and two cookies. How many cookies does each kid get' (Dana Interview II, 2005 November 17)?

Dana was very positive about the importance and expectations of education to her father. As she often did, Dana showed a lot of animation as she spoke of the high expectations her parents set for her and her siblings screaming, "I'd get good grades and my parents would be like, 'So what. All of our kids did that.' You know, I'd be like, '*I did a lot of work* [italics added]!' and it's like horrible [italics added]" (Dana Interview I, November 1, 2005)!

There were a few participants who admitted that their father was a role model to them. "Like my dad would help me with math. They (parents) were like really positive role models. They were like good in education" (Hetty Interview), Hetty said. Along with Jerry and Hetty who looked up to their fathers as role models was Raquel who admired her father for the role he played in assisting underprivileged students. She said,

> I also really look up to my Dad because he could have had…. He's a great teacher and he could have had any job that he wanted, but he decided he wanted to work in inner city schools with the auto mechanics helping people when they get right out of high school. They can go get a job. And I really look up to him for that; because he made differences in a lot of people's lives (Raquel Interview I; 2005, October 29).

As many of the participants, I too had a father who believed in the importance of education. When I was in junior high school, I had a poor habit of losing my books. I don't recall if you had to pay for the first book you lost, but that was beside the point. My father was not happy with my carelessness and warned me to keep up with them. Well as the saying goes, "I didn't believe fat meat was greasy." I lost another book and was severely disciplined for not heeding his warnings.

At the time, I thought my punishment was due to the fact that he would have to pay for a new book, which I'm sure was part of the reason, but as I think about it now, I've come to believe that he was more angry that I was losing knowledge. Losing my book, I believe, was a metaphor for devaluing and rejecting education, not taking it seriously, being careless and thoughtless; setting my priorities in the wrong place. Instead of me placing my books in a secure place before playing with the other students, I most likely was throwing them somewhere in a corner. Education was of the utmost importance to my father (and mother for that matter). "Don't speak that way," he would say as I broke the English language, "When you get to college, you don't want to speak like that in front of your professors. It sends a poor message."

Little did I recognize at the time, but when he said things such as, "When you go to college…." He was not placing a mere expectation but a reality; a prophesy if I may call it that. This truth was as true as the moon will be seen tonight. Similar to almost all of the represented students and something not seen in almost any of the underrepresented students, he and my mother were speaking into existence the idea that college was not an option. This point is something that I will discuss further later on.

Similar to other participants, my father was a role model. He would tell me his stories of working with local politicians and marching with Dr. Martin Luther King. He would recite large portions of Dr. King's speeches. He would give me spiritual, academic, and social guidance. Even though I sometimes still break the English language, for the most parts, I noses how knots to broke it win I wants too, and I love him for it.

Maternal Figure was Motivational in Performing Well in Education

> My mom was a teacher and she uh…. They (parents) always wanted to make sure that that I do my best. They always stressed that. They didn't stress necessarily straight A's or be perfect, but as long as I was doing my best. That's all they cared about" (Jade Interview I; 2005 November 8).

With the exception of Jerry whose mother was an alcoholic at an early age (Jerry Interview I); all of the participants spoke very positively about their mothers. Jerry has begun to respect his mother as she has cleaned up her life. Most participants described their mothers as being supportive and motivational of their education goals. "When I was, when I was in elementary school, my mom would si(t), would actually help me with my math homework and with any other homework that I needed (Lona Interview I). Even Nate's mother, the only represented participant's parent who did not have expectations of him going to college, was supportive of his educational choices saying, "If you want to go to college, I'll like support you. If you don't that's great too, I'll support you" (Nate Interview I, October 29, 2005).

The majority of the participants had mothers who had graduated from high school and attended college. However, out of the underrepresented participants, only Delores's mother had college experience. From the surveyed data 47% of the underrepresented students said that they did not know their mother's education level or said their mothers did not go to college. In contrast, 36% of the represented group said the same; however, this was not a significant difference. ($z = -1.59$, $p = .113$, two-tailed).

For me, the importance of my mother on my education was very significant. When I was in the 7th grade, I can recall doing poorly in a reading/spelling class. The class was not difficult to me in any way; however, I had little interest in the material. I

began to slack; not doing my homework and being disruptive in class. Of course with this type of behavior, my grades went down. One day, unfortunately or fortunately depending on how you would like to look at it, I was goofing off with my friend and partner in crime as normal when she looked at the door window and said something like, "Whose loser mama is this?" I'm sure it comes as no surprise that I was the loser; guilty as charged.

My mother had seen everything that I had been doing in class that day; peeking through the window. She walked past me with "the evil eye" insinuating that I was in danger of not reaching my next birthday or tomorrow for that matter. She went straight to the teacher who spat her venomous poison. "He's a smart student, but… he goofs off. He can do the work, but… he plays too much. He hasn't been doing his homework." If I could have shut her mouth at the time, there would have been no hesitation because I KNEW my mother's ear ache would cause me ache! Later on, it was made crystal clear by both of my parents that I had better start doing better! Even though no Comeback Student of the Quarter award existed, I can imagine that I would have won it that next quarter if it had existed.

My parents valued education, had no problem instilling those values in my sister and myself, and were typically very positive. Like Jade's mother, they did not harp on us making good grades as much as they harped on us doing our best. My goofing off in reading/spelling class was unacceptable and did not meet their expectations. To be honest, I don't believe I received punishment for acting poorly in class (That was a surprise!), but I was given a stern tongue lashing with promises of fury in the future if I

did not turn my act around. After it's all said and done, I am so thankful that my parents had greater expectations for me than I had for myself at the time and they were and will always be a constant presence in my education.

Role Models: Underrepresented's Change the Community while Represented's Assure Academics

"They kind of care about the communities and you know want to have something to do with the upbringings of the community…" (Asharii Interview I, January 19 2006).

Both underrepresented and represented groups discussed the importance of having role models to whom to aspire and succeed in life; however, the types of role models typically discussed by the groups were different. The underrepresented group's role models tended to be people who changed the community or society; being national figures, local figures, and for a few, family members. However, the represented group's role models tended to be relatives who assured and motivated the participant's success in academics.

"I guess people that I consider role models are someone who's trying to make a difference in this world" (Raquel Interview I, October 29, 2006). "I would say Martin Luther King. Brother King he was just really somebody that looked at the big picture; he looked at – you know what I'm saying – those types of things that would set us in a position to really be able to be successful and be equal" (Jerry Interview I, January 18, 2006).

> I also really look up to my Dad because um he could have had…. He's a great teacher and he could have had any job that he wanted, but he decided he wanted to work in inner city schools with the auto mechanics helping people when they

> get right of high school. They can go get a job. And I really look up to him for that; because he made differences in a lot of people's lives, (Raquel Interview I, October 29, 2006)

"so it was pretty inspiring" (Lona Interview I). I often asked the participants who their academic role models were, so I was a little surprised that more of them did not speak of family members. In fact, excluding Delores, the only family members the underrepresented groups spoke of as role models were their parents.

As I mentioned earlier, for the vast majority of represented groups, family members were typically their academic role models. These role models were living the lifestyle that the participant wanted and were inspirational in the participant going to college. When asked the question, "Can you discuss with me your academic role models?" the response was, my "Mom, Dad, siblings, aunts, uncles, cousins went to college" (Dana Interview I, November 1, 2005). I look up to "my dad 'cause he is just like…was successful and like graduated and stuff so he is like my role model" (Hetty Interview I, November 7, 2005); "my cousin Aaron; because, he's…he went into the same field I'm going into. So like I spent some time with him when he was going through his undergrad and everything and I've just seen him go through that and accomplish that so he's one of my role models" (Nathan Interview I, November 8, 2005).

Besides my parents, I have had so many role models in my life. I suppose like so many of the other underrepresented minorities, they are more than just academic role models, but they are role models who are changing the community, aspiring for more in life, being successful in their careers, and helping people. These people are my sister, grandparents, aunts and uncles, two teachers specifically, Mr. Williams and Mr. Casey, former professors, and of course Dr. Martin Luther King.

From my family members, I have received wisdom, knowledge, advice, and examples through their lifestyle. I'm proud to say that while many of them are retired, they still give me hope of some of the things life has to offer when I reach that age. Some of them have started second careers, written a book, moved to new places, began new hobbies that they enjoy, and taken new leadership roles.

While I had quite a few former teachers who were inspiring, none were more inspiring than Mr. Williams, and Mr. Casey whom I will speak about in more detail later on. Mr. Williams was my mathematics instructor in junior high school. He also was the boys' basketball and track and field coach. Mr. Casey was my high school band director. Both were positive teachers who cared for and wanted only the best from their students. They molded students in the classroom and in the extra curricular activities that they led. Not only were they winners in their activities but they were winners in life. When you learned from them, you learned how to work to achieve success.

As far as my professors go, I have had some wonderful people who have advised me both inside and outside the classroom. The ones that I have most looked up to were the ones that "took me under their wings," showing me how to succeed in their respective fields. When I was trying to complete a phase required for graduation such as writing a thesis, passing a qualifier, or this dissertation, they were pushing, guiding, and stretching me.

Last of all, Dr. King has been my greatest public role model. There is so much to discuss about him that I would never finish writing. I will simply say, besides changing the world as he did, Dr. King was highly intelligent; going to some of the most prestigous universities! He literally dedicated his life to something far beyond himself, and he spoke

in such a way that an 8 year old could understand. As I go back and read or hear some of his speeches, it always fascinates me how many words he spoke that I didn't understand when I was younger, yet the context was so clear that I knew exactly what I needed to know.

Support Groups Help Motivate Educational Achievement Verbally, by Example, and Competitively

> I had this group of friends where we would compete on Saturdays and I had this teacher who was very supportive of my, of my schoolwork and everything. And so yeah, it changed who I wanted to be and who I was becoming (Lona Interview 1, 2006 January 18).

Both groups believed in the importance of support groups. They believed these support groups helped motivate them to achieve in their education. For Delores, Akira, Hetty, Jade, and Dana, they were surrounded by successful family members who led by example and gave words of encouragement. For others such as Asharii, Lona, and Jerry, their support groups understood the persons they were and pushed and helped them. Finally for a few, their support groups were friends that made them compete for better grades.

When asked about her academic role models Delores said they were people, "Probably like more family members, my grandfather and just aspiring to get his doctorate, see him use his knowledge and skills the way he has." She also mentioned, "I have two uncles who are attorneys. So that has…just their success, that's kind of played a role in my, I guess, striving" (Delores Interview I, January 6, 2006). I found myself being pleasantly surprised when Delores told me of her family's educational pedigree. I

must admit that I don't ever recall meeting any underrepresented minorities whose mother, father, grandfather and uncles had doctorates, doctorates of jurisprudence, or were obtaining a doctorate. My personal bias was that Delores had almost no choice but to succeed academically.

Similar to Delores, Dana, Akira, and Jade said, "college degrees are like everywhere" (Dana Interview I, November 1, 2005). They had family members with doctorates, masters, and/or bachelors degrees, "telling you what to do" (Akira Interview I, November 3, 2005), "motivating you to do better" (Hetty Interview I, November 7, 2005). "So, each "family really encouraged education" (Dana Interview I, November 1, 2005). For many of the participants, support groups were "very important" (Hetty Interview I, November 7, 2005).

For those participants with highly educated families, there was a perceived burden due to their family's success. Dana in her typically excited voice said, "There was a lot of pressure – maybe I put it on myself – to compare favorably to my siblings who got straight As without seeming to try which annoyed me like crazy" (Dana Interview I, November 1, 2005). Sharing this pressure, Jade also mentioned the pressure from her family, saying her grandfather who "was really obsessed about all his kids going to college, placed pressure on the family members" (Jade Interview I, November 8, 2005). She felt pressured from her father and mother's family adding, "I like to do well and I put a lot of pressure on myself to do well" (Jade Interview I, November 8, 2005). Even though they felt pressure from their families, they believed that, "it's definitely a very strong support system" (Jade Interview I, November 8, 2005).

For Asharii, Lona and Jerry, their support groups consisted of people who understood what they wanted to accomplish. People who helped find college opportunities and people who understood their backgrounds. Jerry said, "A [*sic*] support group for me really means like having someone who understands my struggle. Somebody who understands the types of things that I really want to accomplish, and they'll support me and you know push me…" (Jerry Interview I, January 18, 2006). Jerry mentioned many African American organizations such as his fraternity and the Office of Minority Affairs that helped keep him on track during his college experience. "I've had support groups through since I've been here" (Jerry Interview I, January 18, 2006), he said.

Finally for two of the participants, Akira and Hetty, they found that their support group of friends motivated them through friendly competition. "Like my friends doing better than me in school, it sort of like motivates me" (Hetty Interview I, November 7, 2005), because, "when I see my friends doing a lot, I have to push myself. I don't know if they're really support or more of a competition to me, but I think they play a big role in my…education" (Akira Interview I, November 3, 2005).

For me, my support group was primarily my family. I have been blessed to have so many people in my corner: (a) parents, (b) sister, (c) aunts and uncles, (d) grandparents, (e) cousins, and, (f) yes, I can happily say my in-laws and their extended family. These individuals have given me wisdom, helped me stay focused, led by example, encouraged, motivated, and prayed for me.

While the question that I am about to pose has been somewhat irritating and makes me feel pressured, to me it is an indicator of the support that I have received while

finishing my doctorate. Often when I visit or talk to them, I have gotten the question, "When are you graduating? Let me know as soon as possible so I can come." While the question has gotten on my nerves, probably because I have been more ready to graduate than they have been ready for me to graduate; it demonstrates that they can't wait to show their support at the graduation as I get hooded. I have no doubt that a minimum of 12 of my family members will be in attendance traveling from Illinois, Missouri, Tennessee, and Texas. I have little doubt that they will embarrass me as they scream as loud as they can when my name is called, and you know what? I would have it absolutely no other way! Because in the grand scheme of things, it's not everyday that someone receives their doctorate. In some ways, I receiving my doctorate is them receiving their doctorate. So, the supportive love in their hearts will drown out the scream of "uncultured" shouts of joy bringing me attention and embarrassment.

Unsupportive Families can Discourage Underrepresented Students Educational Performance

> I think he (teacher) would be (the) first person that actually gave me encouragement on things; because, with my par(ents), with my family they were like, "You can do better, and you can do this" (Lona Interview 2).

One issue that all of the underrepresented participants had excluding Delores was one or more significant family members who were unsupportive of their education by being discouraging, poor role models, or jealous. Only one represented participant discussed having negative significant family member in their life.

For Asharii, her mother showed little interest in her education until she was in middle school. "When I was younger, it wasn't a big thing academically in my

household. We just kind of went to school and got grades. That was it" (Asharii Interview1). Her father did not appear to be part of her life. I say this because she chose not to discuss him, seemed to know very little about him such as when I asked questions like, "Did he graduate from high school or college?" and told me that her mother was the only person who took a role in her education. When asked about positive people in her life, other than her mother, Asharii really had a difficult time finding one.

In Jerry's case, his mother was an alcoholic for a large portion of his life. As I mentioned earlier, Jerry says she has now begun to change her life around in a more respectable way by stopping drinking and becoming more spiritual. "Like she started to take like some classes um in college, but she never really like got finish with them" (Jerry Interview I, January 18, 2006).

Finally, even though she uses her unsupportive family members as motivation, Raquel had lack of support from her brothers. She said, "I know what I want to do now, it's just getting to do it? Are my brothers annoyed? Yes. So one flunked out of law school and the other one dropped out of his bachelor's degree. And that isn't gonna happen to me" (Raquel Interview 2). Raquel seemed adamant about achieving what her brothers were unable to achieve. While I found it good that she had such a fighter's attitude, I found it discouraging to know that from her perspective her brothers were sort of "rooting against her."

I am fortunate to say, that for the overwhelming part, I have not had many family members who were unsupportive. In fact, in all of my years, the ONLY time I remember a family member having something negative to say was right before I came to school to work on my doctorate. When I told this member that I was leaving my well paying

career, she negatively asked me, "What are you doing that for? Don't you have enough education?" Besides her, as I mentioned in the previous section, I have had nothing but positive support.

Represented Students Agree that Underrepresented Groups Lack the Right Family Motivation to Succeed in Education

> They're (underrepresented groups) not moti, as motivated to learn 'cause there are other things going on in their life. For me, like my parents just were always like you do good in school and whatever else and I don't think it's that way for them (Hetty Interview I; 2005 November 7).

Many of the represented students believed that underrepresented groups lack the proper motivation from family members to be successful in education contributing and agreeing with the ideas and suggestions in the previous section. Most seemed to believe that it was primarily the parent's responsibility to provide motivation, but there was mention of the entire family being motivating.

While discussing the achievement gap between underrepresented groups and their represented counterparts, Jacqueline suggested that there are differences in family values saying,

> Like in Asian families, they're really big in education and Whites are generally pretty big in education in going further in college and stuff like that; whereas more underrepresented minorities, they may not have that as much. Like, it's just a cultural thing (Jacqueline Interview II, December 5, 2005).

"Maybe they didn't have the same encouragement" (Jade Interview II, November 18, 2005), Jade said supporting Jacqueline's belief.

For Akira, she discussed her mother's struggles with motivating her students to perform and motivating the parents to encourage their children.

> My mom was like, "I met lots of parents down there (inner-city school) and you know? They don't have an education, and they don't know what to do with the kids when they go to school; because, they don't know what to do. So she would have to like tell them, "You know, I'm giving them homework. Would you kind of like reinforce this to them?" but I mean they still didn't understand the concept of actual work and having grades you know (Akira Interview I, 2005, November 3)?

