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ENTRANCE CRITERIA FOR NURSING PROGRAMS:
EQUALITY OF OPPORTUNITY OR DE FACTO DISCRIMINATION

A dissertation

Presented to

The College of Graduate and Professional Studies
Department of Educational Leadership, Administration, and Foundations

Indiana State University

Terre Haute, Indiana

In Partial Fulfillment
of the Requirements for the Degree
Doctor of Philosophy

by

Pamela B. Primrose

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ABSTRACT

The acute nursing shortage across the nation is compounded by underrepresented minorities in health care in light of the growing diversity of America's citizenry. These issues are converging into a major debate in higher education regarding admission policies and practices to ensure entry of most qualified students to meet the growing demand for nurses. While nursing programs have been charged with increasing the diversity of students admitted into their programs, it has not yet come to fruition.

This investigation evaluates entrance criteria for RN associate of science degree nursing programs (ASN) at two-year institutions using an ex post facto design to determine if nurse entrance criteria provide for equal opportunity for admission or results in de facto discrimination. The research examines the effect of nurse entrance criteria of overall Total Quality Points (TQP) for non-science, non-math, math, and science courses, and nurse entrance exam scores, specifically the Test of Academic Assessment Skills (TEAS) to determine how they impact the admission of minority students, specifically African American students, into the nursing program.

Admissions criteria of TEAS only, TEAS plus TQP, TEAS and TQP separately, and TQP only are assessed to determine which criteria maximize the admission rate of minority students into nursing programs along with regression studies to identify which demographics or characteristics significantly impact the success of African American students' performance on the TEAS test or to determine if de facto discrimination is present. Identification of various

stages of elimination of students from the applicant pool as it is narrowed down will aid in determining which levels of the admissions criteria may require intervention during the pre-nursing preparation phase. This study will investigate the role of standardized tests as a barrier to minority enrollment.

Data analyses revealed discrimination against African American students seeking entrance into the ASN program at three community colleges. The TEAS test was a serious barrier to African American student inclusion in the final applicant pool and consideration for admission into the ASN program. Students who did not pass all TEAS subsets did not move forward for inclusion in the final applicant pool. Those African American students in the applicant pool were also negatively impacted by the TEAS test as well as TQP after controlling for first generation status, age, high school rank, and high school rigor. Thus, the admission process for the ASN program using TEAS as an admission criterion is discriminatory against African American students.

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CHAPTER 1

Introduction

"Quality is never an accident; it is always the result of high intention, sincere effort, intelligent direction and skillful execution; it represents the wise choice of many alternatives" (Foster, n.d., para. 1). These words could readily describe the intent behind the still controversial application of standardized test scores such as the SAT or ACT to make admissions decisions by colleges and universities. And if old habits die hard, they can also be said to grow horns for in addition to these required examinations are a host of other exams that add yet another barrier to gaining access into educational programs such as nursing programs. Seeking to admit quality students into institutions of higher education for the purpose of fostering scholarly discourse, developing an educated and responsible citizenry to lead future generations, and providing a workforce that will be globally competent is indeed a monumental challenge. However, is the current process of requiring nurse entrance examinations negatively impacting the admission of quality minority students into nursing programs through de facto discrimination? Does the nursing algorithm used in admissions decisions have a disparate impact on minority students?

Diversity of the United States

The United States is rapidly becoming one of the most racially and ethnically diverse nations worldwide (Milem, Dey, & White, 2004; Smedley, Stith-Butler, & Bristow, 2004). Minorities within the United States are comprised of African Americans, Alaskan Natives,

American Indians, Asian Americans, Hispanics, and Pacific Islanders to name a few. Together these subpopulations are emerging into the majority rather than the minority; already in Texas, Florida, and California European-Americans comprise fewer than 50% of the population (USINFO.STATE.GOV, 2005). In spite of the rapidly expanding racial and ethnic minority groups within the nation at large, their presence in the health professions has exhibited only modest growth over the past 25 years (Smedley et al., 2004). The lack of representation in health professions has outstripped the proportion of minority groups several fold over and is a cause of national concern on several levels (Milem et al., 2004; Smedley et al., 2004).

Nursing Shortage

The nursing shortage crisis has been documented by numerous nursing and health care professional agencies such as the American Association of Colleges of Nursing (AACN), the Joint Commission on Accreditation of Healthcare Organizations (JACHO), the Institute of Medicine (IOM), the Health Resources and Services Administration (HRSA), and the American Public Health Association (APHA, 2006). All studies appear to indicate that the nation may be at risk for a national health care crisis if steps are not taken to increase the enrollment of nursing programs, increase recruitment and retention of nursing instructors, and retain employed nurses (AACN, 2003; APHA, 2006; HRSA, 2006; JACHO, 2002; Smedley et al., 2004). The American Hospital Association (AHA) reported in April 2006 saying that the nationwide shortage of registered nurses was at 118,000 for a vacancy rate of 8.5%, up from 8.1% in 2004 (AHA, 2006). According to the U.S. Bureau of Labor Statistics (2005), government analyst projections indicate that by 2014 more than 703,000 nursing positions, new and replacement will account for nearly two-fifths of new health care jobs. According to a report by the HRSA (2006), by 2015 all 50

states in the union will experience a nurse shortage to some degree. This crisis is expected to increase to more than a million nurses by 2020 (AACN, 2006).

Health Disparities

The nursing shortage impacts the delivery of healthcare to minorities. Currently about one in three United States citizens identify themselves as being African American, Latina/o, American Indian, Alaskan Native, or Asian/Pacific Islander. It is estimated that by the year 2050 that minorities will account for almost half of the population in the United States (Lillie-Blanton & Lewis, 2005). Minority representation in nursing is currently around 14% and thus does not meet the needs of a diverse population now and if it remains at that level, will represent even greater disparity in the future (Villarruel, Canales, & Torres, 2001). There are not enough minority healthcare workers to meet the needs of the minority populations whether they are doctors, nurses, technicians, and so forth. This appears to negatively impact the healthcare of minorities. Minorities are not able to access healthcare providers of the same race or ethnicity and therefore may not seek medical care until it becomes urgent. Language barriers prevent minorities from seeking treatment because patients do not understand what the healthcare providers are saying to them unless there is a translator available. Cultural differences also impact access to healthcare as healthcare professionals may not be sensitive to cultural differences and practices and thus in their ignorance, are not respectful or understanding of the needs of their diverse patient population (Lillie-Blanton & Lewis, 2005; Villarruel et al., 2001).

Minority Representation in Health Care

A study conducted by the IOM confirms that minority representation in health professions has fallen short of the needs of the communities across the nation. The disciplines of health care are being greatly impacted by the major shifting of demographics in the nation's

population. This increase in the proportion of American minorities, whose primary language differs from English, and whose beliefs regarding their health and healthcare embrace a diverse range of cultural values is presenting the current health care community with serious challenges in the equitable distribution of and access to health care services (Smedley et al., 2004). The 2004 study conducted by the IOM, *In the Nation's Compelling Interest*, indicates that irrespective of insurance or economic status, non-minorities receive better quality health care overall than do racial and ethnic minorities. The report further stated that encounters of minorities with health care professionals were wrought with bias and stereotyping that confounded the opportunity for equal receipt of health care services and treatments (Smedley et al., 2004).

The assessment of the numbers of minorities currently employed in the health care professions emphasizes the sobering reality that there is indeed a disparity between the minority population and their representation in the healthcare professions. The proportion of minorities in the United States' population is currently at 25.3%. Participation of underrepresented minority in health care professions in comparison to this proportion is as follows: nursing 7.4%, medicine 6.1%, dentistry 6.8%, and psychology 6.9% (Jones, 2004; Smedley et al., 2004; Sullivan Commission, 2004). The United States Hispanic population is over 12% with the following health professional representation being "2% of the registered nurse population, 3.4% of psychologists, and 3.5% physicians" (Milem et al., 2004, p. 245). Among Americans, one in eight is African American but dentists and physicians of the same race comprise less than 1 in 20 (Milem et al., 2004). With the proportion of African Americans at 12.1% they are underrepresented in nursing at only 4.9%. The American Indian population is 7.0% with representation in nursing at 0.5%. Asian/Pacific Islanders are the only minority group to exhibit

parity in the nation's population and representation in nursing at 3.7% (Kimball & O'Neill, 2002). This disparity of representation of minority health care professionals has been duly noted and initiatives have been implemented to reduce the growing gap with little success (Jones, 2004; Kimball & O'Neill, 2002; Milem et al. 2004; Smedley et al. 2004; Sullivan Commission, 2004).

Couple the acute nursing shortage across the nation with the issues of underrepresented minorities in health care and it is evident that these issues are converging into a major debate in higher education regarding admission policies and practices to ensure entry of most qualified students to meet the growing demand for nurses. The nursing shortage has been responded to by professional and governing bodies of nursing such as the AACN, JACHO, the IOM, and APHA in which they call for nurse educators to increase the diversity of the students they admit into their programs through active recruitment of students who are reflective of the racial and ethnic diversity of the nation (AACN, 2003; APHA, 2006; JACHO, 2002; Smedley et al, 2004).

The directive for recruitment of minority students for many nursing programs has gone unheeded for several reasons. Nursing program directors indicate that they are turning away as many as 30,000 to 42,000 qualified students seeking entrance into nursing programs because of a nursing faculty shortage of about 1.9 faculty vacancies per nursing school (AACN, 2005, 2006). In addition, there are huge waiting lists for students seeking entry into nursing programs. Thus, active recruitment of students into nursing programs is deemed unnecessary by many nursing faculty. Nursing programs are only seeking the cream of the crop and to try and recruit those who do not meet that description would be counterproductive to meeting the nursing shortage crisis in terms of retention, program completion, and passing of the licensure examination (Kupina, 2006).

Factors Preventing Educational Participation

Nursing programs have a selective admissions process in addition to college admissions requirements. The disparity between the numbers of White students enrolled in nursing programs compared to Black students has elicited numerous studies as to identify causal relationships as well as initiatives to increase the number of minority students (Fletcher et al., 2003; Aiken, Cervero, & Johnson-Bailey, 2001).

A number of factors that prevent participation of Blacks in nursing programs have been identified. According to the National Advisory Council on Nurse Education and Practice (U.S. Department of Health and Human Services, 2002) several factors are responsible for the lack of opportunities for access to nursing educational programs including the lack of awareness of health profession careers by minority and disadvantaged students and nurse faculty shortages that limit student admissions into nursing programs in particular. Other factors that were identified as preventing participation included lack of academic preparation, poor study habits, inadequate test taking skills, and not seeking help from faculty or academic support resources. Financial problems posed significant barriers to participation and retention. Full-time work schedules to help with the rising costs of tuition, financial obligations to family, or scholarships with restrictive rules that dictate working hours also impacted participation (Amarao, Abriam-Yago, & Yoder, 2006; Childs, Jones, Nugent, & Cook, 2004; Villarruel et al., 2001; Yurkovich, 2001). Amarao et al. (2006) and Gardner (2005) also identified language as a major deterrent to nursing program participation and retention.

Studies by Aiken et al. (2001), Childs et al. (2004), and Gardner (2005) have identified factors that discouraged minority participation in nursing programs but prevent their participation. Those include being the *Other* in the educational setting, marginalization in the

classroom, lack of respect, underrepresentation, isolation, lack of a support system, work schedules, and loneliness. In addition, a lack of understanding by White peers as well as knowledge about different cultures resulted in minorities being misunderstood, ignored, and being negatively viewed (Gardner, 2005).

Quantitative research by Fearing (1997) and the qualitative study by Aiken et al. (2001) have identified institutional barriers preventing participation. Barriers that prevented minorities from accessing nursing programs included high school rank, standardized test scores either ACT or SAT, grade point average (GPA) of high school courses, GPA of college courses, GPA of science courses, and other pre-admission criteria set forth by nursing programs in addition to college entrance requirements (Fearing). Other variables that were identified as preventing participation included scheduling inconveniences, lack of minority faculty members, and curriculum lacking in diversity perspectives (Aiken et al., 2001).

Admissions Practices

In terms of seeking to admit the best and the brightest, many nursing programs require that all applicants complete a nurse entrance examination. The pool of test takers is then considered contenders for the limited number of admission slots for entry into the nursing programs. However, standardized tests have been called into question in terms of equitable predictability of student success in college (Attewell, Lavin, Domina, & Levey, 2006; Green & Griffore, 1980; Nairn, Allan, & Associates, 1980). The validity of standardized testing has been studied in the past and proven questionable as applied across the board to all students of various race and ethnicities seeking entrance into colleges and universities. Those who tout the use of standardized testing in admissions practices justify their usefulness in conjunction with other admissions criteria. Even in light of the limited usefulness of standardized test scores in making

admissions decisions, an array of differentiated and specialized tests are still being developed and utilized today to decide who gets in and who is barred from entrance into various disciplines of study (ACT, 2008; Assessment Technologies Institute [ATI], n.d.; College Entrance Examination Board [CEEB], 2008). The debate still continues over the use of such tests and its extension to admission into nursing programs.

John F. Kennedy said in his Civil Rights Address that not everyone has “an equal talent or an equal ability or equal motivation, but they should have the equal right to develop their talent and their ability and their motivation, to make something of themselves” (Kennedy, 1963. para. 21). Is the use of standardized testing preventing the equality of opportunity for individuals to become educated to the limits of their abilities, talents, and motivation? Standardized testing may remove the choice of a career for many minority students. If this is the case then it may be time to re-evaluate the use of standardized testing in admissions decisions.

As, Isaac Asimov wrote,

It is change, continuing change, inevitable change, which is the dominant factor in society today. No sensible decision can be made any longer without taking into account not only the world as it is, but the world as it will be. This, in turn, means that our statesmen, our businessmen, our every man must take on a science fictional way of thinking (n.d., para. 1).

Colleges and universities are seeking to achieve diversity within their student populations and looking at their admissions criteria to see if changes may be necessary to achieve their goals. The world is changing, the face of America is changing, the face of the workforce is changing, and the face of health care needs to change as well. If disparate impact exists in admission practices, new alternative ways of making wise entrance decisions that ensure not only quality

but equality can be made with the same intention, sincerity of effort, intelligence, and execution. This would require educators begin to think in new ways.