Akira's mother was suggesting that despite her efforts to get both the children and parents involved in education, she was ignored. The students refused to do their homework, and the parents did not seem to care or encourage them. It appears that Akira's mother and ultimately Akira was suggesting that if a person comes from a home that lacks education, the family will not place a value on the children receiving an education.

This was an idea reinforced by Dana who said, "I wonder if this is related to familio perception of whether or not the kids can succeed and whether or not the kids should succeed and whether or not the parents want them to succeed; whether or not they even advocate school as a viable option for something; for the kids to do with their life" (Dana Interview I, November 17, 2005). Initially when Dana mentioned "familio perception" I questioned what it was, but as she explained that she was studying the theory in one of her courses and began to say that the theory supported the idea that some families don't encourage education because it is not a realistic way of life; it began to have an all too familiar Ogbu ring to it.

Akira believed that underrepresented groups have not understood and valued education because of lack of parental motivation saying, "And I didn't really realize why there were so many African Americans in the inner city. I just thought it was lack of will

power maybe" (Akira Interview II, November 17, 2005). She was not able to understand why, underrepresented were not "actually wanting to do something with their life with high school" (Akira Interview I, November 3, 2005), and initially said, "I don't think they see the whole picture" (Akira Interview I, November 3, 2005). The reason why I said she initially made this comment is because as we continued interviewing, her opinion seemed to change. She seemed to start believing that all underrepresented people have not necessarily been unmotivated, but many have faced obstacles that she had not considered.

College was not an Option for Represented Participants

"Um my mom was very influential in my decisions [*sic*]. She always pushed me and my older sister. It was never like an option to go to college. It was like, 'We're going to college'" (Jacqueline Interview I, November 12, 2005).

One of the findings for the represented group that was not a finding for the underrepresented group was the expectation that they were going to college. Only the two represented men did not mention being expected to go to college. Many of the represented participants were told from an early age that they were expected to succeed in education. Comments said were, "I knew from an early age that I'd go to college. I don't know if they (parents) were pounding that in my head …" (Akira Interview I, November 3, 2005) "I mean my parents expected me to go to school and none of this skipping school stuff and they expected me to do well in school" (Dana Interview I, November 1, 2005).

There were also stories of previous generations expecting their children and grandchildren to attend college. "My dad's father didn't go to college and still, he's near

eighty and he still talks about it all the time. How it was so…. He wish he could have had an education and he built up his money without going to college and he was really obsessed about all his kids going to college and so um I guess it's been from both sides of my family" (Jade Interview I, November 8, 2005). For Jade, the choice of college was a legacy notion. The family was loyal to the college she is attending. She seemed somewhat exuberant that she had a family that placed such demands on her.

In summary, the influence that parents, friends and other family play in educating a person are immeasurable. For the overwhelming majority of represented participants, they received positive support, were encouraged to achieve in school, and were expected to go to college by these influential figures. However for most of the underrepresented participants the story was somewhat different. Role models were people who typically helped the community. Most of them had some family and friends who gave support for achieving academically; however, most also had a few unsupportive people who discouraged or through negative actions, motivated the person.

In the next chapter, I will begin by exploring an influential person of education, the teacher. I will explore the participants' beliefs in the role that race plays in education as well as the important characteristics of good teachers. I will share the participants' beliefs on the important factors involved in underrepresented students succeeding in statistics. Finally, I will discuss why underrepresented students have a challenge ahead of them to succeed in introductory statistics courses.

CHAPTER 6

INFLUENCES THAT SHAPE STUDENTS' EXPERIENCES IN INTRODUCTORY STATISTICS COURSES

For Underrepresented Students, Race Plays a Role in Learning from Instructors

This chapter explores many of the influences on general education and introductory statistics classes for both underrepresented and represented students with an undertone of racial experiences, beliefs, and burdens of inadequate preparation for the academic achievement of underrepresented students. A primary finding from this study concerned how the teacher's race and or the student's race shaped the pupil's learning experience. For many underrepresented participants, the race of the teacher was important while for most of the represented, the teacher's race was irrelevant to their ability to learn. Even though most of the participants believed that there was no way to teach to specific races, many of the underrepresented participants believed that teachers taught White students better. This chapter will also discuss many of the important qualities of effective teachers. Finally a discussion of the specific influences involved in learning statistics and the challenges for underrepresented students will be undertaken.

Does the Teacher's Race Matter? Yes for Underrepresented; No for Represented

"If I first walk into a room and see a Black teacher, I'm really going to know instantly that, I'm just gon' be like paying a whole lot more attention" (Jerry Interview I, January 18, 2006). While discussing his experience of entering a college classroom where the professor was African American, Jerry seemed to be expressing a sense of pride as if the professor was an example, a role model of what a person of color could achieve when they worked hard and were given an opportunity.

Many of the underrepresented groups felt that the teacher's race mattered. They felt that some teachers of different races from their own prejudged the student based on their race.

> I've had several teachers who have been able to you know look and see the, the quality, star qualities in students regardless of the color of their skin, but there are some who do look at…and I think sometimes it's based upon appearances. Some teachers, they make judgments based on the way that they look, and use that to determine whether or not the student has the intellectual capacity (Delores Interview I, January 6, 2006).

This is one topic that seemed to recur for Delores that she seemed extremely passionate.

A few of the students admitted that they believed that a racist teacher could cause the teacher to not be as effective in the classroom. For Jerry, it frustrates him, "Just like the way that White teachers [*sic*] talk to me, I can really tell that they're really not there to – you know what I'm saying – make sure I'm, I'm getting like the absolute best grade" (Jerry Interview I, January 18, 2006). Raquel added,

> If someone's prejudiced, they're not going to care as much about someone of the ethnicity that they're prejudice towards. The way that they would teach them; they probably wouldn't be willing to help them outside of class, or they probably

> might grade them differently with them because they don't think they should get a good enough grade. Or like you know maybe something that they would let slide in a White person's category (Raquel Interview I, 2005 October 29);

they wouldn't for the race they are prejudice against.

On the other side, many of the represented students felt that race played a part in some races getting better opportunities to attend better schools, but overall, the teacher's race did not matter. While discussing why some races may find it more challenging to teach races other than their own, Akira said, "My dad teaches African Americans. He teaches a variety of peop(le) – you know – and he said he doesn't have a problem with it (race). Like he's like, 'If they're there to learn, then I'm happy with that and I can teach them'" (Akira Interview II, November 17, 2005). "You're going to get the same understanding if they (the teachers) know the material as somebody else does" (Nathan Interview I, November 8, 2005), Nathan said. A thought relatively common for many of the represented participants was, "I mean I think everybody is viewed the same come class time" (Nathan Interview I, November 8, 2005). My own personal bias was most of us can agree that there are many racists in society and people with lowered expectations based on race, how could we believe that schools and teachers, microcosm of our society, could not have similar thoughts about students of different racial makeup. Perhaps I am pessimistic in this particular case, but I have a difficult time believing that out of the assumed racist and discriminatory people in our society, none tend to enter the school system. Furthermore, if racist, discriminatory people enter the school, I have a difficult time believing that they are transformed upon entering the building into a non-racist, non-discriminatory people with the same expectations for all students. It sounds a little too euphoric to me.

From my perspective, I believe the teacher's race does matter, but I am uncertain how long that has an effect on one's education and interests. For example, like Jerry mentioned, when I enter a classroom and I see an African American professor, I have a sense of pride and hope that the instructor is going to really be good. Why? For the same reason that I celebrated Tony Dungy and Lovie Smith being the first African Americans to coach their professional football teams to the Super Bowl; it is a rare occasion to see underrepresented people in such high-status positions. It is so meaningful to see someone who disproves those negative stereotypes. So yes, I am just a little bit more interested initially.

However, I am here to tell you that regardless of race, if the instructor is poor, that whole "race thing" wears off pretty quickly. Don't get me wrong, I'm still proud to know his or her accomplishments, but what I've found is a poor teacher is a poor teacher as a good teacher is a good teacher. What's more important I believe is the teacher's ability to relate to the culture. I once took a class where the instructor was African American and had reached impeccable credentials; however, I found him to be arrogant, dogmatic, and inflexible, along with being extremely demanding – many of the qualities that most of us do not desire in a professor. I did quite well in the course, no thanks to my initial pride in him being African American. However, by the end of the term, I along with many of my majority African American classmates shared the same view of him as we would have shared with any White teacher having the same qualities: he sucked!

Underrepresented Students Feel More Comfortable and Relate Better with Teachers Who Understand Their Culture

> African American teachers or minority teachers; they know that African Americans can do the work. Minorities or African American teachers, you know, they kind of stress or push that I do well or that I try my best, or put all my effort into it…. When a White teacher has to teach a student of a different race than themselves, they kind of have to step out the box and try to relate or pretend to relate (Asharii Interview I, January 19 2006).

Even though most agreed that the race of the instructor did not hinder a person's ability to learn, the majority felt that underrepresented groups would feel more comfortable learning from instructors who understood their culture.

> I definitely feel more comfortable around people of my own race just because it really is good to know that someone understands where you're coming from…. Knowing that there's a Black professional teaching me something; that means they really got somewhere. They really worked hard to get where they're at. 'Cause it's not something you're going to see everyday – especially at this school (Jerry Interview I, 2006, January 18).

This quote adds context to Jerry's quote in the previous section discussing his interest upon walking into a classroom that has a professor of color. While showing his pride, he expresses his comfort and approval of a person who shares his culture and race.

These sentiments of underrepresented minorities having teachers who understand their culture were agreed on by Dana and Jade however with a slight subtle difference. Dana believed administrators should "find fabulous (underrepresented) role models and examples from within their own language, culture, religious group, heritage, and stuff and designate them as the teachers" (Dana Interview I, November 1, 2005) while Jade believed the teachers, regardless of race needed to understand underrepresented group's culture. She discussed the book Ain't no makin' it, which she says illustrated a White female teacher trying unsuccessfully to "save" her inner city Black students while a tough White male teacher from the streets succeeded in motivating the children – not focusing

on trying to save them per se. "He knew where they were coming from and he could relate to them, and maybe even understood. Not understood, he couldn't understand, but was able to relate to them more than this woman that they felt like they were being looked down upon" (Jade Interview I, November 8, 2005).

While I cannot definitively say that Akira's mother, who was a teacher, was trying to save the inner city school children of African Americans, she ran into similar issues as the White, female teacher discussed above. "My mom had a hard time teaching at Cincinnati public. She taught um fourth grade at one time and they would cuss her out and I mean she would come home crying like all the time. It was awful. And so that's why I think when my mom moved to a Catholic school (which was predominantly White), it was a lot easier for her" (Akira Interview I, November 3, 2005).

In my own experience, there are three teachers that I want to discuss: (a) Mr. Gordon, (b) Mr. Rodriguez, and (c) Mr. Williams. All three were nice guys who appeared to want their students to learn. Mr. Gordon, a 50 year old White male, small in stature, and introverted, was my 7th grade, Algebra I teacher. Mr. Rodriguez, a muscular, 6'1'', extroverted Hispanic man, was my 12th grade Spanish I & II teacher. And Mr. Williams, a muscular 6'1'', extroverted African American teacher was my 8th grade Algebra II teacher and track coach. Keep in mind that I went to schools that probably had a 99.3% African American population and I was in the higher track classes filled with honor roll students so many of us would probably generalize that my classroom was studious and well-behaved.

Mr. Gordon wore conservative colored suits, shirts, ties and slacks every day. He attempted to teach mathematics amongst distraction after distraction, until eventually he would erupt only to be laughed at even more. It was a distraction to learn – not to insinuate that I was not occasionally part of the distraction – and it was a distraction for him to teach. However, he rarely seemed to chastise us, call our parents, or discipline

us. Mind you, it was acceptable for instructors to paddle. So when he began his rant and rave in his cute little suit with his peppered gray hair, and puny voice, the students took him as serious as you would take a 3 year old.

Mr. Rodriguez who was probably in his late twenties, possibly early thirties often wore fairly tight pants and shirts that accentuated his physique. He was an extremely nice guy, but also did not demand the respect he deserved. Monday: "Mario (pronounced Ma-dee-yo), where are you going?" "Oh, we have a (jazz band) gig," I'd say. "Do you have a pass?" he asked. "Here ya go," giving him the often fake pass that was created by a friend. Wednesday: "Mario, are you leaving again?" "Hey, I gotta go play," I said. "Alllriiiight Mario. You guys play an awful lot. Do you have a pass?" He was right, we did play a lot, but we weren't always playing at a gig. Many times we'd be practicing our instruments in the band room. Friday: "You're leaving again this week!?" as if he didn't believe me. "Come on Mr. Rodriguez, would I pull the wool over your eyes?" I'd say as truthful as the wolf who claimed he'd protect the sheep with his life. By the end of the semester, he rarely even bothered asking for a pass.

Finally, Mr. Williams was probably in his late 30's, wore colorful, somewhat clingy shirts and elastic-band slacks. He had a good sense of humor; he had high expectations of all of his students, and he didn't take no crap! You knew that he cared. You knew that you better had done your homework. You knew that you better not talk out of turn, better not eat in class, better not disrespect anyone in the class, and better try your best. The penalty for messing up a "better not" was a meeting with Big Bertha, his specialized wooden paddle with three holes or Little Bertha, his leather strap. Did I happen to mention that Mr. Williams was a baseball player and former school disciplinarian whose reputation preceded him? Because of that reputation he very rarely needed to paddle, but when he did, BOY did he put the fear of God in yo' behind!

Mr. Williams was many of the students' favorite teachers that they had ever had. You know why? Not because of the fear; not because he was African American, not because of his attire, but because he cared. He challenged; he disciplined not as a way of hurting, but as a way of structuring you for life. It was all in the name of Love and you knew it! He had fun and was interested in teaching you. He discussed more than just mathematics. He expected nothing but the best from each and every last student in his classroom, never lowering his standards. He believed in you! When you were in his classroom you were THE most important person in the world; so important that when often frequent former students visited him during their college breaks – an honor that many teachers would be most proud to have – he'd introduce them by name, brag on their achievements, present them as role models to admire and aspire, talk to them for about two minutes, and shoo them off; because, THE most important students were in his present class. Talking to the former disallowed teaching the present. He related.

Teachers Teach White Students Better

"I think a lot of them (Whites) want to see their race be "superior" or [*sic*] whatever to other races. So they take it more seriously" (Delores Interview I, January 6, 2006).

An issue that many of the underrepresented participants (all of the African Americans and none of the Hispanics) believed was teachers teach white students better. There were two reasons why they believed it, but no consensus and then there was Jerry who said, "I don't…, it just seems like something that they do (laughter)" (Jerry Interview I, January 18, 2006), saying his statement as if "it is what it is; who knows why?"

Delores seemed to believe that teachers teach White students better primarily because of sheer interest in the White student, but she also added the presence of a support group of White parents participating in the children's education to facilitate stimulating learning. She mentioned,

> Maybe also because parents of other uh White parents you know check up on the kids whatever [*sic*], but I think as a general thing, they do tend to take teaching one another more serious than they would if they were teaching an African American or Asian or Hispanic kid (Delores Interview I, January 6, 2006).

I cannot say definitively, but I believe Delores was insinuating that because she believes White parents are more involved in the student's education, they take a more active role and place pressure as a group on the teachers to perform.

To Asharii, the reason she has believed teachers teach White students better is "'Cause they can relate. Teaching Whites is [*sic*] not something different or something out of the norm; so that they can kind of be their selves or, they can relate better than teaching students of another race" (Asharii Interview I, January 19 2006). My personal opinion was that Asharii was saying that the White teacher teaches White students better because of similar cultures. It should also be noted that even though one of the statements that I said leading to the responses in this section was "Respond to the following statement: teachers teach Whites better;" many (underrepresented and represented groups) interpreted the statement as, "White teachers teach Whites better."

Even though most of the represented participants did not believe that teachers teach White students better, there was one, Dana whose comments I believe are relevant to the heart of this study. Here is a small portion of our conversation:

> Mario: I am going to read a sentence and I want you to comment. Most teachers teach White students better.
> Dana: Whoa! I like that. I like that. Yes, because I think a lot of studies have been done by Harvard professors on White upper-middle-class male students and so especially teaching research. Sure, I think the White student is taught better by most teachers because teachers are taught to teach the White student.
> Mario: How are you taught to teach White students?
> Dana: (Laughter) I think it's something they do in teaching school.
> Mario: So there's some hidden course that…?
> Dana: It's not hidden. It's the culture prevalence; the entire place; the entire style of thinking; the entire way that they deal with things. Good question….um…I don't…; it just seems like something that they do (laughter) (Dana Interview I, November 1, 2005; 2005 November 9).

By her laughter, initially I thought she was joking; however, as she continued to answer and discuss the topic, I began to realize that she seemed to believe the statement. I began to ponder, are teachers taught to teach White students? Not as special classes "Teaching the White Student Better 100" sequence taught at all major four-year universities as a requirement for graduation, but through learned behavior in classroom settings. After all, many of us teach the ways we were taught.

The reality is many teachers have not "studied" other cultures so they do not understand cultures other than their own which is a handicap to the teacher and the student. Sure, many of us have been required to take one or two multicultural/diversity classes, but is this not like taking a couple of cooking classes and expecting to be able to cook the finest dishes from across the world? As (I would suggest) most courses are, in properly taught diversity courses, the student is given tools necessary to become an expert, but they are not experts at the end of the class. Becoming an expert involves delving into the subject matter through research, practice, exploration, and/or continuing education. Until a teacher has visited, socialized, ate, read about, and/or shared experiences, food, fellowship, music, laughter, etc… with other cultures, they have not

internalized the culture. They cannot be sure of what really matters in the culture. True relationships and understanding can be superficial at best. We have been immersed in our own culture all of our lives, thus it is relatively easy to interpret meaning from our own world; the challenge lies in interpreting others'.

In my opinion, I believe many teachers' communication and behavior is more affiliated with a culture more prominent amongst Whites. Case in point, one day my cultural anthropologist professor, a White, male professor teaching a qualitative studies data collection methods course, began to return an assignment with his feedback on how to improve. While returning the papers, in pretty much his normal reserved speaking voice, he said to the classroom something to the effect of, "And some of you are using fonts smaller than 10. Like Mario, is this 8?" For the most part, this was the end of this discussion. Initially I didn't think much about the statement; after all, he didn't appear angry to me. In fact, I kind of apologetically chuckled in my mind thinking, "Dang…my bad, I just had so much to say, and it wouldn't fit in the page restraints, but it wasn't 8." I think it was 9 or 9.5.

However, something happened in that qualitative course. I began to start interpreting language and behavior more so than I ever had before. As I sat in my chair, I began to replay his five second discussion of small font sizes. I began to think, "You know, even though he didn't sound mad, I think he was criticizing me. In fact now that I'm thinking about it more, I know he was at least a little perturbed; criticizing me."

Considering the tone and brevity in which he said the statement, I typically would have let it roll off of me without a second thought; however, my interpretive analysis proved to be justified. During the break, he politely said, "I hope I wasn't too hard on

you." I definitely didn't think he was. Heck, in my opinion at the time, if I had to figure out that he was perturbed and criticizing me, he couldn't have been too hard. You see, where I'm from – a predominantly African American community and culture – when a person is angry, there is no doubt that they are angry – perhaps I have just been trained to notice the signs. "What the heck are you doing!?" would have been said fairly hostile on a nice day. "I told you NOT to do that!" "Don't do it no more (or else)…!" The nose would have been flared, the voice raised above comfortable level tone, the darting eyes, the poked out lip, the wrinkle in the forehead and eyebrows, perhaps the movement of the neck, exaggeration of the arms and hands, and/or perhaps the invasion of personal space would have occurred. If you haven't seen this form of expression before, just imagine an angry parent threatening their child with a spanking because they're fed up with the child's behavior.

However, for what I believe is more aligned with the culture of Whites in general from my experience, I refer to something the actor/rapper/producer Will Smith has said numerous times in interviews. When he went to an African American school, he found that his jokes that worked on his White friends didn't work and vice versa. Even though there is no definitive way to categorize everyone within a race and I clarify that to generalize any people is dangerous and not scientific, there often seem to be some very common culture amongst people of the same race.

From MY personal experience, the difference between many represented groups and some underrepresented groups' expressions and communication are these: With represented people, often the emphasis is on WHAT is said. The meat is in the conciseness, pundits, and articulation of the wording often spoken without flamboyant

expressiveness. However, with underrepresented people, the emphasis is on HOW it's said. The spice often is in the expressive delivery, the body language, the tone of the voice, the creative (which is subjective), illustrative nonsensical play on words using simple metaphors, folklore, storytelling, experiences, and/or examples to depict meaning.

To strengthen my point I have two additional illustrative experiences regarding this subject:

1. *In a statistics class taught by a White professor that a colleague and I attended – if you asked me – the professor spoke in a monotone with an occasional dry humor that bored me to no living end; however, if you asked my White colleague, she thought the class was pretty great. In her opinion, his use of examples and clarity in discussing the topic were informative and to the point.*
2. *At a recent cancer conference, a White researcher presented with flare and expression emphasizing his points about cancer by using body language, raising his tone, and being very creative in his delivery. I thought it was by far the most interesting talk of the morning; however, my Chinese colleague thought it was THE worst, saying, "This type of talk should not be delivered in this way. These types of talks should be factual."*

There is No Teaching to or by Race

"I don't think you could say, 'White kids learn best by listening to music,' or 'Asian kids learn lest by drawing pictures.' No, I don't think you could stereotype anyone" (Jade Interview I, November 8, 2005).

In general, both groups believed that there was no way to teach a particular race. "I don't think it's a race thing; I think it's kind of the way you think" (Delores Interview I, January 6, 2006), "It's probably their (student's) ability to learn; their want to…that they want to learn and that they have the will to stick it out no matter what" (Lona Interview I, February 8, 2006). "You can't make generalizations for one race" (Raquel Interview I, October 29, 2006). For mathematics in particular which, "I think is almost universal. So there, it doesn't matter what race" (Dana Interview I, November 1, 2005). This section seems to contradict the previous section which I interpret to mean it is not that many of the participants believe teachers teach Whites better, but they believe (perhaps White) teachers place more effort into teaching White students because they feel accountable to White students and perhaps face scrutiny from White parents, school officials, politicians, and/or society if they fail.

I am not certain that there is a way to teach any particular race; however, I believe there is a better way to reach people by their culture. I will discuss this topic more later on. What I do believe when it comes to teaching various races is if a teacher introduces topics and examples that sometimes include the races that he or she is teaching, the topic may very well be better received, allowing the person to recognize that people who look like them are involved in the course . For me, I enjoy seeing examples with people like myself; something that I can't ever recall seeing in any of my statistics courses.

Furthermore, while I saw some people of color in the statistics text that the study participants used, I did not find many examples dealing with race. It would be nice to occasionally incorporate topics and examples related to race.

In general, there were key differences between underrepresented and represented students' perspectives on whether race was an important factor in teaching. For the majority of represented students, the race of a teacher was unimportant. They believed that there was no one way to generalize and teach race specific. On the other hand, even though most of the underrepresented students did not feel a teacher could teach race specifically, they believed that teachers taught Whites better; contradictory ideas that I believe suggest that underrepresented students felt that more effort, learned behavior of "White culture" transferable to White students, and desire to teach Whites was present. Furthermore underrepresented students felt that it was important to have instructors who represented them. These ideas are important because they help shape the experiences and opinions of the students on what they believe are qualities of effective teachers.

Qualities of Effective Teachers

In general, there were many qualities that the participants described when discussing effective teachers. Often there were specific comments made about the qualities of the student's statistics lecturer and TA; however, much of the conversation about qualities was centered on teachers in general. Many of them believed that teachers were or should be positive role models. They also thought that it was important for a teacher to be intrinsically motivated to teach the subject and likewise be able to motivate the students using flexible teaching styles. Most thought that it was nice or important to have an instructor who cared, gave positive feedback, and was patient. Last, the

importance of a teacher being able to communicate effectively, listen without being pompous and being able to speak in a language relatable to the student all while challenging them were found to be important communicative skills.

For Underrepresented Students, Teachers are Positive Role Models

> I really look up to my (She began to speak Spanish describing her teacher.). She was my um teacher…um for Spanish 150 which is the linguistics but she does a lot of research and work trying to help people who live in Mexico and the border; because the women in Mexico and the border have the worst lives I've ever heard of [*sic*] in my entire life, and they basically are all raped at least once a year. I feel so bad for them. It's horrible (Raquel Interview I; 2005 October 29)!

One difference that the underrepresented participants had versus the represented participants was they had teachers who they felt were role models in general. Teachers who assisted them, guided them, and made social change. For Asharii, even though she had a difficult time finding anyone positive in her life other than her mother, she had an appreciation and fondness for the counselors at her school; "because those were the ones who decided whether or not – you know – you would be able to get into certain programs" (Asharii Interview I, January 19 2006). These counselors also helped her find scholarship money (Asharii Interview I). For both Jerry and Lona, their high school teacher gave them direction for going to college, were positive, and supportive.

As I have said earlier, I have been fortunate to have numerous role models in my life. Many have been teachers and professors. However one that I mentioned in the previous chapter, Mr. Casey, my high school band director, has left an impression on my life that will never go away. He was one of the top (if not the top) high school jazz band director in the nation. His bands were ranked number one, won more competitions than

could be counted, won numerous awards, rave reviews, toured in Europe, made albums, and played with numerous jazz greats such as famed trumpeters Wynton Marsalis and Clark Terry to name a few. Furthermore, he has produced professional musicians who have gone on to make their own albums. Trust me, this is reallllly just a summarization.

With all of his accolades, it should come to no surprise that he was demanding! Five to six times per week, we were practicing for an hour mostly before school. We were required to sign up for jazz band as a class for an hour during school. Most of us practiced during our lunch hours and breaks – I don't recall ever eating at the high school cafeteria. There was jazz band practice after school from 5:00 until 8:00 or 9:00 if we didn't have a gig to perform at which often occurred once or twice a week if you weren't in the combo. The combo, the band's top musicians, would occasionally perform an additional two or three times. And this schedule was all DURING the school year; we won't talk about the summer practice schedule.

If you suspect that most people hated the demand, you would be wrong. Yes, we all occasionally got tired, but the rare once or twice during the quarter that we did not have practice after school, we hung around the locked band room door as if we were thieves scoping the joint, all so we could do our normal routine. In fact he'd have to tell us to go home.

Mr. Casey was not just a band director. No, he was a teacher, a motivator; to many, a father figure and role model. To be honest, I'd like to believe that his greatest accomplishment was not directing the number one ranked high school jazz band in America twice, but instead being the figure who provided a family, opportunity, and outlet for teenagers from an impoverished, crime stricken city to become successful.

"It's not the big things that make you great; it's the little things that matter. Anyone can do the big things." "If you want to be good, you have to practice!" "It's not always what you know, it's who you know." "I don't care how good your licks (a cool jazz melody) are, if your tone sucks, no one will want to hear you." "If you want to be a professional, you have to be able to read (music)." "It's important to learn your theory." "If all you play is jazz, you'll starve. You have to be diverse in your styles: jazz, rock, R&B, Latin, classical, gospel;" all analogies for life. Most of us kept coming back; because, more than merely telling us, he showed us how we could be great!

Quality Teachers are Motivated and Motivating

> Some teachers inspire. You kind of want a person that has a passion for people to understand, and I think that that passion is what really um separates good teachers from poor teachers. If someone is really excited about it and if someone really wants you, or really cares if you learn it or not, then there's more likely a chance that you will grasp the material (Jade Interview I, 2005 November 8).

A common finding that both groups believed was that teachers in general should be intrinsically motivated and be able to motivate the students that they teach. Important keywords that were used were 'passionate,' 'interested,' 'energetic,' and 'engaging.' "If I know that a teacher is really in to what they're doing and that they're really interested in doing it and seeing that their students succeed, then that really shows me that the teacher is going to be there to answer the questions that I have" (Jerry Interview I, January 18, 2006). The students loved to have a teacher who had "a younger energy" (Jacqueline Interview I, November 12, 2005), and were "hype to be there" (Jacqueline Interview I, November 12, 2005). They enjoyed a teacher who was "enthusiastic and…so happy" (Lona Interview I, February 8, 2006). For these types of teachers, Lona said, "I loved

that, you know, to be with a teacher who wants to teach us" (Lona Interview I, February 8, 2006). It was felt that these types of teachers were engaging and able to "talk about things that seem interesting to the class" (Hetty Interview I, November 7, 2005).

Personally, while working on my Master's at TSU, I can recall my older mathematics professor one time buttering us up for the next class. She told us, "Next class we are going to prove my favorite proof of all time." My favorite proof of all time…hmmm, I still love that. I can imagine it just seems so wrong for most people to have a favorite mathematical proof. Anyway, she told us that this proof had absolutely, positively, no practical purposes, but the mathematics was exquisite – OK, so she probably didn't use the word, 'exquisite,' but she would certainly agree with me that that was her meaning. I think she used the word, 'beautiful.' Back to the story, the day came; she was so happy and excited to be proving this theorem. To this day, I can't remember what theorem she proved, but I can always hope that when teaching, I remember her zeal and the enthusiasm and interest she stimulated in us for an otherwise "useless" theorem.

Caring Teachers are Important in Helping Represented Students Learn and More Important for Underrepresented Students

"He (teacher) would always tell me, 'You can do better, and I want to see it;' 'Look, you need to get it together.' 'You're not….' I don't know, that kind of shows (softly) that he cared a little bit" (Asharii Interview I, January 19 2006). As has been mentioned earlier in the writing, Asharii has not seemed to have many supportive people in her life. Even when asked to discuss the topic of having a caring teacher, she had a difficult time recalling one with that nature. Asharii was soft spoken throughout the

interview, but when she began to discuss this teacher, she became even softer. It is my superficial, personal opinion that she somewhat lacks self-esteem and does not feel loved by many people other than her mother. I certainly questioned if her teacher cared more than a "little bit;" I personally don't tend to challenge people to do better if I don't care and expect more effort out of them. His expectations demonstrated that he believed in her abilities and knew that she could work harder to obtain better grades. By him criticizing her he was using a philosophy that my parents always said, "You discipline your children because you care."

Speaking of teachers in general, everyone, excluding Delores, felt that it was important to have a caring teacher. "That makes a good teacher if they really care about the student and they really want the student to succeed. So they'll help them in any way they want" (Raquel Interview I, October 29, 2006). "I think caring is like most important; because, like it motivates you to do better in the class if you know your teacher like wants you to…"(Hetty Interview I, November 7, 2005).

For a few students, they believed a caring teacher would be able to directly help the students learn better. "If someone is um…really wants you, or really cares if you learn it or not, then there's more likely a chance that you will grasp the material" (Jade Interview I, November 8, 2005). If the teacher doesn't really care, then you know the students who do well are going to suffer a little just because they realize the teacher doesn't care. They would try to do their best, but they would probably end up confused (Lona Interview I, February 8, 2006).

I questioned how caring could increase or decrease learning. I per se don't believe that caring can directly help a person learn; however, I believe that a caring

teacher creates accountability (for me, disappointing a caring teacher was equivalent to disappointing a friend), trust, motivation, and an environment conducive to learning. When a teacher has high expectations of the students; not settle for mediocre work; recognize the students' success depends on meeting their expectations; and provide moral support; caring is demonstrated. Caring becomes a vessel for which relationships form and imprints are left on both the students' and teacher's lives.

When asked to rate the importance of a caring instructor on a scale of 1 to 10 where 10 indicated that caring was very important, 85% of the surveyed students ranked caring with a 7 or more even though caring did not appear to be a significant predictor of the overall statistics grade. Despite not being a significant predictor of final statistics grade, analysis suggested that there was a difference between underrepresented and represented students on how important it was to have a caring instructor, ($X^2(2, N = 443) = 8.649$, $p = .013$). Overall, the percent of underrepresented who ranked a caring instructor with a 7 or more was higher than expected while the results were vice versa for represented students suggesting that having a caring instructor was more important for underrepresented students.

During my time in the statistics department, I had two professors who definitely were motivating and caring. One professor showed how much she cared by giving me test taking tips and encouraging me saying, "Relax;" "If you don't know the answer, go on to another problem;" "If you know your answer is incorrect, explain why you know that it is incorrect, and let the committee know that for the follow-up questions, you are basing your answers on your previous incorrect answer. If you have time, go back and try to answer the question." The other professor loaned me old statistics books with

numerous problems, scheduled time with me whenever I had questions, and encouraged me as well – all of this was during his Christmas break. I am in gratitude to both professors and never miss an opportunity to thank them. As I mentioned above, I don't believe that caring per se helped me learn; however, the actions and words behind the caring motivated me and challenged me. Besides wanting to do well for myself, their caring made me want to do well for them.

Positive Feedback from an Instructor is Important for Classroom Success

"I think feedback is important because like I…, I can always learn better from my mistakes, like knowing that I did something wrong once" (Hetty Interview I, November 7, 2005).

In general, both groups thought that it was important to have an instructor who gave positive feedback. This feedback helps to stimulate growth and "helps you to understand more" (Asharii Interview I, January 19 2006), where the student had problem areas. Nathan said, "You've gotta help explain it and show the students what they're doing wrong if they're misunderstanding it and help them along the way" (Nathan Interview I, November 8, 2005). For Jacqueline, she appreciated when one of her professors sent an e-mail to the entire class discussing common problems the class made as well as discuss areas on each student's homework as to where they could improve. "So maybe I didn't have that problem, but I could see where other people had that problem with, so I know not to do it for the next one. Like I felt that was helpful" (Jacqueline Interview I, November 12, 2005).

For me, it was always helpful to know from the instructor how to improve, but one piece of feedback that particularly encouraged me was when one of my professors told me, that I was one of the few people in the classroom that, "Found their voice in their writing." The reason why it was so meaningful was because for years, I never considered myself a good writer – decent, but not good – and still don't consider myself any Langston Hughes. I was typically a B student when it came to writing. However, around the time that he gave me this feedback, I was receiving similar comments from others. The combined feedback of these support groups helped me begin to feel more confident in my writing abilities and actually begin to help me enjoy writing certain styles.

Having a Patient Teacher is Important

"I perform better when I have a patient teacher" (Asharii Interview I, January 19 2006).