Statement of Problem

The problem is the lack of minority student representation among students in nursing programs. A major concern that greatly affects the efforts to increase diversity within these is the inequalities for educational opportunities for minority students (Aiken et al., 2001; Fearing, 1997; Kane & Rouse, 1999; Shom, 2006). Coupled with this lack of access to higher education, minority groups are faced with institutional policy barriers such as entrance examinations that prevent access to training in some nursing programs (Breland, Maxey, Gernand, Cumming, & Trapani, 2002; Crouse & Trusheim, 1988; Haney, 1984; Nairn et al., 1980; Noble & Sawyer, 2002). This study investigates the role of standardized tests as a barrier to minority enrollment.

Nursing program chairs are seeking to admit the best and brightest from their applicant pools through the use of an admissions algorithm. It is assumed by nursing admissions staff that students who meet criteria used in these algorithms for program admission will have the greatest chance at successfully completing the nursing program and passing the licensure examination. Grade point averages, SAT or ACT scores, completion of prerequisite courses such as anatomy and physiology, psychology, English composition, math, and nurse entrance test scores have been numerically weighted to calculate a score and the students with the top score are selected from the pool. The issue at hand is whether or not the algorithm being used has a disparate impact on minority students. Of particular concern is the use of the nurse entrance exam because of the known impact of standardized tests on minority students (ACT, 2006b; CollegeBoard SAT, 2006; Crouse & Trusheim, 1988; Special Report, 2000; Nairn et al., 1980).

Purpose of Study

The purpose of this study was to examine the proportionality of White students and African American students admitted into nursing programs at two-year institutions that utilize a nurse entrance examination score as part of their admissions decision algorithm. Data generated from this study identified the ethnic profile of Whites and African American nursing students who have been admitted into nursing programs at two-institutions on the basis of identified admissions criteria. A comparison between the minority representation within the applicant pool seeking admission and those admitted into the classes was examined to determine if disparate impact was evident in the admissions process of associate degree nursing programs. Statistical analyses to control covariates that may influence the outcome of student performance on standardized tests served to validate the impact of those tests on the admission of African Americans into the nursing program.

Research Questions

First research question. Are there significant differences in the admission rates between Whites and African American students for the four admission criteria evaluated in this study based on (a) TEAS and TQP separately, (b) TEAS only, (c) TEAS plus Total Quality Points, or (d) Total Quality Points only?

Second research question. For African American students, how is admission into an associate degree nursing program influenced by three admissions criteria TEAS only, TQP only, and TEAS + TQP COMBINED test after controlling for first generation student, age, high school rigor, high school grade point average, class rank, gender, and ethnicity?

Significance of Study

This topic is of nationwide importance as the U. S. Department of Health and Human Services, the National League for Nursing, and the American Association of Colleges of Nursing

and other agencies have called for the nursing profession to increase the number of minority nurses in order to reflect the diversity of the nation's population. The dismal results thus far warrant a careful examination of current practices to identify if entrance criteria play a role in the status quo. Ogundeyin (1991) validated the use of nurse entrance exams along with other preset criteria to be a good predictor of successful completion of the nursing program and passing the licensure exam. A study from California Community College developed a statistical selection model based on college grade point average (GPA), core biology GPA, English GPA and core biology repetitions to compute the probability of associate degree nursing (ASN) program completion (Phillips, Spurling, & Armstrong, 2002). Limited research however has been found on the impact on minority admissions of the algorithms used to determine entrance into nursing programs.

This study sought to identify if the use of a nurse entrance exam resulted in a disparate impact on minorities seeking admissions into associate degree nursing programs at two-year institutions. The presence of de facto discrimination was identified. Nurse educators across the nation need to examine their entrance criteria and if they are found to discriminate then adjust these criteria in a manner that provides equal opportunity for admission to students of all ethnicities. Through identification of factors that may present barriers to enrollment of minorities in nursing programs, removal of these barriers, and implementation of policies that are supportive of minority student enrollment and success, the face of health care will begin to mirror the face of the nation's population.

CHAPTER 2

Literature Review

Controversy surrounding the administration of standardized tests to students, the validity of the tests, and the application of the scores generated by such examinations has been debated for many years. The context of the debate of standardized testing is both education and political. A review of the origination, evolution, and types of standardized tests is warranted.

Access to Higher Education

Access to higher education has been narrowly defined as being “the availability of high-quality postsecondary education opportunities for all students regardless of race, ethnicity, income or gender” (Education Commission of the States, 2006, para. 1). Access is not only focused on getting underrepresented students into institutions of higher education but it is also about ensuring that these students have the requisite tools to help them complete a degree and thus reap the societal benefits that such a degree provides. Merely getting underrepresented students in the door is not sufficient, persistence to completion is essential (Gladieux & Swall, 1998). However, for many of these students access is the first barrier that must be overcome.

The Secretary of Education’s Commission on the Future of Higher Education released a draft of its report August 9, 2006 stating that the United States higher education needs to improve dramatically in terms of moving more students through higher education to degree completion if America is to be globally competitive in the 21st Century. According to the

Commission's findings, 90% of jobs that are the fastest growing in the new economy are high demand fields requiring postsecondary education such as education, mathematical science, computer and healthcare. With a projected need in 2014 for close to five million new jobs in just these fields alone, concern has been raised that there will not be enough workers to fill the positions (U.S. Bureau of Labor, 2005; U.S. Department of Education, 2005, 2006). This concern is valid as America is fast becoming one of the most ethnically and racially diverse nations in the world with the minority populations fast becoming the majority (Milem et al., 2004). America's future workforce will primarily be comprised of diverse racial and ethnic groups however, their participation as well as participation of economically disadvantaged groups in higher education at the present time is currently not adequate to meet the growing demands of the future. Without intervention the nation's economic growth and social cohesiveness could be in jeopardy. Future economic growth will be dependent upon higher education's ability to sustain its innovation, leadership and level of excellence. One issue that impedes successful attainment of an educated citizenry for competitive economic growth and social mobility is access to higher education for all Americans (U.S. Department of Education, 2005, 2006). The Commission supports the belief that the United States must embrace and sustain a commitment of accessibility to higher education for its entire citizenry. In their investigative assessment, several intertwined and complex limitations to American's ability to access higher education have been identified by the Commission. These limitations have been linked to apparent gaps in egalitarian accessibility of underrepresented groups (U.S. Department of Education, 2006).

There are a myriad of variables that can affect a student's access into higher education and in reality it is usually a combination of factors. One in particular that poses a critical barrier

for African Americans in attaining admission into four-year institutions: standardized admission testing such as the SAT and the ACT examinations. For some open-access institutions and certain four-year institutions, entrance exams for specific programs such as the nurse entrance exam appear to pose a barrier to gaining admission into nursing programs. Key factors that the Commission has identified as impacting access of Americans to higher education are as follows: (a) lack of information in regards to college opportunities, (b) inadequate preparation in K-12, (c) poor alignment of college expectations and high school products, (d) increased needs for remediation, and (e) financial barriers (U.S. Department of Education, 2006). Putting the two common lineages of barriers together would indicate that a primary key factor directly affecting performance on standardized testing is inadequate preparation at the K-12 level thereby resulting in a need for remedial education. Once a student has been *remediated* it would stand to reason that their performance on entrance examinations should improve. As performance improves as a result of remediation, admission of those students into programs requiring entrance examinations such as nursing programs should also improve or increase but this is not the case. The proportionality of minorities in health care remains dismally low in comparison to their proportionality in the nation's population (Aiken et al., 2001; Fearing, 1997; Kane & Rouse, 1999; Shom, 2006; Smedley et al, 2004). An examination of nurse entrance criteria which includes the nurse entrance test is in order to assess where the barrier for admission of African American students into nursing programs lies.