Most of the participants in both groups believed that it was important to have a patient teacher in general. Some made comments on the importance of having a patient statistics teacher. Fifty-eight percent of the surveyed students ranked having a patient instructor with a 9 or 10. In fact Jerry said, "I think patience would be the most important," when asked which was the most important quality between caring, patience, or feedback. Two of the participants, Nathan and Jade, thought having a patient instructor was a plus especially when the class was difficult saying, "You're going to have some students who aren't going to understand right away. If it's a course I'm struggling with, I mean obviously I'm gonna want them to be patient and help me"

(Nathan Interview I, November 8, 2005). Jade added that learning a new concept can be challenging within itself. A teacher who is not patient will add pressure to the student to learn the information, and students "don't need someone else on their back taking much longer to learn it and adding more stress to it" (Jade Interview I, November 8, 2005).

Having a patient instructor never meant so much to me until I began my statistical degree. Once again, I refer to the professor who helped me through my qualifier exam. During my initial time spent in his office, I asked questions that he would speedily answer – not because he was trying to shoo me away, but because he's a fast talker and it was clear as day to him. "You understand?" he would ask. "Oh…yeah," shaking my head in agreement as if the answer was so clear now that he talked me through it when the reality was I often sat there dumbfounded trying not to appear as if I didn't have a clue as to what he was saying; pride can be so harmful when a student is clueless!

Regardless of some of the questions that I asked, which I have to believe sent a message that I didn't understand, he continued to open his door for me, over and over and over again. I probably spent more time with him than his doctoral advisees. It didn't seem to matter; he welcomed me in whenever he had the time.

Over time, what appeared to be so distant began to become so close. Previous questions that probably should have been relatively routine were now just that. With his guidance, I began to see the problem's solution before putting the pencil on the paper; knowing the precise way to attack it. If you've ever taught for a few quarters or more, it is the same intuition that you have when the student asks you a question you've never seen or thought about. Because you've done so many of these types of problems (regardless of the new twist), you conquer it making the student believe that you've been

doing this type of work since you were three. In a sport's analogy, "the game was coming to me," I didn't have to force it. Under his tutelage, I often began to do what my A students typically do: ask him a question and before he could talk for 5 seconds, I was finishing his sentence. It was no longer him feeding me the answer, but we were having an intellectual conversation. The frequent visits decreased enormously over time. I don't know if I ever would have seen the light as bright as I did without him being as patient as he was.

Having a Teacher Who Communicates Well Facilitates Learning

"A good teacher is probably the… a person who can make the material simple. They can simplify everything" (Lona Interview I, January 18, 2006).

There was no discernable difference between groups regarding their opinion on the importance of having an instructor who was able to communicate and articulate ideas to the student. Both groups believed teachers in general and statistics teachers should have good communication skills. "Good teachers to me were those that explained information in detail. I could just see the step by step process to do well especially in math" (Delores Interview I, January 6, 2006). The participants felt that a good teacher was a person who could simplify a topic even to a person who had no background on the subject. Jacqueline mentioned that the teachers whom she found to be the best "were able to talk about it (the subject) in a way that makes sense to people who don't necessarily know a lot about the subject" (Jacqueline Interview I, November 12, 2005).

Personally, I believe that to be considered a good teacher, one must constantly work on his or her communication skills; being prepared for the problem areas that the

students will encounter. I believe that it is important that the teacher finds scenarios or examples that illustrate the topic in a meaningful way. In my opinion, Mr. Casey, my former high school band director, said it well when he said, "I don't care how good your licks (a cool jazz melody) are, if your tone sucks, no one will want to hear you." In terms of teaching, I don't care how motivated, caring, patient, organized, etc… a teacher is, if they don't have good communication skills, the students will not want to hear them; it will all sound like noise.

Teachers Should Listen to the Students and not be "Know it Alls"

"The teacher [*sic*] can take criticism from students and integrate that into their lecture and class well. They're not offended, um…especially if it's relevant to the subject matter" (Dana Interview I, November 1, 2005).

One of the important signs of a good teacher to many of the represented group was when a teacher had a willingness to listen to the student and not portray themselves as an arrogant "know it all." Hetty mentioned a psychology instructor that she viewed negatively; because, "He was like very biased and like, 'This is how it's going to be'" (Hetty Interview I, November 7, 2005); an attitude that Akira said, "I don't like that about someone" (Akira Interview I, November 3, 2005). The students appreciated when the teacher was able to accept constructive feedback and recognize that they too were learners in the classroom. When discussing a teacher who had received constructive feedback, Dana said a bad teacher is one who "won't work it in or won't integrate that especially if it's relevant to the subject; because, they're offended and intimidated by someone else knowing more than them" (Dana Interview I, November 1, 2005). Most

had a favorable opinion of their statistics lecturer or TA; however, Nicholas did mention that he heard rumors of students complaining about one lecturer who was nice but did not listen to or try to help the students. It sounded as if Nicholas was saying the instructor was not very approachable (Nicholas Interview II).

While many felt a good teacher was one who "knows the material and is willing to discuss like if students disagree with something that…. He's willing to discuss it and to take the time to explain to them and why it is this way" (Jade Interview II, November 18, 2005). They were recognized as good teachers; because, "they were willing to listen to (the) student. They didn't have problems. They were understanding" (Nathan Interview I, November 8, 2005).

Teachers Need to Speak My Language

> Like my stats TA, like he can't really speak English at all, and it's really frustrating and it's just like I don't know. Like I know he tries really hard to do well to teach us good, but I just don't understand him. So that really affects my ability to do well (Hetty Interview I, November 7, 2005).

For both groups, it was important that the teachers used language familiar to the student. For some, there was mention of difficulty understanding a foreign language and for others there was a comfort in teachers who used a common language and vocabulary used by the student. The remarks regarding English as second language lecturers and TAs primarily seemed to be instigated by conversations regarding difficulties in the students' statistics classes. A few made comments that they heard from students in other statistics sections that the language barrier was a serious problem.

Probably the most common concern regarding language was when a participant had an instructor whose native tongue was different from the student. Jerry mentioned, "Like I've never had an Asian teacher, but I guess like the accent would really – you know like however strong the accent is – it just really would make me wonder whether or not I'll be able to understand them" (Jerry Interview I, January 18, 2006). This was a similar idea that Akira expressed about Asian TAs in her statistics class saying, "When you have a TA who doesn't speak English, yeah, things are going to be said" (Akira Interview I, November 3, 2005). She herself made mention to not having Asian TA's who were not able to speak English clearly. Once again, Akira somewhat surprised me by not being more sympathetic toward Asians who had a difficult time speaking English. When she made these statements, she appeared somewhat appalled to have a teacher who was unable to speak clear English.

For other participants, it was important that they felt comfortable with the language that the teacher spoke. For Lona this meant speaking in Spanish with her teachers and classmates saying, "In middle school, my teachers were supposed to te(ach)…suppose to be using English, but we would slip into Spanish" (Lona Interview I, January 18, 2006), even though it was typically frowned upon by many teachers at her school. However, it was a good way to encourage the students to speak out in the classroom (Lona Interview II); something that she has found difficult to do in college and will be addressed later in the writing. However for Dana, it was important for a teacher to be articulate like her, saying, "I like it when they have a similar vocabulary to me" (Dana Interview I, November 1, 2005).

My experience with foreign teachers has generally been good. For those who had thick accents, I discovered that you must focus a little bit harder and pay close attention to key words for meaning. However, I can understand how it could be a little bit more challenging to have an instructor whose native tongue is not English, but I also recognize from talking to foreign colleagues that many of them are trying their best. Many of them are extremely knowledgeable and want the best for their students. They recognize that there is a language barrier and are often conscious about their English, but as most of the people in graduate school, they are trying to become successful. So they are required to do their best standing in front of some who don't want to listen because of their accent or some who are sometimes prejudiced. There is no easy fix, but I would encourage anyone with a non-native speaking instructor to recognize that like many native speaking instructors, many of them want to do their best to help you understand. Sometimes, you just have to keep trying.

There are many qualities that specifically make effective statistics teachers and teachers in general. Some of these qualities are skills and characteristics that the teacher should possess and other qualities deal with the way a teacher uses language. One of the distinctions between underrepresented and represented students regarding their perspective of a quality teacher was the belief of underrepresented students that teachers are role models and thus influential in the student's life. It was also found that even though represented students valued a caring teacher, underrepresented students appeared to value this quality more. Teachers are critical in fostering success in academics. In the next section, I will explore important influences for being successful in an introductory statistics course that are not necessarily dependent on the teacher.

Important Influences on Being Successful in Statistics Courses

There were two important findings based on the survey results: the importance of GPA and parents' income. The results suggested, on average, we expect for a 1 point increase of cumulative GPA to result in a 13 point increase in a student's overall statistics grade. We also expect for students whose parents make between $30,000 and $61,000 to earn 2.5 fewer points than those whose parents make between $61,000 and $100,000.

From the qualitative data there were three attributes that commonly arose amongst the majority of participants. First of all, they believed that mathematics and statistics were important subjects that were useful in today's society; so there was a reason to be interested in the subject. Second, many believed that the course was extremely conceptual and thus, to succeed, one must focus on details. Last, the participants believed that clear, concise examples were a must to understanding the topic.

Speaking Out in the Statistics Classroom for Underrepresented Students: If the Culture is not to Speak…Don't

The lecture hall was partially filled with 130 people. Brilliant minds from some of the top high schools in the world wait with their hands out and their mouths open for their mother's first feeding that she worked so diligently to capture (Fieldnotes; 2006 January 11; 2006 January 18; 2006 February 8).

"Knock, Knock," the professor said.

"Who's there?" they replied.

"Tank," she responded.

"Tank who?" they asked.

"You're welcome," she laughed.

The echo of quietness resounded as loud as it did when you were a child stuck in the backseat of the Chevrolet amidst the uncomforting feeling exacerbated by your conflicting, non-speaking parents. "Is my mic on!?"

Substance must be provided, so the professor continues giving protein and carbohydrates before attempting to provide more sugar of humor. "Ah, this is a juicy tidbit. Surely, they will eat this up," she thought. Surely they won't. The joys of having children: laughter, inquisitiveness, excitement is not all that joyful anymore. They dun' went out and turned into that dreaded anti-social teenager who enjoys locking themselves in their room in isolation and –if you didn't know better – despises your mere existence; not ever wanting to be around you.

While I colorized a statistic's lecture period that I attended and only discussed a brief portion of the class period unrepresentative of the entire session, this depiction is not far from what was seen multiple times in the classroom during multiple sittings. The instructor worked diligently on her presentation, tried to entertain the students (I found many of the jokes to be amusing.) while providing important information only to be stared at with the familiar looks of, "Is it time to go yet?" or "Is this going to be on the test?" Despite her effort, the students rarely spoke out.

The underrepresented participants (or the represented for that matter) rarely said anything in lecture. They often did not participate in class surveys, ask questions during lecture, or say much during recitation. An instructor was almost lucky to get a head nod of agreement to a point he or she had made. "I'm not really involved so to say, I'm just

kind of like sitting back and you know, observing everyone else" (Asharii Interview I, January 19 2006). "I think it's important that if you have a question, you feel comfortable" (Delores Interview I, January 6, 2006), asking questions or responding in class; however in statistics class, it proved to be "kind of impossible for me" (Lona Interview I, January 18, 2006), because of intimidation. Delores was the only underrepresented participant whom I saw asking questions after class and occasionally answering questions during recitation.

Perhaps the class culture overwhelmed the individual; meaning if no one else asked any questions or responded neither should the participant. Or perhaps the fear of being ostracized or considered dumb was unbearable. The idea of having a willingly participating class where the instructor gets "me confident in my ability to say things" (Lona Interview I, February 8, 2006), may very well lie with how the instructor interacts with the students.

Speaking from my own experience while working on my Masters of statistics, I often did not feel comfortable asking questions in class which is unusual considering that I'm a pretty extroverted person who feeds into two philosophies: if I have a question, there is probably someone else in the class who has the same question, and I'm there for knowledge, and the instructors typically want to give me knowledge. Perhaps, my conversation could have been stimulated more by the way the professor dictated the class, but more than anything, my discomfort came from two things. Not only did I not want to appear to be dumb, but I was typically one of THE only persons who would speak. If others did not understand, I certainly could not tell, in fact considering how well most of my colleagues did in solving difficult problems, I am led to believe that if

given a few months by themselves with the textbook, paper, pencil, and maybe a library, many of them surely would be able to teach the courses themselves. I am certainly being facetious (not much though); however, it was made clear to me that the culture of our class was to say nothing and speak to your fellow students after class if you were not able to solve the homework problems. From conversations with some of my close Chinese colleagues, who were the majority, I was told that in China, students mainly listened and had little interaction in class. I will always believe that their culture primarily dictated our classroom culture.

Reasons Why Mathematics and Statistics is Important to Understand

> If you're going to research like even like in science; you know in your Ph.D., you want to do research, you have data you're working with, and you have to be able to display your results in appropriate ways, and you have to use statistics to do that… So, I mean for furthering yourself, understanding the principles of statistics is important (Delores Interview I, February 9, 2006).

Despite most of the participants taking statistics because it was a requirement for their majors, most of them saw the practicality of the subject. "It's beneficial in the long run in any major you go to. That's why it's probably a prereq(uisite) for a lot of majors" (Nathan Interview II, November 21, 2005). They saw how there were many careers that used statistics; the use of statistics in the media; and the importance of understanding to have a healthy skepticism.

For many, they saw the benefits of statistics in research fields. When asked what careers used statistics, common answers were,

> I would say psychologists. Like, I mean, half or…really half of psychology is like statistics like um when they do studies and research and stuff of that nature and so

> it's very relevant to my major so I do see like the relevance in taking the class. I think sociologists do too to a degree (Jerry Interview I, February 17, 2006).

"When you go look at statistics for studies and stuff like that that hospitals do. I mean if you're a health major, anything like that, you're going to need to understand this kind of material" (Nathan Interview II, November 21, 2005). It should be noted that the people who mentioned the use of statistics in health related fields and research were all in health related majors, so it is my personal bias that they should directly see the benefits of taking the course – especially since most of them planned to obtain a master's degree.

Other purposes that were seen for statistics was to understand statistical concepts used in the media. "Well I think between just reading the newspaper and watching the news, you learn a lot. You always see survey statements from Gallop Polls you know they say, 'President Bush's approval rating is 37% ± 3 % '" (Nate Interview II, November 21, 2005). These types of polls are given daily in the newspapers, magazine, Internet, and on the television.

Lastly some found statistics to be important in developing a healthy skepticism of published results, polls, and experiments. Some mentioned that understanding statistics is important to keep from being hoodwinked. "It's (Statistics has) been good for that (questionable result). Just making it clear that statistics can be distorted and twisted and put in one's favor and so it's good for people to take that" (Jade Interview II, November 18, 2005). While discussing a conspiracy theory against African Americans, Jerry emphasized the importance of understanding statistics saying, "The ignorance that we have as far as understanding certain stats as Black people that kind of keeps us repressed from being able to be bamboozled really; like just to really have something to keep going

and going. Until people understand what's going on, no one's going to stand up for it" (Jerry Interview I, February 17, 2006). Jerry appeared to be saying that as African Americans, it is important to understand statistics to keep from being taken advantage of and to stop racial atrocities from occurring. Only by understanding will African Americans be able to intelligently stand against these repressions.

Fairly recently, two people who work in the same building that I work in sent me e-mails regarding how to best describe their data. Both work under the administrative side of the healthcare system. Neither has any experience with doing statistics. Unfortunately, their managers, who don't appear to have much experience either, asked them to use some statistical concepts to improve their work and arguments. My point, as I've told my statistics class, you just never know when you'll need statistics. I'm guessing neither one of these individuals ever believed they would use it.

Many people avoid taking statistics like the plague; some even unfortunately wait until their final quarter before (for some supposedly) graduating. Experience suggests that statistics is difficult for many, but one cannot underestimate the practicality of it and the need to understand it. Not only is statistics often required with undergraduate degrees, but, to obtain a graduate level degree, I would be willing to say, that most programs require a minimum of one graduate level statistics course. Considering how the trend of having at least a master's has increased, statistics can be a gatekeeper to finishing a graduate degree, keeping or being promoted at a job, and making extra money. Unfortunately I've seen people's degrees postponed because they could not pass the course.

Along with needing statistics in graduate programs, it is important to have a basic understanding of how people get the results they get in published research, polls, and experiments. It is unfortunate, but there are a lot of studies out there that are designed poorly, have a lot of bias, incorrect measurement tools, questionable and invalid results, and the list goes on. Even though an introductory course will not provide the depth to understand these concepts in great detail, it allows a person to have an intellectual idea of what may be occurring. Think of it this way: You may not be able to fix your car, but it sure would go a long way in not getting stiffed by the mechanic if they understood that you knew what and where the engine was. The point is: as long as people can be fooled with faulty research, researchers will stiff others – whether intentional or not.

More than Most Subjects, Statistics Requires a Good Mathematical Foundation that is Highly Conceptual, so Students Must Study Details!

"Pay attention; be focused; take notes; understand concepts; details are important" (Lona Interview I, January 18, 2006).

For many of the participants (both underrepresented and represented students), they assumed statistics was a "typical" mathematics class; meaning there was a systematic way of solving most of the problems. Most found otherwise. Similar to many mathematics classes, statistics has problems that can be systematically solved; however, unlike many mathematics classes, almost everything in an introductory statistics class requires interpretation. In many regards, the best way that many participants described it was by saying statistics is more conceptual.