Theoretical Framework: Theory of Justice

The theoretical framework for this study embraces the theory of justice. Justice is essentially the quality of being just or fair, moral, and impartial in the treatment of others. The application of justice in a social setting becomes that of the basic structure of a given society. It

references the distribution of the fundamental rights and responsibilities by major social institutions as well as the division of the advantages conferred by those distributions (Rawls, 1971/1999).

Major institutions involve principal social and economic arrangements as well as the political constitution and define the rights and responsibilities of mankind. These institutions also have the power to influence the life prospects of individuals and groups of individuals within society. As a result, multiple strata of people are affected either advantageously or adversely by the distribution of goods, services, and opportunity merely by the position into which they were born. These pervasive inequalities result in different starting places in life and different expectations of life depending upon one's station in society. These inequalities affect individuals and groups of individuals' chances in life and "cannot possibly be justified by an appeal to the notions of merit or desert" (Rawls, 1971/1999, p. 7).

History has repeatedly evidenced that the economic position into which an individual is born, is fairly rigid. It would appear that God or nature had fixed the economic distribution of the benefits and burdens. As societies and institutions within societies evolved, it became evident that the distribution of these benefits and burdens could be manipulated by the government in terms of the various laws that are made and changed throughout time. Theories of distributive justice provide guidance for the challenges to current laws and the unavoidable review and revision of current laws and policies to improve their distributive effects (D'Agostino, 2003; Lamont & Favor, 2007).

In reviewing laws, policies, and procedures, distributive justice becomes a focal point in the construction of these governing entities. The selection of principles of justice to apply to various situations requires some type of non-arbitrary method of selection. One method for

selecting a principle of distributive justice is to simply follow tradition. Traditional practices exist because they have proven to be successful in the past, have satisfied all persons affected by the practices, and are collectively considered to be better than any other alternative (D'Agostino, 2003; Rawls, 1971/1999). Traditions however, may be radically unjust and oppressive. Rawls states that:

Justice is the first virtue of social institutions, as truth is of systems of thought. A theory however elegant and economical must be rejected or revised if it is untrue; likewise laws and institutions no matter how efficient and well-arranged must be reformed or abolished if they are unjust. Each person possesses an inviolability founded on justice that even the welfare of society as a whole cannot override. For this reason justice denies that the loss of freedom for some is made right by a greater good shared by others. It does not allow that the sacrifices imposed on a few are outweighed by the larger sum of advantages enjoyed by many. Therefore in a just society the liberties of equal citizenship are taken as settled: the rights secured by justice are not subject to political bargaining or to the calculus of social interests. (pp. 3-4)

Rawls (1971/1999) goes on to say that the only possible reason for acquiescence to a theory of justice that is erroneous, is that there is lack of a better theory. The only reason to tolerate injustice is if it would avoid an injustice of greater magnitude.

Rawls' Theory of Distributive Justice

There are different principles of distributive justice that have been proposed by various philosophers and include strict egalitarian, the difference principle, resource-based, welfare-based, desert-based, libertarian, and feminist principles. Each of these principles sets forth a process for the allocation of the benefits and burdens that arise in economic activity. There are

also numerous dimensions to distributive justice such as the subject of distribution, the subjects of distribution, and the basis for distribution. Subjects of distribution include jobs, opportunities, income, wealth, utility, welfare, and so forth. The nature of the subjects of distribution includes persons, groups, classes of persons, and so forth. The basis for distribution includes maximization, equality, individual characteristics, free transaction, and so forth (Garratt, 2002; Lamont & Favor, 2007).

Rawls proposed a method of selecting a theory of distributive justice. His theory embraces two principles of justice referred to as the liberty principle and the difference principle. Rawls states that when two primary principles, liberty and justice versus efficiency and welfare conflict with each other prioritization supersedes compromise. The restriction of liberty can only occur for the sake of liberty. The total system of liberty that is shared by everyone may be strengthened by liberty that is less extensive. Liberty that is less than equal must be accepted by those who possess less liberty. If an equality of opportunity is to exist, it must benefit those with the least opportunity (Garratt, 2002; Rawls, 1977/1999). The disparity of health care for minorities in America coupled with a lack of minority representation in health professions in particular nursing, suggests that there may be an inequality of opportunity and liberty to participate in a health care system that meets the myriad of needs of a diverse population as a result of inequality of opportunity and liberty to participate in nursing programs.

This inequality impacts what is right as set forth in the social contract and the Rawls' (1977/1999) specialization of what is right in terms of it being fair. According to Rawls every person's good is what will allow for the successful execution of a plan to achieve liberty, opportunity, income, wealth, and self-respect. If this good is disrupted by social injustice then change is in dire need. In terms of nursing education, the lack of minority representation that

mirrors the population suggests a possible disruption of minority student's pursuit of educational opportunity that would allow for liberty, income wealth, and self-respect.

Social Justice

Social justice embraces the tenets of compassion, diversity, knowledge, achievement, and service. According to Wilson (2006), social justice in education is evidenced when learners are provided with equitable access to knowledge about the world and how it relates to them. Social justice in education embraces pedagogical practices that are effective, caring, and supportive of students' acquisition of knowledge and the skills to apply knowledge. Social justice in education assists in student development of independence and the desire for lifelong learning. And finally, social justice in education advocates for issues of importance to the students (Wilson, 2006).

Achievement of social justice in education requires respect and understanding of the nature of the cultures and communities of a diverse student population. It requires a belief that all students can learn regardless of race, ethnicity, geographical location, language, age, socioeconomic status, sexual orientation, religion and any other human differences physical or mental, and requires the inclusion of cultural relevancy of the educational experiences. Any inequalities within the education arena imposed by society must be challenged. In the context of social justice, achievement is reflected by the belief that all students can learn given the proper opportunities, conditions, and resources. Social justice requires the tenet of compassion so that societal inequalities are recognized, considered intolerable, and removed (Wilson, 2006).

In terms of knowledge, social justice assists students in building on prior learning experiences and the knowledge gained. It helps students to be able to apply newly acquired knowledge in real world contexts through identification of and building upon their strengths. When the developmental process of acquiring knowledge is viewed as being as being socially

constructed, then meaning is attached to learning through personal dialogue and intellectual interactions with a community of others. It is then that knowledge can be given meaning within the context of the real world (Wilson, 2006).

Service embraces the reality that by helping others we can improve their quality of life and in doing so, improve our own and ultimately the life of society as a whole. Our humanity and future demands the acknowledgement that all life is intractably interconnected to others. Humanity and truth is at the heart of social justice (Wilson, 2006).

Historical Context of Standardized Testing

Standardized testing of students has become a norm in the American educational system. Children are subjected to standardized testing early on in their educational careers. One application of such tests is to separate out and categorize students on the basis of their scores which imply students' ability. In high school, students are given standardized tests to determine graduation eligibility and predict their future success in higher education. Test scores are used as a major factor to determine acceptance into colleges and universities as well as admission into specific programs in higher education. Graduate and professional schools also employ the use of standardized tests in the admission of students. These types of tests are also used to assist organizations in employment and promotion decisions. As such, standardized testing has become a pervasive and powerful entity on the future opportunities of students (Crouse & Trusheim, 1988; Green, 1980; Nairn et al., 1980; Valencia & Suzuki, 2001). A look at this historical evolution of standardized testing in determining intelligence and ability is important and necessary in understanding the impact that standardized testing has on educational opportunities.

Initial Applications of Standardized Testing

The initial application of standardized testing was political in nature in terms of its application to civil service employment, army recruit placement, immigration law, and the rise of xenophobia. In 1883, political use of standardized testing accompanied the passing of the Civil Service Act and the founding of the U.S. Civil Service Commission. Competitive examination became the basis for the awarding of federal jobs. By the turn of the century, civil service examinations were used in the awarding of approximately 50% of federal government jobs (Haney, 1984).

With the advent of World War I the psychological science of testing for mental ability was presented to the Surgeon General of the U.S. Army for the purpose of testing recruits and placement within the hierarchy of the army (Chapman, 1988; Fancher, 1987; Galloway, 1994; Haney, 1984; Yerkes, 1920). The results of the army testing were used to formulate a generalized statistical profile of the nation's intellectual makeup and resulted in the publication of two studies that fueled conclusions of racial inferiority and espousement of eugenicist views: Yerkes' 1921 publication of *Psychological Examining in the United States Army* and Carl Brigham's *A Study of American Intelligence* in 1923 (Chorover, 1980; Fancher, 1987; Human Intelligence, 2007b; Yerkes, 1920).

Results of the army data from an environmentalist view indicated that the scores were positively correlated with how long immigrants had been residents in America, irrespective of national origin. The army test however, did not take into account the differences in knowledge of American history and culture of the recruits based on time in residence. The impact of environmental factors on test scores and the resultant interpretations of intelligence were not

taken into consideration by Yerkes and Brigham as well as others (Chorover 1980; Fancher, 1987).

Military testing during WWI contributed to the application of psychological testing in civilian life especially in relation to education as a result of the massive publicity and attention that military testing generated. The data served as a resource for researchers in terms of the intelligence of state populations as well as the intelligence of Blacks (Brigham, 1923; Haney 1984).

Brigham (1923) confirmed the validity and trustworthiness of the scientific value of the statistical analysis used by the Army psychologists (Brigham, 1923; Haney, 1984; Mead, 2004). He extended the application of the results to the general population without regard to the acknowledgement of social class and educational opportunity in conjunction with nativity. These important variables went unsupported as Brigham concluded along with Yerkes (1920) the racial inferiority of those persons of non-Nordic descent (Brigham, 1923; Fancher, 1987; Yerkes, 1920). The 1920s rise of xenophobia and escalating racism had been attributed to the views of Brigham and Yerkes and were fueled by the credibility attributed to them on the basis of their association with Princeton and Harvard as well as the National Research Council (Haney, 1984; Kluger, 1975/2004; Yerkes, 1920).

The Binet-Simon scale as well as the army testing analysis supposedly indicated that American Blacks and other racial ethnicities were intellectually and mentally inferior (Haney 1984; Kluger, 1975/2004; Yerkes, 1920). A national opposition to immigration was already evident and Yerkes' and Brigham's work appeared to substantiate yet another reason to be concerned about the impact of immigration on the nation's intelligence. This concern escalated into the congressional passage of a bill restricting immigration in 1924 as each national group

was assigned a strict quota for the purpose of limiting or preventing the dilution of the intelligence of human resources of the United States (Fancher, 1987).

Standardized Testing in Education: 1880-World War I (WWI)

Standardized testing expanded its form and function from army and civil applications into the educational arena. Standardized testing in education has evolved from simple inquiries into how human intellect develops to measuring intelligence on the basis of standardized test scores to the interpretation and application of those scores that convey life-long benefits or consequences.

The inception of standardized testing. The inception of standardized testing began with Francis Galton's 1883 publication *Inquiries Into Human Faculty and Its Development*. Attribution of Galton's research includes not only the development of testing mental capacity but also the statistical techniques which are still considered to be the tools of the testing trade in an attempt to explain how human capacity differed among individuals (Boring, 1950a; Chorover, 1980; Haney, 1984; Noel, 2004; Valencia & Suzuki, 2001). The application of Galton's mental test was for the purpose of demonstrating human differences in performance (Boring, 1950a; Chorover, 1980). It was not meant to explain the "detailed physiological or conscious conditions that lie back of the performance" (Boring, 1950a, p. 484). His belief was that intelligence was an inheritable trait and he discounted social inheritance that came with wealth, privilege, and status from his theory (Chorover, 1980; Noel, 2004; Valencia and Suzuki, 2001). Galton went on to research the inheritance of intelligence in *Hereditary Genius* in 1869 and *Natural Inheritance* in 1889 (Boring 1950a, 1950b; Chorover, 1980; Haney, 1984; Noel, 2004; Valencia & Suzuki, 2001). His view of racial intelligence differences was discussed in *Hereditary Genius* where he ranked the races accordingly: Ancient Greeks at the top, Anglo-Saxons at an intermediate level,

and African Negroes and Australian types (indigenous) at the bottom (Chorover, 1980; Valencia & Suzuki, 2001). His coining of the term eugenics expressed his concern about improving the human race through the use of “anthropometry, genetics, psychometry, and statistics” (Boring, 1950b, p. 484).

During this same time period the Supreme Court handed down the Plessy v. Ferguson decision declaring the constitutionality of racial segregation in their separate but equal doctrine. The prevailing view at that time was that African Americans were inferior. Preventing the contamination of White blood by segregating the races would help to ensure that the defective genes of African Americans did not spill over into the White blood line. This laid the groundwork for the view of the inferiority of African American intelligence and their defective genes. Since their release from the bonds of slavery, African Americans had failed to find success in the land of opportunity proving that even 47 years after the Emancipation Proclamation that their derelict state must be due to a lack of intelligence and other problems (Delgado & Stefancic, 2001; Kluger, 1975/2004).

The first standard test of ability in education. Education reform was the goal of a standardized test devised and implemented by Joseph Mayer Rice in the early 1890s. Rice began his crusade on education reform reporting on the use of unqualified teachers who resorted to rote drill and repetition. Reportedly, this type of educational process resulted in schools that were inefficient and ineffective in the education of the nation’s children. Rice surveyed over 1200 teachers and collected data on more than 30,000 children enrolled in 36 schools across different cities to study the relationship between the amount of time teachers spent on spelling drills and the performance of children on objective spelling tests. His data showed no correlation

(Cronbach et al., 1982; Haney, 1984). His work has been cited as the first to use a “standard test of ability” (Cronbach et al., 1982, p. 26).