When I began taking statistics at the university, I had a little background – not as much as I needed, but a little. The introductory 600 level summer statistics course was not easy, but not terribly difficult. I was able to do decently without studying too much since I had seen probably about 65% of the material. Unfortunately, because I had a very demanding mathematics course, I was unable to focus my attention on the statistics course. I glossed over things; not studying in detail or conceptualizing.

The demands of the quarter system (which were homework, homework, homework, test, repeatedly over about a ten-week period) were taxing to say the least (and we're not talking about straight forward homework that took two or three hours for me to complete; I wished). It didn't help that I had a leaky mathematical foundation and a constant re-patching job of building a statistical structure that I should have had prior to coming to the university in conjunction with new statistics material. Professors were trying to reheat the undercooked microwave popcorn in order to get new light fluffy kernels only to be scorching what was already there, and boy did it burn baby! It felt like the professors were "throwing all this information at you very fast" (Jacqueline Interview I, November 12, 2005). So just like the volume of it and making sure you understand each specific component since everything goes on each other" (Jacqueline Interview II, December 5, 2005) *made it difficult for me who was* "just trying to stay above water" (Jacqueline Interview II, December 5, 2005).

For the next couple of years, I failed to practice what Mr. Casey taught me, "It's the little things that matter." My failure to pay attention to details created havoc on my understanding of the concepts and vice versa. I slowly began to realize, "that some of the questions…they're really getting at do you understand the concepts" (Delores

Interview I, February 9, 2006). *OK, so perhaps I'm understating this; almost ALL of the questions were getting at do you understand the concepts? Unlike some (mathematics) courses where if you see a problem, often you can apply the same formula or tactics to solve the same types of problems,* "You figure out that this wasn't a plug and chug, rote memorization class" (Delores Interview I, February 9, 2006). "If you don't give yourself time to really like understand the concepts and take some time to study 'em… then you have the next chapter that's referencing the one you took before, but you didn't stay on top of it, you're kind of like uneasy about everything" (Jerry Interview I, February 17, 2006). *I failed to* "read it pretty slowly I think; just so I could [*sic*] make sure that I didn't [*sic*] miss anything" (Jade Interview II, November 18, 2005).

My misunderstanding was not a racial, gender, or class issue. Noooo sir! There was a diverse group of others who had similar issues: (a) Whites, (b)middle-class people, (c) men, and (d)women. Statistics had no favorites if you did not understand the details, have a strong mathematical foundation, and focus on the concepts. Even though I believe many of my former teachers (underrepresented and represented) did their best to provide me with a strong mathematical foundation, many of them were not successful in shaping my mind to think more critically about complex mathematical concepts. They were unable to make me personalize mathematics in a way that demanded that I understood the intricacies of the language that many of them cherished and spoke fluently. Unfortunately it took me a while to finally realize that once you "go into it a little bit deeper, it's a lot easier to understand" (Jerry Interview I, February 17, 2006).

Underrepresented Groups have Poor Mathematical Foundations Accentuated by Modest Graph Reading Abilities at Best

"If they came from predominantly um like Hispanic or Black or other schools like that, they probably they had focuses on other places. You know? Math wasn't as strong as it should be" (Lona Interview I, February 8, 2006).

The reason why many of the participants believed statistics was challenging for underrepresented students was because of a poor educational and specifically mathematical foundation. Using the survey data, when comparing overall statistics grades, a significant difference occurred between underrepresented participants who averaged a 70 versus their represented counterparts who averaged an 80, $t(51) = 3.71$, $p = 0.00$ (one-tailed). It was also found amongst underrepresented groups that, on average, their final statistics grades increased by 6 points for every point increase in cumulative GPA, when considering whether their father attended college or not, $t(25) = 2.47$ $p = .049$ (two-tailed); however, represented participants increased by 14 points under the same conditions, $t(252) = 16.64$, $p = 0.0^{+}$ (two-tailed). These results suggest that despite similar GPAs for students whose fathers have similar educational levels, underrepresented students are expected to make approximately one letter grade below represented students.

The results also suggest that the overall statistics grade differs for underrepresented and represented students depending on the level of mathematics taken prior to taking their statistics course. It was not known at what level the students took their mathematics courses. Seven percent of the represented group's highest level of mathematics taken was Algebra I while 11.5% of underrepresented students' highest

level was Algebra I. When comparing students who took arithmetic and Algebra I, underrepresented students performed better in statistics than represented students; however as the level of mathematics increased for both groups, represented students performed substantially better. That is, when comparing underrepresented and represented students who took at least Calculus I, represented students performed substantially better than underrepresented students. (There was a race, mathematics level interaction, $t(264) = -2.41$, $p = 0.017$; two-tailed). Approximately 55.3% of represented students and 34.6% of underrepresented students have taken at least Calculus I. This is approximately a 21% difference ($p = .003$). When comparing underrepresented and represented students who had taken up to Algebra II, there did not appear to be a difference in overall statistics grade.

While discussing why he felt many underrepresented students have not performed well in mathematics and statistics, Jerry said, "I feel like a lot of it is due to the educational systems from like a foundational standpoint" (Jerry Interview I, February 17, 2006). This was a sentiment shared by Dana who agreed by saying "I think math, you have to have a very good foundation. You have to build from the ground up. Lots of practice in addition, subtraction, multiplication, division, building blocks of mathematics" (Dana Interview I, November 17, 2005). Dana believes that it is important that underrepresented students have good mathematics instructors from an early age that will provide a solid mathematical structure. "If you have a bad Algebra I teacher, you're not going to do well in Algebra II. I mean you have to have good all the way throughout"

(Dana Interview I, November 17, 2005). This was something reinforced by Jade who said, "If you don't have that core information or core knowledge, the upper level becomes more difficult" (Jade Interview II, November 18, 2005).

Excluding Raquel, who said, "I've never not understood a graph [*sic*]" (Raquel Interview II, November 2, 2006); all of the underrepresented participants claimed that their graph and/or table comprehension were modest at best; something that none of the represented groups claimed to have any problems with. Even though graph comprehension did not prove to be a significant predictor of overall statistics grade, survey data suggest that there was a difference in underrepresented and represented students' belief in their ability to understand graphs. On average using a scale of 1 – 10 where 10 represented high graph comprehension, underrepresented students averaged a 6.4 while represented students averaged a 7.18, ($t(412) = 2.65$, $p = .008$). This suggests that represented students felt more confident in their ability to understand graphs.

When asked about his abilities to read graphs, Jerry said, "Certain graphs I'm good at reading; other graphs its like, I just see bars and stuff" (Jerry Interview I, February 17, 2006). Considering that he was taking an introductory statistics class, I am guessing that Jerry was referring to a histogram or possibly a bar graph. When I first started to discover that many of the underrepresented participants' graph comprehension were suspect, I found myself being intrigued and somewhat surprised. I was surprised that so many misunderstood graphs because I personally don't ever recall having any difficulty interpreting graphs or tables.

> Graphing is my hardest part to do … (Lona Interview I, January 18, 2006). Like the graph has to be clearly written…like the axis. Then I would probably be able

> to read it, but there are times when, like the histogram, I still don't get; 'cause, it says frequency, and I don't understand what they mean by frequency (Lona Interview I, February 8, 2006).

Graphs and tables are an essential part of statistics. Typically when a statistician begins analyzing data, they begin by considering multiple graphs in order to understand how the data is distributed using tables, box plots, histograms, normal probability plots, residual plots, and scatter plots. These are just the tip of the types of graphs that may be exercised. Some use pie charts, Pareto charts, trend graphs, dot plots, stem-and-leaf plots, and more not only to begin analyzing, but to display the data after it has been analyzed. Normal distributions (bell curves), binomial distributions, t-distributions, chi-squared distributions, and cumulative frequency distributions (ogives) are all typically used in an introductory statistics course. Considering the amount of graphs used in statistics, it should come to no surprise that reading a graph should be second nature. Graphs are almost to statistics what adding is to multiplication.

Unfortunately (or I suppose fortunately) as I just mentioned, I can't truly identify with not being able to understand graphs or tables; because, I never had a problem comprehending them. I do sympathize with people who can't understand. At my undergraduate university, I can recall being in an economics class with mostly business majors. One day, the instructor showed us a graph. I can't recall if it was a supply-demand curve or what. Anyway, he asked what I thought was a simple question pertaining to the graph and I answered fairly quickly after no one else said anything. My colleague sitting next to me whispered in my ear asking, "How did you know that?" as if

I was well read or had discovered a revelation or something. Shocked by the question, I said, "It's on the graph," having a dumbfounded, somewhat arrogant, poignant response as to why this person did not see the answer as clear as day.

Over my period taking economics and accounting courses with mostly business majors, I began to discover that the prerequisite, business calculus, was not preparing them adequately for some of their business courses. Concepts like a derivative were real in name recognition only. I was constantly being left dumbfounded and unsettled for my colleagues when these concepts arose only to find out that they did not see how to solve the relatively easy mathematical problems needed to complete the economic or accounting problem. Their poor mathematical foundation was leaving them maimed in their coursework.

Examples of Social Issues Would Interest Underrepresented Statistics Students

"Does Mario deserve the death penalty [*sic*]?" the professor asked after making a hypothetical crime scene where I was the alleged murderer of one of the students in the classroom (Field notes 2/17/06). Based on the evidence, "Who believes Mario should be sentenced to die [*sic*]?" she said. Most of the students raised their hands. "Who believes Mario is innocent [*sic*]?" A few students raised their hands including myself (I didn't want to die regardless of if the evidence suggested I was guilty.). This was an introduction to hypothesis testing and using the p-value to make a conclusion.

Earlier in the lecture, there when times were the majority of the class seemed engaged in what the professor was discussing like per se a running joke about how to know if you have found your soul mate using the numbers 1.96 versus 2. The numbers

were used as critical values or approximate critical values for a 95% confidence interval. Other times the class seemed somewhat bored by the lecture. However, there definitely was a spark when the professor began discussing me as a killer. What *was* a classroom with the lone voice of the professor became an interactive lecture where students were voting on my alleged guilt, and talking about the issue of the death penalty.

The next example dealt with the racial disparities in health care. The professor gave the percent of people who could afford healthcare and minorities who struggled to pay healthcare. Jerry sat on the edge of his chair listening seemingly attentive. "Well this was like really the first time that she incorporated race into like a …any of her…like statistics that I remember. So like I mean, because it really has to do with Black Americans, I really paid a whole lot more attention to it" (Jerry Interview I, February 17, 2006). This example did not last very long, but it seemed to captivate many of the students' attentions as they looked aware and took notes. "That's something that's really important like healthcare for minorities. It's very important to me; in particularly Black people so it was pretty interesting" (Jerry Interview I, February 17, 2006), Jerry admitted while discussing the importance of having social examples in the statistics classroom.

Social issues were rarely seen in any of the statistics classrooms that I visited or the textbooks; however, many of the underrepresented participants either agreed or suggested that examples dealing with social issues would be more interesting than the examples typically given. For Lona, her interest in statistics at the college level grew from a community project involving her middle school statistics course. "I took it

because I had done statistics in eighth grade; because um my group of teachers that was teaching me, they were, they were given the task of creating a community center for the school" (Lona Interview I, February 8, 2006).

Having social issue examples was something that Raquel likewise believed she would have preferred over some of the business examples that her instructor used. "I think it would have made things more interesting. Because like right now we're learning about businesses and I'm not really interested in (a) business major" (Raquel Interview II, November 2, 2006). Mind you, Raquel was the participant who admired both her professor who helped women in Mexico and her father who helped students have opportunities outside of their impoverished lives.

If you haven't been able to tell, I enjoy talking about racial matters. Poverty, violence, justice, human rights, discrimination, and crime, are all interesting topics to me. I know what you're thinking; I probably should have become a sociologist and given up these lofty goals of doing statistics. Unfortunately, I can't remember even one of my statistics professors ever using an example regarding social issues! What I do remember is this awful tree example that continuously arose in my regression course. As if I cared about the height, width, or diameter of a bunch of trees! True, it may have been a good example that was useful for understanding many of the components of multiple regression analysis, but did it ever stimulate my mind? Not really. Did it ever show me how trees could be used to help mankind? That would be a big NO-O! Did it ever challenge my thinking? Sure, statistically, but I can imagine knowing information about the condition of the penal system would be more useful common knowledge.

Even though I only heard responses from underrepresented groups about the interest in social examples, I have reason to believe that represented groups may enjoy these types of examples as well. The reason why I say is because I introduced such topics as the death penalty, gay rights, health disparities, and more in my statistics classroom and got very good responses. One of my represented students complimented me saying, "I told my husband, that this guy really knows how to make statistics interesting. After a full day's work, not once this quarter did I go to sleep," admitting that that was a testament to my teaching ability. She was not the only represented person to give me these types of compliments as I stood both in awe and flattered.

Examples dealing with dice, marbles, and cards are good statistical teaching tools that are useful – I use them in my class and will continue to use them. However, many people don't care about dice or cards. Some don't care about a roulette wheel; a baseball player's statistics; a virus, or a random number generator. These topics, while important, often don't stimulate a healthy debate like abortion, religion, the impact of hip hop, homosexuality, or xenophobia. Social issues create dogmatic conversations. While a classroom of highly opinionated students may be scary to many teachers, it may very well increase interest, retention, and purpose of the subject matter.

Teachers who Give Multiple, Clear Examples Facilitate Statistical Understanding

"I need a teacher who goes step by step by step by step and gives you different examples, and then based on that I'm able to piece the general picture" (Delores Interview I, January 6, 2006).

Most of the participants regardless of race liked it when the teacher and/or textbook gave multiple, clear examples. The examples were useful for helping them understand the statistical concepts and giving additional insight. Many of the participants' instructors gave multiple examples; some dealing with real world issues and others dealing with the infamous flipping a coin, rolling the dice, or choosing marble experiments. Some wished their instructors gave more examples saying, "She explains things really well, I just wish(ed) she gave more examples" (Raquel Interview II, November 2, 2006). "You're going to have some students who are going to need examples over and over to get an understanding of it" (Nathan Interview I, November 8, 2005).

Not only did some students mention the need for more examples to understand the concepts, but one mentioned that the examples were necessary to decipher the meaning of the terminology. Lona, while discussing her textbook said, "Some of the definitions get me a little mixed up because they don't use examples to back up the definitions. Because they have like three definitions in a row in the book and they would not…and they mean basically the same thing to me because I don't have an example or they don't have anything to point out that this is what this means" (Lona Interview I, January 18, 2006).

For others, it was not just enough to have multiple examples, but they wanted meaningful examples where they were able to practice the concepts.

> He gives a lot of examples. Um, almost I feel like he has a little too many…. If he slowed down and did two really good examples instead of four boom, boom, boom…you know and made us practice it out ourselves in class that might be more beneficial (Jade Interview II, November 18, 2005).

Jade believed her instructor overall was good, but she seemed just a little frustrated and was giving constructive remarks about how her instructor could improve. For Dana, she wanted an instructor who would, "Give me lots of examples, makes me do tons of homework, make me regurgitate the information but with a new twist," in order "to make my own big picture" (Dana Interview I, November 1, 2005). Dana is probably the rare person who seemed to get excited about having lots of homework. It was easily seen that Dana loves knowledge. Fortunately, Nathan had an instructor that gave examples the way both Jade and Dana desired. "Like she'll give us examples to work on in groups, and then we'll come back and do it together and make sure we have the right answers. So, I mean, in my opinion, she's a very good teacher" (Nathan Interview I, November 8, 2005).

For me, one of my favorite statistics professors was the professor who mentored me through his Christmas break. Even though this professor spoke and wrote extremely fast, he gave multiple, good, concise examples. The examples were different from the examples in the text book – something I greatly appreciated – and were very detailed. To give you an idea of how many examples he gave in a typical 50 minute long class period, I once came to his class about 4 minutes late. He had already filled up the board with the proof to one example. I finally caught up with him with about 5 minutes left in the class period. My hand was extremely tired, and mind you, I'm a pretty fast writer myself. While I often struggled understanding many of his examples – partially due to my poor mathematical foundation and I would guess partially due to the speed he was going – they were all too helpful in helping me to complete my homework, and even more helpful when studying for my qualifier exam.

The statistical learning experience of all groups can be enhanced by realizing and/or focusing on a few major points. The importance of GPA as a predictor of success in statistics classrooms suggests that being well rounded students in education is important. Not only is general knowledge important, but mathematics is particularly important. Even though data suggest the achievement gap increases for students who have taken more advanced levels of mathematics, it still suggests that overall, the level of mathematics taken is an important predictor of classroom statistical performance, and in order to achieve, a mathematical, structured mind which pays close attention to detail and concepts is necessary. This is extremely important because data suggest that underrepresented students have poor mathematical foundations as perceived by represented students and supported by underrepresented students.

Fortunately, the students believed that understanding statistics was important, thus there seemed to be at least a small motivation to be interested in the class. To increase understanding and interest, they believed that it would be beneficial to give multiple, clear examples. Furthermore the data suggest that for underrepresented students, it is important that some of the examples deal with social issues and create an atmosphere where they are willing to participate in class.

Unfortunately, even though these things will help foster learning for both groups, the teacher must still recognize that some underrepresented students have unique situations that make the road tough ahead. Some of the hazards are created from historical experiences and others are created from lived experiences.