Standardized testing to determine success in the classroom. Early standardized testing evolved into an educational role that assisted in a relatively benign curriculum differentiation of students as Alfred Binet developed and later improved upon his famous Binet Scale of 1905, 1908, and 1911. The test was revised for the purpose of identifying the success of children in a normal classroom setting or those in need of specialized instruction. The technique involved assessing the performance of children on a collection of tasks that did not rely on the processes of reasoning but corresponded to teachers’ categorizing children as being average or mentally deficient (Becker, 2003; Bergin & Cizek, 2001; Binet & Simon, 1905/1980; Chorover, 1980; Haney, 1984; Human Intelligence, 2007a; Marks, 1981; Noel, 2004; Palmer, Bresler, & Cooper, 2003; Wolf, 1973). His intelligence scales were based on behaviors that included attention, memory, comprehension, reasoning, and judgment (Anastasi, 1988; Noel, 2004; Valencia & Suzuki, 2001).

Binet stated that intelligence exhibited a wide range of diversity and that it needed to be studied qualitatively not quantitatively. His work demonstrated that the human intellect developed at variable rates, was environmentally impacted, and could not be explained on the basis of genetics alone. Assessment of the mental and intellectual capacity of children would require that the subjects have comparable backgrounds in order to give the data credence. He stated that intellect was not fixed but malleable and therefore not generalizable (Binet & Simon, 1905/1980; Human Intelligence, 2007b; Noel, 2004; Palmer et al., 2003; Wolf, 1973).

Standardized test made culturally neutral. The importation of the Binet-Simon intelligence scale into the United States required that some adjustments be made to the test. It

had to be “translated, culturally appropriate, psychometrically modified, and normed by American psychologists” (Valencia & Suzuki, 2001, p. 5). The standardization of the test came under scrutiny and criticism regarding the standardization sample that focused on 1,000 children (from the Stanford, California area) and the racial composition for the most part was exclusively White, middle-class children. There appeared to be deliberate exclusion of other racial groups from the sample. Revisions of the Stanford-Binet test in 1937 and 1960 were similarly standardized with a norm group comprised of White children. It was not until 1972 that minority children were included in the standardization group (Valencia & Suzuki, 2001).

Standardized test applied to racial differentiations. Racial differentiation of intelligence led to the first barriers in educational opportunities and career options in 1916 as the Binet-Simon scale was replaced with the Stanford-Binet intelligence test for use in investigating differences in race intelligence. The revision of the test was led by Terman at Stanford University. This test was a revision of the Binet-Simon test, incorporated the intelligence quotient (IQ), and the results were used in the stratification and segregation of races for purposes of education (Chorover, 1980; Noel, 2004; Terman, 1916; Valencia & Suzuki, 2001).

Terman’s (1916) work *Measurement of Intelligence*, written to serve as a guide for the use of the Stanford revision of the Binet-Simon test, discussed the issues of intelligence and educability of minority children. His views were undeniably racist and he stated that newer methods of testing will confirm “significant racial differences in general intelligence, differences that cannot be wiped out by any scheme of mental culture” (Terman, 1916, p. 91). Terman goes on to state that minorities should be segregated and educated for practical work so that they can be self-sufficient as abstract concepts are beyond their scope of learning (Chorover, 1980; Terman, 1916).

Terman's work not only involved the development and sales of test but also was instrumental in application of such tests to determine "vocational fitness" (Valencia & Suzuki, 2001, p. 17). As a result, standardized intelligence testing played a major role in the stratification of students along the lines of educational tracking and educational opportunities via the use of curriculum differentiation. Minority students experienced extreme limitations in regards to educational opportunities and career options as testing during the seminal years of the intelligence testing movement appeared to be biased against them. Minority children were given an assessment for intelligence with a test that had no representation of their race or ethnicity in the norm group. Their futures were solely determined on the basis that the inequality of class and race was due to intelligence (Valencia & Suzuki, 2001).

A measure of intelligence and ability. A variety of standardized tests are currently used as measures of intelligence, ability, and prior learning to determine acceptance into various colleges and universities as well as placement in educational programs. However, the history of the measurement of intelligence and ability identified the pitfalls of such practices such as using a single test, the effects of social class, subjectivity of test results, and the ideology of the testing movement.

Intelligence testing requires a series of tests. Binet's work earned him the distinction of being the inventor of IQ testing but it was William Stern, a German who first introduced the use of the "ratio of mental age to chronological age" (Chorover, 1980; Haney, 1984, p. 602) and thus allowed for the comparison of intelligence in relation to age. Stern's view of intelligence was that "intelligence is a general capacity of an individual to consciously adjust his thinking to new requirements: it is general mental adaptability to new problems and conditions of life" (Stern, 1900/1914, p. 3). His definition of intelligence differentiates it from other mental

capacities that had previously been included in the definition of intelligence such as those capacities that were not emotive and volitional. The broader definition of intelligence had included the assessing “immediate memory, of ability to learn, of range of information, of fidelity of report, or of discriminative sensitivity” (Stern, 1900/1914, p. 3) in addition to “ability to apprehend, to synthesize, of capacity to judge, to conclude, to define, to criticize, etc.” (Stern, 1900/1914, p. 3). Stern’s definition deals with an individual’s adjustment to *new* as opposed to *memory* “whose fundamental teleological feature is the conservation and utilization of conscious contents already given” (p. 3). He further differentiates intelligence from genius and talent, one creating *new* spontaneously and the other which is “efficiency to one kind of content” (p. 3).

Stern (1900/1914) stated that a single test should never be used to assess the intelligence of an individual child. Single tests do not fully encompass what is necessary to determine intelligence and capacity to be educated. There are some individuals who possess a high level of general intelligence and are better able to manifest that intelligence through analytical and critical work versus synthetic work. There are other individuals who possess superior receptive activities of intelligence such as apprehension and understanding versus more spontaneous activities, etc. Thus, two individuals may possess similar intelligence but of different kinds. Testing must be able to systematically compensate for these differences by testing the different activity of intelligence. Therefore testing must be a series of tests that “will set into play the various constituent functions of intelligence...that afford a reliable and symptomatic value, general applicability, and possibility of objective evaluation...a system...of which the several particular results of the testing can be united into one resultant value” (Stern, 1900/1914, p. 22).

Implications of social class on educational test results acknowledged. Social class was identified as being influential in the outcomes of individuals that were being tested. Stern

(1900/1914) contended that no series of tests could determine innate intelligence without all of the complications of differing external influences between the classes. Internal and external factors as well as endowment and environment influences play a role in the resultant outcomes of intelligence testing. However, at that point in time the exact amount and range of influence each factor had on intelligence was unknown (Stern, 1900/1914).

Subjectivity of intelligence test results. Subjectivity of standardized test results became a problem because the results could not be generalized. There appeared to be a mosaic of test results that required “intuition, routine and subjective estimation of their results” (Stern, 1900/1914, p. 24) that culminated in the final decision regarding an individual’s intelligence. A means for objective evaluation through a closed system of tests would be required for the derivation of a final index of intelligence that could be generalized. It was evident that a means to assess intelligence was beyond the scope of educators; it then became a major focus of psychology. Two different approaches arose in ranking intelligence: age gradation developed by Binet and Simon that allows for a rough gradation of intelligence in children encompasses the entire range of development, and the method of rank correlation which allows for greater precision in intelligence testing but is limited to small homogenous groups. Rank correlation allows for finer scaling of rank versus the Binet-Simon gross placement. Ranking intelligence within a group is possible by assessing where within the group each individual ranks in relation to others (Stern, 1900/1914).