Underrepresented Groups Face an Uphill Battle to Succeed in Statistics

For underrepresented groups, there are different sets of challenges that the student brings into the statistics classroom that many represented groups do not face. One challenge may be the residual effects from lives of underrepresented students growing up in environments not conducive to learning. These groups may have not had the same types of opportunities as their represented counterparts due to lack of resources and coming from neighborhoods where illegal activity is a concern, and/or education takes a backseat to home life. Another challenge may be a lack of interest in mathematics and statistics because of lack of representation in the field.

Underrepresented Groups Lack Resources and Opportunities

> If you're from a certain area, the hood, in Cleveland you're not going to get the same kind of education that somebody who's like in the suburbs. You know what I'm saying? Because, the money is not distributed the same way (Jerry Interview I, February 17, 2006).

The quote above was a common belief from both groups, that underrepresented groups lacked the same resources that many predominantly White schools had, thus not affording them equal opportunities. "I mean if you have someone who grew up in the suburbs, they may have a higher education; because they went to a private school or something like that compared to someone who grew up in the inner city" (Nathan Interview I, November 8, 2005). Jerry explained what he felt were some of the differences that unequal funding resources afforded predominantly White schools. "Like suburban city schools, I mean…like they have so many programs on top of programs on top of programs, but like if you go into an inner city school like maybe 10 or 15 miles from that same place, you'll get places that have lack of chairs, lack of books; like the

books are outdated" (Jerry Interview I, February 17, 2006). Lona believed that because of lack of funding, some of the classes did not have the best teachers and they lacked the up-to-date equipment.

> Sometimes other classes weren't as strong as it should be either and sometimes the sup(plies)…the resources were low for other students. 'Cause like in my first year, like when I was in my elementary school, we had this computer lab, and the computers were really outdated (Lona Interview I, February 8, 2006).

Both Raquel and Dana believed because of lack of opportunities, underrepresented groups were discouraged from going into fields requiring mathematics. "I've heard that Black school systems are likely to have less money, less funding therefore worse teachers and therefore I wouldn't go into math if I had bad teachers in math or something. I'd stay far away" (Dana Interview I, November 17, 2005)! Dana in her normally expressive manner said this statement somewhat excitedly. Because of these disparities, Jacqueline believed that society needed, "to give people more opportunities" (Jacqueline Interview I, November 12, 2005).

When the surveyed students were asked what their parents' total yearly income was, results suggested a difference between underrepresented and represented groups ($p = .041$). The median income for represented groups was between $61,000 and $100,000; however, the median income for underrepresented groups was below $61,000.

As I have mentioned earlier, I came from a predominantly African American, poverty stricken city. The schools were often in need of resources. My senior year, I took my first computer programming course. The computers were pretty old and 2-3 students had to share a computer. The teacher who had been teaching the course for 20 years

decided to quit or retire prior to my senior year. That resulted in me NOT learning Basic software language from 2 or 3 seemingly rotating teachers in which none were qualified to teach. In fact for a short period, we didn't have a teacher at all.

It was common for our band to have old instruments (the cheapest of the student models seemingly) patched by the band director, and it was nothing less than walking on water when we were able to buy new band uniforms – of course, if I remember correctly, we raised the majority of the money ourselves. Almost all students had an instrument, but there were a few who didn't. Getting new cheap instruments was a luxury – not a necessity. There were no teachers available who taught string instruments except for piano (which I recognize some people refer to as a percussion instrument).

During sporting events, we sat in a crowded, somewhat poorly lit gym or a poorly kept field. The football field/stadium if you would like to call it that, had bleacher seats with two "shacks" of a concession stand. The football/track field for the local junior high schools and high schools was run down. And the baseball team played in a nearby park to the football field that I would recommend to NOT be visited after dark. Considering that our band, was able to raise considerable amounts of money that I would guess were comparable to some of the biggest school fundraisers across the nation, did not seem to get money from the school system; I can only imagine the lack of resources the athletic department received for equipment.

Furthermore, the textbooks were old, used, worn, and written in, but hey…they were free and borrowed by each student. In high school, I recall two languages being offered: French and Spanish. I believe there were a debate club and perhaps a chess club. Swimming? Definitely not. Many of the chairs were written on and some were

broken. To be honest, I am pretty certain that many of the teachers provided extra resources out of their own pockets. I didn't know of any Harvard, Yale, or MIT recruiters visiting us or sending our counselors paperwork regarding scholarships and funding. Who knows? Maybe those schools didn't offer them; maybe we didn't meet their criteria, or perhaps it was just me who wasn't informed. To be honest, from my conversations with fellow honor roll students, U of I (University of Illinois), which I believed and believe to be a wonderful university was THE university to attend if you could be accepted, but let's be frank here, it just doesn't quite have the same…um, je ne sais quoi as a Princeton now does it?

As far as the status of the predominantly White schools in the surrounding areas, I cannot attest to them since I was never afforded a tour. However, what I can attest to is that many of their basketball gymnasiums seemed to be substantially larger than ours. They appeared to be better lit with a better hardwood floor often glossed to a finish. At the time, I can recall thinking that their gym was much nicer than ours, but it was not until later that I thought about the implications of such construction and upkeep.

If they placed such money into their gymnasium, what type of money was placed into the educational facility and its people as a whole? The outside of the building often looked pretty nice. These lead me to wonder: What types of programs were offered? Did they have orchestras? Some of them had to because I would ALWAYS see White students carrying their violins, violas, cellos, and bass at the regional and statewide band events. How about a drama club? Young Republicans or Democratic groups? A newspaper or newsletter? What was the curriculum? How many computer classes were offered, and how many computers were available? Were there college preparatory courses where

students took AP Calculus? How many books did their library possess? Was Latin offered? Mandarin? Japanese? Russian? How were their students prepared for standardized tests? Were they given classes? Previous exams? Test taking tips? Did Harvard frequent or contact them regarding enrollment, scholarships, and funding? Was their educational experience different from mine, and if so, how? I just don't know!

As I just alluded, I am not totally aware of the differences between predominantly African American and White schools. What I do know is that it has been widely publicized that many predominantly White schools receive more money than predominantly underrepresented schools. This extra funding is said to be a result of our tax system. To put it simply, the more taxes the residents of a district pay; the more funding a school acquires. This seems like a pretty… good…fair formula for a capitalist society: make more, pay more, get more; however, there are a few… little bitty problems. First, we live under a government that claims it wants a "good" education for ALL American children where the latest educational trend is "no child is left behind." I suppose I would be…um, naïve to interpret "good" as equal. Second, we must put our educational experiences in context. As has already been mentioned, we began the race five laps behind. While the opportunities of intellect and resources for Whites have been prosperous under a steady rate of return comparable to those received from blue chip stocks, underrepresented people's opportunities and resources have resulted in low interest CDs slow to grow. Beyond slavery, humiliation, and conquering, we have never received anywhere near comparable to what was lost. Third, because our tax dollars are on average less; does that make them less valuable in the eyes of our government? I suppose I would become an idealist if I dare ask the question "Does our government

created to 'promote the general welfare, and secure the blessings of liberty to ourselves and our posterity' work to make lives better for the more affluent, or everyone?" with the hope of the answer being…?

Outside Lives of Underrepresented Groups May Discourage Academics

"He (father/teacher) made the students [*sic*] actually care about themselves; because they had really shitty families" (Raquel Interview I, October 29, 2006). This was the only time during our interviews that Raquel used profanity indicating to me her disgust for students' families from negative home environments that had few opportunities.

Participants from both groups believed that underrepresented groups may have a difficult time focusing on education because of disadvantageous lives beyond academics. Many come from poverty stricken environments where crime is rampant and/or some have negative influences in their lives; be it their family, friends, or people in their community. Because of these outside lives, it was believed that survival was more of a concern than education.

Fortunately for all of the underrepresented participants, they had positive role models in their lives; however, most of them had important people who could have been more influential in their academic lives.

> It's not like even if they (underrepresented groups) go to a good school then sometimes what's going on at home is like more important than learning. Like when you have parents that aren't good role models to them; they have to take care of their like younger siblings so they don't really have time to do well in school (Hetty Interview I, 2005, November 7).

While discussing his mother, Jerry mentioned, “There was a time like she really got caught up into alcoholism and that’s how the things of life…” (Jerry Interview I, January 18, 2006). Jerry seemed to stop short of saying “that’s how the things of life are,” as if this lifestyle is something that just occurs and one has to learn to live with it and adjust to it.

Asharii’s mother, the only person she truly seemed to believe was supportive, dropped out of high school and became a single mother of two children before eventually starting her own business. From Asharii’s recollection, it wasn’t until around the 6th grade that her mother had her younger sibling and “got her business off the ground” (Asharii Interview I, January 19 2006) that she began to stress the importance of education. “Now, she never was the type to help…like sit down and help with the English homework or math homework, but she kind of made sure that it got done” (Asharii Interview I, January 19 2006).

Likewise both Lona and Raquel had a difficult time dealing with the pressures of family life saying,

> So it was kind of hard for me; because, I was the oldest, and so I had to help her (mother) with things, and also we were basically a very (traditional) Hispanic family where the women took care of the house work and all these things and I resented that a little, (Lona Interview I, January 18, 2006)

appearing visibly irritated and having an attitude that said, “It was not fair” (Lona Interview I, January 18, 2006), that she had to cook, clean, and do well in school. During the same interview, she mentioned that her brothers were not required to do much other than lie on the couch and watch T.V. Meanwhile, Raquel mentioned, “I was pressured to do really well because my brothers didn’t” (Raquel Interview II, November 2, 2006).

Besides dealing with a family life that could have been better, it was widely perceived that many underrepresented groups had a challenge because of the impoverished, negative communities in which they reside in. Hetty said,

> I think it's sort of like where people are, like I think that people's environment are what affect them most. Like it seems like it's more prevalent among African Americans; like live in the less developed portion or the worst off (Hetty Interview I, November 7, 2005).

> Like in LA for example, I'd…like we'd go there all the time and you'd see that there'd be a lot of poverty, or there'd be a lot of African Americans there, and then you'd read about it; and you'd read about how the crime is so bad there; and you see that; and you're like, 'OK, well people aren't getting educated.' It's hard for them to make it to where they could; because they're living in those circumstances (Jacqueline Interview I, 2005 November 12).

This opinion was also shared by Raquel who believed that this lifestyle was a deterrent for higher education and furthermore mathematics saying, "They've been trying to survive; they haven't been trying to higher their education, they've been trying to survive! They haven't had an opportunity" (Raquel Interview II, November 2, 2006).

In the city where I grew up during the 80s, my city had been invaded by gangs who recruited like the guy in the neatly, ironed uniform and polished shoes who frequented the high school seniors and juniors saying, "Be all you can be." For such a small city, we often had one of the worse homicide rates in the country. Even though there were some definite bright spots, the city was impoverished and was overshadowed by negativity. The crime rate was ridiculously high, and many people did not trust the police.

There were more than a few times where I encountered threatening situations. One time while walking to my grandmother's house, a gang member snatched my freshly bought hamburger only not to be caught; trust me I chased him! Another time, I ended

up helping defend one of my good friends against four of the local street corner thugs who absolutely hated the band members – we believe they thought we were arrogant because of our success. Oh, and my all time favorite, while in junior high, everyday I would walk to my grandmother's house after school pass numerous gang members often carrying a white tuba (sousaphone) all while many days they tried to throw things in the bell of the instrument. I could have been brave (analogous with stupid in this case) and tried to fend them off, keeping my self-dignity and "manhood," but when dealing with gangs, you have to really consider the ramifications: (a) Can I take 'em (i.e. Can I beat them up?); (b) will I end up seriously injured or dead for that matter? (c) if I don't end up dead, what happens tomorrow when they are looking for me? (d) after answering the first three questions, how much is it really worth for me to confront them? Fortunately, I was pretty level-headed and was able to make the right choices.

Unfortunately, a few of my family members were not so level headed. Some of them joined gangs or lived the thuggish life. I hate to say, but for some of my cousins, the jail doors have been revolving. They did poorly in school and have had a difficult time keeping a legitimate job. They have stolen, sold drugs, taken drugs, illegitimately had numerous children and are most likely evading child support, shot people, shot at people, been shot, fought (including beating up the guy who stole my burger), vandalized, and yes, even murdered. I could be naïve, get on the evening news, and declare them good guys steered by the wrong people, but let's just keep it real! Even though I love them dearly and wish the best for them, they probably were doing the steering. It is an understatement to say that they have NOT been upstanding citizens! They made poor choices that will haunt them and others for the rest of their lives.

Because, I had a strong support system of positive role models, I was steered in the right direction. Like many children, I had chores, but I was not required to support the family. I was not required to take care of my siblings. I was disciplined, but not abused. And for the most part, I didn't feel like I was going to get shot, beat up, or killed. Don't ask me why these morbid, violent thoughts did not cross my mind very often. Who knows, maybe I just became numb to some of my surroundings; because, the opportunity for the thoughts certainly existed! It probably helped that I was not allowed to hang out with the thugs, and I was always encouraged to participate in extra curricular activities which took up a lot of my time and energy. From my experience, I have to say, it takes a VERY strong support system to successfully maneuver out of a trough. For some, the practicality of street knowledge supersedes the theory of book knowledge!

Underrepresented Groups Lack an Interest in Mathematics/Statistics and Thus Tend Not to Enter Mathematical Science Careers

"I think there is just a lack of interest in mathematics. I know me myself, I don't like math at all" (Jerry Interview I, February 17, 2006). Jerry said this with one of his typical snickers as if it were up to him, he would not take another mathematics course in his life.

Both groups believed that it was important for underrepresented groups to have an interest in mathematics and statistics, but felt that there were primarily two reasons why

there was a lack of interest. First, most of the underrepresented participants felt that the mathematical experience had not been kind to underrepresented groups. Second, most of the represented participants felt that there was a lack of representation.

Experientially speaking, many felt that there was a good reason why underrepresented groups lacked interest in the subjects. "I think minorities are discouraged from excelling in math" (Delores Interview I, February 9, 2006), due to discrimination. As Delores continued to talk, it sounded as if she was also saying that underrepresented groups lacked interest in mathematics and statistics because there was a lack of representation. This attitude of now being cultivated was something also discussed by Lona. Lona believed that the interest needed to be stimulated during underrepresented group's early years, "because if they lose interest in like math at a young age, they probably won't want to lower it in any more by the time they're adults" (Lona Interview II). I believe Lona was meaning that if underrepresented groups lost interest in mathematics at an early age and performed poorly, they would become adults and continue to lack an interest.

On the other hand, Raquel approached the issue from a historical perspective responding by saying the lack of interest is, "because they're not really focused on that. Like that's not their…but like its just historical background…with their historical background like um that wasn't their main focus" (Raquel Interview II, November 2, 2006). During earlier conversations, she recognized that many underrepresented people from other countries did advanced mathematics. However she also mentioned that many represented people destroyed this advanced mathematics knowledge.

Similar to the allusion that I believe Delores was making, many of the represented participants believed that underrepresented groups were disproportionately represented in the mathematical careers. There seemed to be a perception that underrepresented people do not enter mathematical careers. "Yeah to be honest, I didn't know that you'd be African American. You didn't sound like it" (Akira Interview II, November 17, 2005)! Akira blurted out before quickly recognizing her blunt, un-politically correct comments and becoming embarrassed by her response to my statement, "When I think of a statistician, I don't think of an African American." I will assume that she believed I was White. Perhaps my Southern sounding twang that people have claimed I have threw her off.

Both Jade and Nathan shared Akira's beliefs.

> I guess they just perceive it as a field that's not so exciting. I guess. I don't know... (Nathan Interview II, November 21, 2005). It's made up of representative…. Minorities may not… (Nathan Interview I, November 8, 2005). I guess maybe they perceive that as a field or career that's um….might not be geared toward their culture (Nathan Interview II, November 21, 2005).

"Even famous African Americans are either musicians or athletes. Um aren't typically very much in um that role that wasn't expected of themselves and I think it also goes with their education" (Jade Interview II, November 18, 2005).

"When I think of a statistician, I don't think of an African American," anymore than many of us typically think of a princess as being an African descent or Latino. Why? Because once again, our imagery has been violated by the likes of primarily beautiful White princesses on our television screens, books, magazines, and computers.

Such princesses as: Sleeping Beauty, Snow White, Cinderella, Princess Barbie, Princess Diana, and what some have called the "Princess of America," Jacqueline Kennedy Onassis.

Considering that I've always liked history, it should come to no surprise that I was fascinated at the geniuses in my mathematics text books. I enjoyed reading little historical, autobiographical blurbs. All of them did some great things! Some were graduating with their doctorates before the age of 20. Some discovered the solutions to century old questions. Unfortunately, ALL of them were of male, European descent! Even though I am aware of some underrepresented people who have had some amazing accomplishments in the mathematical sciences, none had the privilege of gracing any of the pictures in my numerous mathematics and statistics textbooks; not one!

How can we expect underrepresented groups to be interested in mathematical careers if there is no one who looks like them? Perhaps I'm wrong, but I doubt that most of us want to break the color barrier; be the first Jackie Robinsons. Who all wants to volunteer to go into an area where they will be faced with fears of discrimination? Fears of being questioned about their intelligence? Fears of people questioning whether affirmative action was responsible for their position? Fears of being isolated? Fears of being ridiculed? Fears of being in an unwanted foreign land? Fears of being backstabbed? Fears of racism? If these fears sound appealing and you are an underrepresented person, raise your hand, fill out the paperwork to a good university, graduate, and get a job; we need you! I am not saying that these fears will necessarily become a reality, but for many, fear has always been an insurmountable deterrent of action!

Many underrepresented students may have a difficult time coming prepared for an introductory statistics class. Because some have come from disadvantaged homes, some did not have the proper opportunities and resources, and there are few representatives of their group in the discipline, interest is lacking.

This chapter has discussed how statistics may be taught more conducive to underrepresented students and represented students when both the teacher and student have the proper frame of mind. It may be challenging to reach everyone, but our chances are greater when we understand the significance of culture and race in education, have key skills and characteristics as teachers, focus on both overall education and mathematics specifically while encouraging the students to conceptualize and participate, and acknowledge many underrepresented students' challenges through their historical and lived experiences.

The final chapter will explore the implications of these results on pedagogy and research. It will discuss how the research may be used to affect the decisions that the students, instructors, administrators, colleges, and universities must make in order to help underrepresented groups be successful in statistics. Finally, limitations of the study and future research possibilities will be discussed.

CHAPTER 7

CONCLUSION: EASING THE BURDENS OF RACE IN INTRODUCTORY STATISTICS COURSES

The final chapter will summarize the present research; this dissertation contributes to many areas such as education, mathematics education, statistics education, sociology of race relations, and higher education. To summarize these contributions, I will discuss four salient themes: (a) How race can be a burden on the academic performance of underrepresented students, (b) how positive support networks help underrepresented students achieve academically, (c) students' perception of the qualities of effective teachers, and (d) important influences on student success in introductory statistics courses. While the focus of this study was underrepresented students, important data were collected on represented students for comparison which has helped understand similarities and differences in the experiences and perceptions of the two groups.

This chapter, extends my interpretations of the data, summarizes the findings, discusses implications of the study, and offers suggestions that I believe will help the underrepresented student perform better academically in introductory statistics classes. Finally it takes up limitations of the study as well as directions for future research.

The Burdens of Race Creates Mistrust and Academic Difficulties for Underrepresented Groups

In this section I will summarize and further interpret some of the many burdens that many underrepresented groups face in life and school. Afterwards I will suggest recommendations that universities and teachers, as well as society at-large can do to ease these burdens.

As mentioned in chapter 5, it was not surprising that all of the participants believed that racism existed in our society; however, it was somewhat surprising how few people were able to name any specific incidents, experiences, or observations that demonstrated its existence. In the previous chapters, I discussed how racism is still existent. Just as we believe wounds are healing, a Don Imus incident rehashes the initial painful experience causing not just agony to the underrepresented player, but his or her teammates of society.

In chapter 5, I further went on to express my views on how some underrepresented people sometimes allow the existence of racism to guide their lives in ways non-conducive to their success; while some represented people fail to understand why underrepresented people will not let slavery go, and fail to understand how (even though this generation did not enslave underrepresented people) they have and are benefiting from its deplorable existence. It is unfortunate, but the effects of slavery have been branded on our society.

The Burden of Societal Racism Perceptions on Underrepresented Students

One of the effects of slavery as Steele (1992) and Allen (1988) suggest is the attribution of negative stereotypes toward underrepresented groups. This research supports the notion that stereotypes have been used to diminish underrepresented populations' status as qualified, competent individuals (Hurtado & Carter, 1996), and uplift represented populations as competent knowledge givers. Similar to the participants in Jones' (2002) and Ogbu and Simmons'(J. U. Ogbu, 1990; J. U. Ogbu & Simons, 1998) studies, many of the underrepresented students expressed views that society and teachers have lowered expectations of underrepresented groups. Due to these lowered expectations they believed that teachers often fail to challenge underrepresented students in the same ways that they challenge the represented students. This research supports the this pattern, and furthermore shows how such lowered expectations cause many underrepresented students to become discouraged, angry, and/or mistrust the teacher suggested by Ogbu and Simons.

Because of these negative perceptions of capabilities, data in this study suggests that underrepresented students enter the college classroom with an extra burden suggested by Terenzini (1992) – not common to represented students – having their capabilities judged by the color of their skin. It is a serious issue that I believe affects different underrepresented people in different ways.

On one extreme, I believe it motivates some to strive harder to succeed; having a chip on their shoulder that says, "I can do it, and do it better than you (represented people)!" While striving hard is honorable, this "proving I'm not dumb" attitude can

place the person in competition with every represented person they come into contact and thus may be misconstrued as negative if not controlled. For example, when asking about the burden of being an underrepresented student in class, Jerry said, "In some classes like I know that that pressure really helped me to get… like the grades that I really got out of that class" (Jerry Interview I, January 18, 2006).

On the other extreme, I believe, it keeps some underrepresented students from maximizing their potential. They may have feelings that they will never be able to achieve what a represented student is capable of achieving (J. U. Ogbu, 1990; J. U. Ogbu & Simons, 1998). Within responding to one question, Jerry illustrated both extremities. Following his quote in the previous paragraph, he said, "…but at the same time especially like for math classes; I really felt that I had to work at such a high level that sometimes it's like really…I don't know if it was subconscious or what, but it just really just like negatively impacted my final grades" Jerry Interview I, January 18, 2006). For both types of responses, the challenge becomes responding to failure; when things don't go as well as expected; it can simply make them give up; quit school, or change majors.

In my personal experience, coming to a White university, after attending predominantly African American schools all of my life was a huge adjustment. It was the first time that I questioned my abilities because of my race. I was typically a pretty big fish in a small pond, but here, I was a small fish in a big pond with no fish like myself. Fortunately for me, I brought many weapons: (a) spirituality in my Lord, (b) confidence in my abilities, (c) support from family and friends, experiences that proved my intelligence, and (d) an academic work ethic that would not be surpassed by any!

Fortunately my weapons were far stronger than my self doubt. Even though Self Doubt visited me frequently, he was always attacked with my weapons until eventually being vanquished. Unfortunately, all underrepresented groups do not possess these weapons.

The Burden of Coming from Disadvantaged Backgrounds

Another research finding and effect of history that attributes to some underrepresented students' burden is coming from backgrounds unfavorable to a learning environment that may lack resources and opportunities that would stimulate success (Ladson-Billings, 1998). As the data suggest, many underrepresented students come from impoverished communities where there is illegal activity in the neighborhood. The data also suggest, that many underrepresented students come from homes in which they are required to be parental figures with the responsibilities of looking after younger siblings, cooking, cleaning, etc…. Thus, school was not the first priority in their lives.

Furthermore, this research supports ideas by Ladson-Billings (Ladson-Billings, 1998) and Ogbu & Simons (1998) who suggest many underrepresented minorities do not believe that property taxes is a fair and just way to disseminate money for education. With this method, the rich will get richer, and the poor get poorer. Many of the underrepresented students in this research agreed that racism is at the root of this system of injustice (Ladson-Billings, 1998),

It is my belief that learning to study and achieve in school requires years of training and sound study habits (Honora, 2003) . If a person has constantly been interrupted in their study by a difficult disadvantaged background suggested by Ladson-Billing and Tate (1995), I would not expect them to have the same mental focus on

studying as a person who came from an environment otherwise. Furthermore, it is unrealistic to believe that the average underrepresented person who has come from a school with limited opportunities and resources will be able to maximize their learning potential when they do not receive the best tutoring, specialized tests preparation, the latest software with a sufficient number of computers for each student, updated textbooks, the best teachers that demand the best salaries, etc….

When one considers the burdens of society and disadvantaged backgrounds, it should be no surprise why some underrepresented students believe at face value that White students are taught better. It's an idea that many of the participants in this study did not mention explicitly. Even though they hinted this idea was true, I believe what they were really trying to say was many (White?) teachers hold White students in higher regard than they do any other race. I believe they were saying that these teachers have higher expectations for the White students, place more pressure on them to succeed, and challenges them in ways that will prepare them for success. These teachers teach in a manner more conducive to a culture more prevalent amongst Whites. Furthermore, several underrepresented participants suggested that (White?) teachers take teaching Whites more seriously because they will be held accountable by authoritative figures for failing to teach the White student properly.

I can not definitively say why many of the underrepresented participants said the White student is taught better; I can only offer my opinion. Personally, I believe a suggestion like this comes from years of seeing and hearing negative stereotypes and results suggesting underrepresented groups are academically handicapped in comparison to their represented counterparts.

Because I believe many underrepresented students do not think we are incapable of learning as well as represented students, I believe we search for other explanations. It is my opinion that the most convenient person at fault is the teacher.

Because of historically poor academic showings, the achievement gap, racial disparities, and racial injustices, I believe many underrepresented people have learned that (White) society has not had our best interests at heart. Thus as Ogbu (1998) suggests there is a lack of trust for teachers, administrators, and educational institutions which I would suggest causes underrepresented students to believe that teachers teach Whites better.

Recommendations for Easing the Burdens of Race on the Mistrust and Academics of Underrepresented Groups

As a society we must remove the cataracts of institutionalized racism, and continue to build race relations by socializing together. It is not acceptable to pretend that racism is a long distance call when it is local! In my personal opinion, the injuries of racism can only be cured by having the surgery of love, the counseling of wisdom, the medicine of cultural understanding, and the rehabbing of perseverance; otherwise, it will never heal. When racist acts occur, we must refuse to hate the violators and those whom "look" like them; because hate only begets hate as insinuated by Delgado (1995) as love begets….

As far as what we can do to help ease the burden in the classroom, we must be conscious of our mental frame of mind when we have underrepresented students – especially if the teacher is White. As suggested by the data, because many

underrepresented students come with this burden of race, it is easy for them to perceive the teacher as having low expectations (L. Jones, 2002), being prejudiced, unlikable, discriminating, insulting, and lacking of their best interest. Because of these perceptions Ogbu and Simons (1998) suggest for White teachers of underrepresented students, trust should be the number one priority; an interpretation of this research that suggest to be true. In my opinion, actions speak louder than race. This means by demonstrating that you are not a racist, people will "forget" your race.

As another suggestion, considering the importance of culture and teachers as role models, I concur with Martin (2006) who suggests that teachers need to become more culturally competent. It is just not enough to take a few diversity classes as I have mentioned elsewhere, but to truly become culturally competent, a teacher must delve into the culture; actually making friends of the people; a suggestion in agreement with Tatum who suggests that lack of cultural competence is a result of not being involved with other cultures. By understanding the culture of a student, Freeman (1999) suggests that the teacher will be able to form a relationship which will help underrepresented students begin to trust the teacher.

In order to ease the burden of race this research agrees with Martin (2006) that underrepresented people (African Americans to be specific) are lacking teachers who understand the students' background sufficiently to teach them well which needs to be corrected. This is not to say, that a teacher should bend over backwards to help an underrepresented student understand that they view all students the same, but ensure that you are challenging everyone equally (Becker & Luthar, 2002); you are giving everyone

the same types of questions, attention, and assistance. Make sure you are talking to underrepresented students intelligently not using really elementary words, talking extremely slow, constantly repeating yourself, and raising the volume of your voice as if they can't hear. If you don't heed these ideas mentioned in this paragraph, you may find yourself quickly being perceived as racist, prejudiced, and/or discriminatory.

Because the burden of race is so overwhelming, and many underrepresented students don't come with the same weapons that I possess (spirituality, confidence, support, experience, and work ethics), I believe it is important for universities to work vigorously to promote organizations that provide support and peer groups of underrepresented people (Chiang et al, 2003; Rodriguez et al) who have succeeded in college settings and are familiar with their burdens. I believe these organizations should have counselors who can work on self-esteem, confidence, study habits, and work ethics.

Given the importance of my own faith as a source of strength, I believe there must be wide accessibility to religion. I recognize that promoting religion may present difficulties, but considering the importance of religion in many underrepresented students' lives as a source of inspiration, support, hope, faith, discipline, and accountability, there needs to be a way of quickly promoting available churches to those who are accustomed to going to church upon initial arrival to the university. Martin (2006) suggests the need for understanding of not only culture and ability in the mathematics education of underrepresented students, but beliefs as well.

Lastly, for easing the burden of race, the idea of underrepresented students perceiving (White?) teachers as better teachers of White students is an important finding.

As I mentioned earlier, I believe the teachers' and university's cultural competence is important in helping underrepresented students (or any student for that matter) perform.

In the previous chapters, I suggested that I believe many teachers teach in a way that is conducive to a culture more prominent amongst Whites. The implications of this statement coupled with the generalized cultural expressiveness of African Americans and Whites suggest that perhaps a better way to teach African Americans may be through being more expressive with body language, telling more stories that illustrate the concepts, and using practical examples. However, when teaching Whites, perhaps teachers should focus on articulation, concise language and less expressive body language. As I mentioned in previous chapters and this paragraph, this is a generalization and is in no way a prescription for all people in any race; however, it does provide insight as to possible teaching strategies.

This is not to suggest that a represented person should attempt to speak or act like an underrepresented person or vice versa. It is my opinion that the teacher should be genuine in their expressiveness. When in doubt, speak to the culture, not the race. This means an instructor should not try to "act or speak Black," "White," "Asian," or "Latino," but they should genuinely try to relate to the students of that culture. Putting on an act will come across as disingenuous and insulting.

In order to ease the burden of race it will take a lot of effort. I believe by recognizing the burdens, adjusting our behavior when necessary, and having influential, important, positive people around us guiding us in our concerted effort, we can greatly diminish these burdens.

Positive Support Networks Help Underrepresented Students Achieve Academically

In this research, the data suggest that both underrepresented and represented students are encouraged and motivated by having positive support networks. These networks have been fathers, mothers, other family members, role models, and friends. Even though these support groups were important for both groups, the data suggested that there were some key differences.

The Differences in Underrepresented Students' Role Models

First the study revealed that for underrepresented students, having a father who graduated from college was an important indicator of how the student would perform in an introductory statistics course. Underrepresented students who knew their father went to college were expected to have an overall statistics grade nine points higher than those underrepresented students whose father's educational level was unknown. One interpretation of this finding is fathers who did not attend college or whose educational level was unknown did not place much emphasis on education. Considering the high percentage of underrepresented students who come from mostly single mother homes as reflected by Battle and Scott (Battle & Scott, 2000), another interpretation of this finding is that the father has not been in the home and/or has not played a role in raising the student. One of the major finding of Whitmore (1999) that support the importance of the father is there was a positive correlation between grades and relationships with biological fathers.

Second, the types of role models that underrepresented students had were different from represented students. For underrepresented students, they celebrated role models

who helped a community of people. It seemed to be a common theme that a role model was a person who contributed their time to a cause greater than themselves which supported research by Ogbu and Simons (J. U. Ogbu & Simons, 1998). For some underrepresented students, this role model was a teacher who helped people outside of the classroom, and for others, it was a teacher who stayed in an inner-city school to help his or her people; however, represented students were in stark contrast; not mentioning teachers as role models.

Personally, I believe the reason underrepresented students choose role models who help the community is because we are looking for positive figures in our lives. Ogbu and Simons (J. U. Ogbu & Simons, 1998) described role models as sources of motivation for underrepresented students. From the data, I believe we want people who have achieved amidst the negative stereotypes. Not only do we want people who have achieved, but it's even more important that these role models become Harriet Tubman's leading our people to opportunities otherwise not typically seen or afforded as suggested by Ogbu and Simons (J. U. Ogbu & Simons, 1998).

As far as the represented students' (or perhaps group in general's) role models are concerned, I cannot say definitively why they were not similar to the underrepresented participants; perhaps they don't see themselves as a victim of societal deformation. Perhaps the reason is as Woodson (2000) insinuates they are not lacking in opportunities; they see many of their people being successful. Perhaps they have internalized that education is the predictor of success; thus, as long as they study hard and get a good education, success lies ahead of them. In a nutshell, the burden of race is not a reality.

Revisiting the second type of underrepresented role model, the teacher; I believe the reason why many underrepresented students view them as role models is because: (a) Many of us are taught to view the teacher as an authoritative figure which deserves and demands respect; (b) for some of us (especially those who come from educationally disadvantageous homes), the teacher is the one person we come in contact with who is nurturing and motivating (Honora, 2003); and (d) the teacher is the one professional who has been to college and become successful in our eyes. Thus they represent a reality that some of us have not seen within our own family, friends, and community (L. Jones, 2002), and, (e) these teachers are culturally competent and provide an understanding and relationship with the student based on mutual respect and admiration.

Finally, another difference was that all of the underrepresented students excluding Delores had at least one family member who was unsupportive of their education. This was an unfortunate finding. In the midst of the burdens that many have to endure, it is no justification for having to fend off unsupportive family members.

Recommendations for Implementing Positive Support Networks for Underrepresented Students

Once again, these findings suggest the importance of ensuring that underrepresented students have a network of support (Feenstra et al., 2001). I am not in favor of telling parents' every detail of the students' lives; because, I believe one of the best experiences that one can take away from the college experience is learning to be independent. I am in favor however of encouraging parents to take a more active role in counseling their children on how to succeed in college. I believe a support group of

underrepresented parents supported by university appointed advisors who recognizes how to help students succeed would be welcomed. This suggestion is consistent with Schneider and Wards (2003) who suggests many underrepresented students rely on family. I believe by forming such a group, many of the parents would have a forum to express concerns and receive guidance about their child(ren). Furthermore, I believe a positive outcome of such an initiative may be that parents may hear pertinent information about their child through other parents. Thus, even though I don't recommend the parents confront their child on information given confidentially by another parent (unless it is information of significant magnitude), the parent may use the information to discretely guide their child in the proper way.