Educational ideology of standardized intelligence testing movement. Factors driving the intelligence movement included extra-scientific or ideological factors which were espoused by prime movers of intelligence testing. The key players included hereditarians, eugenicists, and those who were racist. Intelligence testing espoused by the prime movers consisted of

procedures for measuring intelligence, the measurement of intelligence, and the social implications, all of which led to what was considered to be a “value-laden idea with significant implications for the stratification of schooling practices and outcome” (Valencia & Suzuki, 2001, p. 7). The confluence of ideology and intelligence measurement impacted the perception of the line along which social relations should fall not only in arrangement but in control (Chorover, 1980; Valencia & Suzuki, 2001). Chorover stated that “the power to measure is merely an extension of the power to define” (p. 33) and claimed that “the measurement of human diversity has been linked to claims of human superiority and inferiority and has thereby been used to justify prevailing patterns of behavior control” (p. 34).

In 1916 J. McKeen Cattell coined the term “individual differences” (as cited in Marks, 1981, p. 14) as a construct with behavior as its basis and thereby moved the field of psychology into a new arena, behavior science. Attempts to use this construct in understanding social behavior stood in violation of credible scientific practice. Heredity was viewed as being both biological and behavior in nature in terms of the construct of individual differences (Marks, 1981; Valencia & Suzuki, 2001). Marks (1981) described the application of the behavioral construct by commenting that “Psychologists viewed the behavior of people – including women, Blacks, and immigrants – as inherently indicating their biological capacities rather than their socio-economic, cultural-biological conditions” (p. 9). This view severely limited the educational opportunities of women, Blacks, and immigrants (Marks, 1981).

Educational opportunities based on innate ability. Terman’s ideology in the testing movement is said to have deeper implications beyond his self-proclaimed commitment that there should be equal opportunity for all which would enable social amelioration to progress. His view of equal opportunity provided limited opportunity for the poor and people of color and

served to construct a “meritocratic social reality” (Chorover, 1980; Marks, 1981, p. 168) by providing education and training for an occupational status that was to be commensurate with an individual’s innate ability. This skewed attempt to provide equal opportunity would prevent social mobility by limiting educational opportunities (Chorover, 1980; Marks, 1981; Valencia & Suzuki, 2001).

These aforementioned ideologies played an influential role in the standardized intelligence testing movement. The essential components of the evolution of the testing movement included the following: measurement of intelligence by a series of tests which were evaluated, scored and then combined into a single numerical ratio; heredity determined ability which was deemed to be constant; differences in intelligence provided the explanation for class and racial inequality; and in the academic setting, ability, prescribed curricula, and individuals’ futures were defined by intelligence testing (Chapman, 1988; Valencia & Suzuki, 2001).

WWI to 1950 Refinement of Testing Techniques and Expanded Use

Over the course of time standardized testing continued to further expand in technique, form, function, application, and scope as army testing came to an end. Standardized testing began its expansion into education.

Standardized testing in education. Yerkes and Terman’s work with the Army’s Psychological Division came to an end in 1919. Seeking to continue and expand their work, they requested a grant from the Rockefeller Foundation for the purpose of “developing and standardizing an intelligence scale for the group examination of school children – a scale for the measurement of native ability” (Chapman, 1988, p. 77) one day after the dismantlement of the army’s Psychological Division. The emergence of the National Intelligence Tests by World Book Company soon followed as did a myriad of other mental tests. A major error in the

development and application of these intelligence exams was that the General Board of Education of the Rockefeller Foundation as well as Terman made broad assumptions about what constituted American culture and normal experiences within that culture. The assumptions were used in the development of the exams that were in turn used to judge the intelligence of those whose cultural backgrounds differed from what was considered the “norm.” Those whose cultural background and experiences differed, underperformed on the exams versus those whose experiences mirrored the norm. The interpretation of lower scores classified these individuals at lower intelligence levels (Chapman, 1988; Haney 1984). The application of intelligence scores led to the classification and stratification of children into “homogenous instructional groups and for educational and vocational guidance” (Haney, 1984, p. 608).

Variation in grading of student work by multiple teachers as well as the same teacher grading a student’s work more than once revealed that subjectivity of grading was a concern. The move towards objectivity in assessment as a means to provide a more reliable and consistent measurement of student learning helped to push the movement of the newly developed scientific tests of intelligence as a means to improve school efficiency. This efficiency translated into classifying students into homogenous groups for instruction and was the primary use of intelligence tests (Ayres, 1909; Chapman, 1988; Haney, 1984).

By the late 1920s and early 1930s, standardized testing was pretty well entrenched into the education system. World Book Company and Stanford Achievement Tests were making millions of dollars annually in sales of their exams. At the same time, the hereditarian view of intelligence was being replaced by the nature versus nurture concept of the development of intelligence. Statistical analyses for the interpretation of intelligence scores relied upon

Spearman's reliability coefficient, coefficient of correlation, and factor analysis during this era as well (Chapman, 1988; Haney, 1984).

Standardized testing moves to college. With college enrollments on the rise between 1890 and 1924, colleges began to feel the need to somehow accommodate all who sought admission while at the same time maintain their upper-middle-class White clientele. Eugenic and Social Darwinist ideology permeated the testing movement and was embraced by some faculty and administrators who shared similar ideas that associated high intelligence with superior moral character and low intelligence with "negligence, shiftlessness, and imprudence" (Crouse & Trusheim, 1988, p. 21). Columbia was the first college to administer an intelligence test as a requirement for admission, the Thorndike Tests for Mental Alertness. The President of Columbia, Nicholas Murray Butler, hoped that the intelligence test would limit enrollment of Jewish students without the need for a restriction policy. The intelligence tests were used by colleges as a way to deal with the changing demographics as immigration increased. The exams afforded a way to maintain colleges' traditional clientele (Crouse & Trusheim, 1988).

The College Entrance Examination Board was founded in 1900 to standardize the diverse and archaic admissions criteria of colleges. The pre-college requirements of study and systems of determining preparedness differed from college to college (Crouse & Trusheim, 1988; Haney, 1984; Rudolph, 1962/1999). Standardized testing moved into the college arena during the 1920s to 1950s as a means to bring uniformity in college admissions decisions. The early 1920s exams were essay and by 1925 the Board appointed an advisory committee that included Carl Brigham and Yerkes as members, to look into the development of a multiple choice test. The result was the Scholastic Aptitude Test that was quite similar in nature to the Alpha Army test administered by Brigham. The SAT differentiated itself from other types of "subject"

achievement tests and disclaimed any intent of purpose to measure overall intelligence or mental alertness. The disclaimer that the SAT was not a test of intelligence was viewed as ironic in that the SAT was listed in the Mental Measurements Yearbooks (MMYs) under the “Intelligence-Group” rubric from its inception. In addition, Brigham’s commission stated the SAT was similar to an intelligence test in hopes of getting buy-in from colleges who had been using intelligence tests: “It has... been very generally established that scores in such tests usually indicate ability to do a high order of scholastic work” (Crouse & Trusheim, 1988, p. 23). The first test was administered in 1926 using a scale of 800 and gave a single composite score for both verbal and mathematics. By 1930 these scores were reported as separate values. For the next 10 years the SAT was given in conjunction with the older essay exams (Crouse & Trusheim, 1988; Haney, 1984).