With these things in mind, it is extremely important to have teachers of the same race in the field of study. While I do not believe a teacher's race should matter, data from the study and literature suggest having a teacher of the same race provides inspiration, motivation, pride, and hope for the future success of underrepresented students. Moody (Moody, 2004) agrees with this point, saying that African American role models are relevant to molding young African Americans. Unfortunately Neil (Neil, 1997) reveals that Whites are the majority in teaching careers. Based on this statement, I can imagine the number of African American teachers at all levels is not proportionate to their aggregated population.

Within the classroom, I believe it is important to encourage students to work together both in and outside of class. These groups should not contain merely underrepresented students, but be diverse. However, it should be encouraged that the students work with people they feel comfortable with.

I can't speak for every teacher's experience, but in the classes that I've taught, often the underrepresented students migrate to the other underrepresented students as the Whites migrate to the Whites – I have not had any Asians in my class. I want everyone to feel comfortable with their group; however the problem has been that the two groups have not worked together very well. This is not to say that these groups can't work together; it's just stating the facts of my experience. From speaking to both underrepresented and White students – and mind you, this has not been a big sample – Whites believe underrepresented groups clam up in the group unless the group contains other underrepresented students and underrepresented students feel that Whites become "know it alls," and do not value their opinion. Thus there seems to be a constant struggle for who is knowledgeable.

Finally, I believe it is important for universities to continuously recruit high sought after underrepresented students. I believe it would be beneficial to encourage successful underrepresented students to be mentors/tutors for incoming underrepresented students. Once there is a strong nucleus of underrepresented students who are succeeding in the course and mentoring, I believe understanding for many more will follow because excellence is contagious!

Relieving the burden is a continuous job. One additional way of relieving the burden is by ensuring that underrepresented students receive a quality education. In order to receive quality education, there must be quality teachers. The next section will summarize important students' perspectives on the qualities of effective teachers in education in general as well as statistics, and the implications for the classroom.

Students' Perceptions of the Qualities of Effective Teachers

To learn any subject it helps to have a quality teacher who fosters learning. One of the qualities of an effective teacher that both groups agreed on was the importance of having a teacher who could communicate well. This communication went well beyond the classroom, but into formed relationships based on respect, trust, and understanding.

Because of the importance of teacher communication, as a recommendation, it is important that teachers practice their communication through listening. It is my belief that the teacher should allow the students to interact in cooperative group, listen, and learn. In my personal experience, I have seen where the students were sometimes able to simplify things better than I.

Another quality that both groups liked in an effective teacher was the teacher's intrinsic motivation to educate and their ability to motivate the students. Considering that many underrepresented students lack interest in mathematics and statistics and thus tend not to enter mathematical careers, I believe teacher motivation is even more important. Since it appears that many underrepresented students recognize the importance of statistics, teachers should try and motivate their students by building on its practicality and showing the realm of high paying jobs that are available in the field.

Similar to the finding of Becker and Luthar (2002) this study also found that caring is an important quality of an effective teacher. The researchers suggest that a caring instructor is motivating. Furthermore their research suggests and is agreed on by the current research that caring teachers encourage committed learners. Even though caring was important for represented students, it was found that caring was more important for underrepresented students.

In summary many of the students found effective qualities of a teacher to be communication, motivating, and caring. In the final section regarding easing the burden of race in an introductory statistics classroom, I will address some of the important influences on being successful in introductory statistics courses for underrepresented students. Many of these findings were also relevant for represented students.

Predictors of and Influences on Success in Introductory Statistics Courses

The current research found that there are several major influences on underrepresented students being successful in learning statistics. Some of these influences include GPA, influencing the students to participate, giving multiple, interesting, social examples, and having a strong mathematics foundation and mind that pays attention to concepts and details.

One of the main influences of how successful an underrepresented (and represented) student can be, suggested by Hinson, Spradlin, and Welsh (2000) and supported by this research is GPA where the researcher studied 8th and 11th graders. This finding is also consistent with Kuennen (2006) who found GPA to be the strongest predictor of statistics performance; however, unlike Kuennen, this research did not find ACT science reasoning to be the best predictor variable in the presence of many of the other available variables. The importance of GPA suggests that beyond many of the other influences of being successful, having a good understanding of general education is important to introductory statistics performance.

During participant observations in statistics one of the main findings was underrepresented students (or represented students for that matter) did not speak very

much in lecture or lab. While a few of the lecturers attempted to have students interact, many made only feeble attempts; asking a question and waiting probably two seconds with no response before continuing lecture. On the other hand, some of the TAs attempted to have the students interact with success, while others failed fairly miserably. This research supports the ideas of Powell-Mikle (2003) who suggest encouraging students to feel comfortable in interacting to maximize learning, it is important that the teacher promotes student interaction by assigning group work, posing questions, having wait time in between the questions, and keeping the student interested in the topic.

From my experience this research and existing literature and research (Lesser, 2007) suggest that social examples provide powerful, interesting examples for many underrepresented (and I believe represented) students. Typically, on the first day of teaching an introductory statistics class, I introduce multiple examples of statistics dealing with, disabled workers, the high rate of HIV among African Americans, and xenophobia that arouse healthy debate.

In the very first example in chapter 1, I provide a statistic saying that approximately 50% of the surveyed believe Muslim Americans' rights should be curtailed. The class discussion always turns into an interactive classroom where unfortunately I tend to have to cut the conversation off because of time constraints, but this is a wonderful introduction into understanding what a population, sample, parameter, and statistic is. Furthermore, through classroom discussion, many people begin to realize that intuitively they understand what bias means as well as why it is so important to clearly say what the population of a study is; why having a large enough sample size is

important, etc…. This example typically leads the students to understand why the methodology of a study is so important – even though, this is additional information not stressed in their books.

Next, as a recommendation, considering that the data suggest many underrepresented students lack interest in mathematics and have the burden of having a poor mathematical foundation, we must stress the importance of paying attention to details. Even though much of an introductory statistics course has the feeling of one huge word problem, it should be considered a mathematical science; huge on the underlying foundation of mathematics and huge on the scientific reasoning required to test hypotheses and describe the data. To be successful in statistics, one must reason deductively as a mathematician, and inductively as a scientist. Thus, conceptualizing the problems into mathematical formulations is a requirement as suggested by Garfield and Ahlgren (1988).

Furthermore in this study it was found that many underrepresented students did not feel comfortable in their ability to understand graphs. Considering the massive use of graphs in statistics, it is important that underrepresented students feel comfortable understanding them. Even though understanding graphs is a prerequisite for most (if not all) introductory statistics courses, it may be a good course of action to test the students' ability to understand graphs.

As one last short anecdote, this quarter while writing up my findings for this research, I soon discovered that many underrepresented students did not feel very confident with their graph comprehension. Because of this finding, in my own teaching, I decided to make sure to explain in detail how to read a histogram. I began to discuss

what the x-axis and y-axis meant. Feeling elementary, I used my finger to trace the x-axis saying, “You follow the x-axis until,” getting to the desired value and then trace parallel to the y-axis until the graph reaches its height. Continuing, I told the class what all of this meant. After doing this on other examples, one of my outspoken, forty-plus year-old underrepresented students said with thrill, “Hmm, all these years, I never understood that.” I was both excited that a light bulb went on, and amazed yet once again that this finding was so relevant. I can’t imagine ever assuming everyone understands how to read graphs again in my life.

To succeed in statistics, there are many influences that help determine performance. It is important to have a good GPA, participate in class, have interesting examples in which some deal with social issues, and consider the burdens that many underrepresented student have pertaining to poor mathematics preparation. Finally, the data suggest that it important to recognize how well underrepresented students understand graphs.

Limitations of the Study

This study had it share of limitations. First, while I tried to recruit an equal distribution of men and women across race for the qualitative component of the study, recruitment proved to be challenging. I was unable to successfully achieve my goal over a two quarter data collection period. Thus the voice of the men is not as prevalent as I would have desired. Associated with that comment, I was unable to recruit more underrepresented participants for the qualitative study; while recruiting White represented students proved to be relatively easy. All of the underrepresented students except for one was enrolled in the Statistics 145 course, and all of the represented

students were enrolled in the Statistics 135 course. I was unsuccessful in recruiting any Latino or Asian men, so results possibly would vary if I was able to include those two populations.

Second, I was unable to conduct as much participant observation as I would have liked – especially for the represented students, because often participants did not go to class along with I sometimes had a conflicting work schedule. I failed to observe the problem solving session for the Statistics 135 section that may have been beneficial in understanding the pedagogical theory(s) involved in fostering learning.

Third, for the quantitative data, a limitation is this is an observational study and I did not randomly choose the participants. Thus, as I mentioned earlier, I cannot interpret any of the quantitative results as cause-and-affect. However, they do provide insight into the phenomenon at hand and are indicators of possible factors that need further research under more controlled environments. Furthermore, multiple regression models controlling for possible confounders strengthens the findings in this research.

Last, while analyzing the quantitative data, I used an ordinal variable to measure the level of mathematics that a statistics student had taken prior to taking their elementary class. When ranking the variable in such a way, the regression model assumes that each level of the variable is equal and mathematical operations are meaningful. Thus the model assumes that a student who had four math courses had twice as many math courses as a student who had two math courses. While this is true, about the count, the underlined assumption is that a person who has four mathematics courses has twice as much mathematical knowledge as a person who has two mathematical courses.

While I recognize this as a limitation, I feel justified in using this method since there is existing literature that has used similar methods; the mathematics ranking is based on a typical sequence of mathematics enrollment; and while the entire data set did not include the ACT, mathematical scores separating algebra, geometry, etc… since all students did not take the ACT, analysis of these variables showed no indication of being significant.

Future Research Interests

Directions for future research: (a) Understanding the importance of understanding graphs for underrepresented students in an introductory statistics class, (b) what motivates interaction and social learning in an introductory statistics classroom, and (c) the significance of mathematical competency on underrepresented students learning statistics, (d) the types of examples that are most interesting and effective.

This research has provided valuable contributions to the literature in general education, mathematics education, statistics education, and higher education. If we are to continue to help underrepresented students achieve in statistics, we must be conscious of the burdens involved in teaching underrepresented college students at a predominantly White university.

APPENDIX A

QUANTITATIVE QUESTIONNAIRE

Thank you for giving your attention to this questionnaire. Upon completing the questionnaire, you will be automatically entered in a drawing that will award ten participants a prize of $10. For those participating in a second, more detailed but minimal study, free tutoring will be offered and, they will be entered in a drawing to win one of three $50 prizes (See details below question 14 of the questionnaire). This questionnaire should take approximately 3 – 5 minutes to complete.

Information obtained will be strictly used for the purpose of research. By completing this questionnaire, you are giving the researcher consent to use your information for research purposes only. This information includes your completed questionnaire and data limited to your age, high school GPA, college GPA, ACT score, SAT score, race, gender, and Statistics 135 grades via the university's data warehouse.

All information given or accessed is confidential. Only the researcher(s) will be aware of the participants (i.e. No one including the Statistics 135 Coordinator, lecturers, teachers' associates, or fellow students will be informed of your participation.) Completing or failing to complete this questionnaire has absolutely no bearing on your grade.

Purpose

The purpose of this study is threefold: (a) To explore, describe, and determine the influential factors that are involved in the success and failure of underrepresented minority students in an elementary college level probability and statistics course, (b) To be used as a catalyst in developing an awareness of careers that use probability and statistics amongst underrepresented minority students (c) To assist education professionals' teaching methods when instructing underrepresented minority students.

1. What is your gender?
    a. Male b. Female

2. What is your race?
    a. White b. African American c. Hispanic/Latino d. Asian e. Native American/American Indian f. Other

3. Which of the following groups includes your parents' total annual income?
    a. Below $30,000 b. $30,000 – $60,000 c. $61,000 - $100,000

    d. $101,000 - $150,000 e. $151,000 - $200,000 g. Above $200,000

4. Highest educational attainment of father (male guardian).
    a. High School b. Associate Degree c. Bachelor's Degree

    d. Master's Degree e. Ph.D. f. Did not graduate from High School

5. Highest educational attainment of mother (female guardian).
    a. High School b. Associate Degree c. Bachelor's Degree

    d. Master's Degree e. Ph.D. f. Did not graduate from High School

6. Do you currently have a job?
    a. Yes b. No

7. What is the highest level mathematics course that you have completed?
    a. Arithmetic b. Algebra I c. Trigonometry/Geometry d. Algebra II

    e. Calculus I f. Calculus II g. Beyond two terms of Calculus

8. Circle the statement that is most true.
    a. I am a slow reader.
    b. I am a below average reader.
    c. I am an average reader.
    d. I am a quick reader.

9. Upon entering Statistics 135, what grade did you expect?
    a. A, A- b. B+, B, B- c. C+, C, C- d. D+, D, D- e. E

10. On a scale of 1 – 10, rate your initial anxiety in taking Statistics 135, where 1 indicates little anxiety and 10 indicates great anxiety.

1 2 3 4 5 6 7 8 9 10

11. On a scale of 1 – 10, rate how comfortable you feel in comprehending graphs and tables, where 1 indicates little comprehension and 10 indicates excellent comprehension.

1 2 3 4 5 6 7 8 9 10

Often times when talking to students, they have made comments such as, "My teacher is very caring," "He/she really wants me to learn," "The instructor gave feedback," or "My teacher was very patient." We are considering how important it is that an instructor gives feedback, patience, and caring to you as a learner. With these things in mind, answer questions 12 – 14.

12. On a scale of 1 – 10, rate the importance to you of the receiving feedback from the instructor, where 1 indicates not very important and 10 indicates very important.

1 2 3 4 5 6 7 8 9 10

13. On a scale of 1 – 10, rate the importance to you of having a patient instructor, where 1 indicates not very important and 10 indicates very important.

1 2 3 4 5 6 7 8 9 10

14. On a scale of 1 – 10, rate the importance to you of having a caring instructor, where 1 indicates not very important and 10 indicates very important.

1 2 3 4 5 6 7 8 9 10

As expressed in the opening paragraph, a more detailed study with a drawing of three $50 prizes will be conducted. The study requires ten participants. Only participants who answer "Yes" to question 15 and are randomly chosen through a purposeful sample will be entered in the drawing for $50. The group of ten participants will individually be interviewed two or three times for a period of approximately thirty minutes during the quarter (Interview times are flexible). The group will be discretely observed during lecture and/or recitation. Finally, each participant may be asked to write an informal 1– 3 page journal about his or her experience in the course. As a final incentive, any participant in this smaller group will have the opportunity to be tutored in Statistics 135 twice during the quarter at no cost. (Times for tutoring will be coordinated between the participant and researcher. The researcher is a former Statistics 135 teacher's associate and has a Masters of Science in statistics from The Ohio State University)

15. Would you be willing to participate in the study described in the previous paragraph?

    a. Yes b. No

APPENDIX B

QUALITATIVE INTERVIEW QUESTIONS

1. Can you tell me what mathematics courses you have taken?

2. What is your major?

3. Can you tell me about the role your parents played in your education?

4. What role if any does a support group – including family - play in education?

5. Describe your style of learning.

6. Can you discuss with me your academic role models and why they were role model?

7. Assuming that you have had some good teachers, tell me why you thought they were good?

8. How important is positive feedback, patience, and caring? Why?

9. Do you believe racism exist in America? Give examples.

10. Are there particular things that some races can not or should not do?

11. Does race play a role in education?

12. Do you feel more comfortable with people of your own race? If so why?

13. How does the teacher's ethnicity affect your ability to learn?

14. Have you ever felt that teachers did not understand or where unable to relate to how to teach various racial groups and if so, why?

15. What style of teaching do you believe is best for individual's racial group?

16. Contrast the differences between successful and unsuccessful teachers that you've had. Tell me a story.

17. I am going to read a sentence and I want you to comment. Most teachers teach White students better.

18. You may have heard, but underrepresented minorities have not done well in mathematics in comparison to some of their European and Asian counterparts, tell me your feelings about why this phenomenon has occurred?

19. What reasons do you believe there are a disproportionate number of African-Americans and Hispanics in mathematics?

20. Why did you take this course?

21. Do you find any relevance in taking this course? Why?

22. Approximately how many hours peer week do you study for this class?

23. Tell me your impression about probability and statistics. What makes it difficult or easy?

24. What factors do you believe contribute the most to the success or failure of underrepresented minorities in probability and statistics?

25. As an underrepresented minority, does your probability and statistics teacher teach in a way that is conducive to you? How?

26. Can you think of any possible reasons why society would not want underrepresented minorities to succeed in probability and statistics?

27. What else do you think I need to know?

28. Do you have any questions for me?

APPENDIX C

VARIABLES USED FOR EXPLORATORY MULTIVARIABLE REGRESSION ANALYSIS

1. ACT Algebra
2. ACT Art/Literature
3. ACT Composite
4. ACT English Score
5. ACT Geometry
6. ACT Math
7. ACT Mechanical
8. ACT Reading
9. ACT Rhetoric
10. ACT Science
11. ACT Science Reasoning
12. ACT Trigonometry
13. Age
14. Anxiety of Statistics
15. Cumulative GPA Hours
16. Expected Grade
17. Father's Education
18. Gender
19. GPA
20. Graph Comprehension
21. Importance of Teacher Caring
22. Importance of Teacher Feedback
23. Importance of Teacher Patience
24. Job Status
25. Letter Grade
26. Mathematics Level
27. Mother's Education
28. Numerical Grade
29. Parents' Income
30. Race
31. Reading Ability
32. SAT Combo
33. SAT Math
34. SAT Verbal

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