Several innovations came about under Brigham’s leadership of the SAT. Each exam included an experimental section where questions for possible inclusion in succeeding exams were tested. As the use of the test increased, multiple administrations were scheduled and in 1941 the Board instituted a method for equating the current scores of the SAT directly to a preceding SAT using the original 800 scale. The SAT was promoted as a means for colleges to make admissions decisions (Crouse & Trusheim, 1988; Haney, 1984).

In 1947 Educational Testing Services (ETS) evolved to consolidate standardized testing programs. It was a non-profit organization incorporated by the New York State Board of Regents under charter number 5515 that represented three organizations: the Carnegie Foundation, the American Council on Education, and the College Entrance Examination Board. (Crouse & Trusheim, 1988; Nairn et al., 1980). The mission of ETS was described by Henry Chauncey, President of ETS as being,

To serve American education by providing test and related services...which will aid in the guidance of students and in their self-understanding, and which will lead to proper selection and placement of students, not only within but at also at the end of the educational process; second, to serve government agencies by providing test and related services in their educational and training efforts and particularly in time of national emergency to serve the federal government in other activities to which testing and related techniques are applicable. (Nairn et al., 1980, p. 3)

Chauncey foresaw the future of ETS being tied to a census of the nation's human abilities through an inventory of human resources. This was viewed as being critical to the National Military Establishment, to industry in regards to employment based on ability differences between the sexes, and to educational planning. With the prospect of another world war looming in the near future, the War Department reinstated widespread testing of its recruits. Testing during WWII using the Army General Classification Test (AGCT) did not receive the attention as did testing during WWI. This was in part due to the widespread acceptance of standardized testing and also due to the War Department's focus on measuring verbal, number and reasoning, and space factors as opposed to native intelligence (Haney, 1984). In terms of education, Chauncey saw the collection of data generated from these exams as being useful for identifying the abilities of the population. Using the national norms from the exams could then provide career guidance for students identified as moving forward in education or moving down the vocational path (Nairn et al., 1980).

The power of ETS grew as its ties to its many constituencies within secondary education, higher education, private and political sectors increased in number on various ETS committees. The ETS network had connections, trust, and influence in high places. Tolerance of contrary

opinions was foreclosed. Its public message was powerful in influencing what the public thought about testing and the solutions it offered for issues of national concern. The best and brightest would proceed to colleges to further develop their talents and the rest would have a reality check as to where their potential versus aspirations would lead them. Abilities would be matched with educational and occupational appropriateness on the basis of a single test (Crouse & Trusheim, 1988; Nairn et al., 1980).

Testing From 1950 to the Present

Standardized testing had experienced widespread acceptance, success, expansion, and refinement during the last several decades but growing concern centered on professional standards in regards to educational testing.

Issuance of standards in 1950s. In 1953 the American Psychological Association (APA, 1954) issued the 1953 Ethical Standards that addressed the sale and distribution of educational tests and diagnostic materials for the purpose of safeguarding the validity and misuse of what was viewed as “professional equipment” (Haney, 1984, p. 616). In 1954 the Technical Recommendations for Psychological Tests and Diagnostic Techniques was issued by the APA in conjunction with the American Educational Research Association (AERA) and the National Council on Measurements Used in Education (NCME). This manual consisted of 160 standards in six categories: (a) dissemination of information, (b) interpretation, (c) validity, (d) reliability, (e) administration and scoring, and (f) scales and norms (APA, 1954; Haney, 1984). An essential principle of the Technical Recommendations for test manuals was that they should “carry information sufficient to enable any qualified user to make sound judgments regarding the usefulness and interpretation of the test” (APA, 1954, p. 2). The Technical Recommendations also advised the need to warn about common misinterpretations of a test such as the use of

intelligence tests to assess native ability and to misuse the scores in relation to IQ scores versus deviation IQ scores (APA, 1954; Haney, 1984). In 1955 a revised version of the 1954 standards were issued by AERA and NCME, Technical recommendations for Achievement Tests. This revision focused on educational tests (Haney, 1984).

The National Merit Scholarship Corporation (NMSC) was founded in 1955 giving further impetus to the ever expanding testing movement. Nationwide testing of high school juniors was a means of identifying those students who possessed the highest academic abilities. Merit scholarships were awarded as a means to encourage students and provide support as they furthered their education and to provide the nation with a pool of talented leaders (Haney, 1984).

A 1957-58 ETS report by Chauncey to the trustees proclaimed that Russia had only one goal and that was to equal or surpass the U.S. in all endeavors. Success would come through the use education as a means to emerge as a super power through “building up scientific, military, and industrial strength” (Crouse & Trusheim, 1988, p. 33). Chauncey’s challenge was for schools to make sure that students of high intellectual abilities were placed in a rigorous curriculum. The means to identifying those students with such abilities could of course be identified through America’s secret weapon of “testing and guidance” (Crouse & Trusheim, 1988, p. 34; Haney, 1984). Not surprisingly, 1958 the National Defense Education Act (NDEA) was passed by the U.S. Congress after the launch of the Soviet Sputnik satellite. This Act provided federal funding for states to

Establish and maintain a program for testing aptitudes and abilities of students in public secondary schools, and ...to identify students with outstanding aptitudes and abilities...

a)to provide such information about the aptitudes and abilities of secondary school student as may be needed by secondary school guidance personnel in carrying out their

duties; and b) to provide information to other educational institutions relative to the educational potential of students seeking admissions to such institutions. (Goslin, 1963, p. 71; Haney, 1984, p. 617)

Issuance of standards and acts in the 1960s to 1970s. The Civil Rights Act of 1964 gave rise to new opportunities for minorities in the U.S. On the educational forefront, the U.S. commissioner of education was charged with the responsibility to assess educational opportunities nationwide. The nationwide survey culminated in the publication of Equality of Educational Opportunity by James Coleman and associates that aptly described the differences in test results for children of various economic and ethnic groups. This in turn gave rise to the Elementary and Secondary Education Act of 1965 that served to provide federal funds for the education of the poor. In order to assess successful outcomes of this educational endeavor, testing would be required and ETS was there to promote their tests stating that their tests provided an objective measure and would give every student the equal opportunity to demonstrate their level of merit (Crouse & Trusheim, 1988).

ETS capitalized on the social concerns of the 60s and 70s by putting a calculated spin on its testing products that virtually ensured continued use of all of its products. ETS promoted the SAT as being a color-blind instrument, untainted with social inequalities of opportunity and was therefore able to provide an assessment of ability that would place minority students and white middle-class students on equal footing and allow for equal allocation by merit. On the other hand, its achievement test outcomes would be adversely affected by students of low socioeconomic backgrounds and their associated lack of educational, social, and cultural opportunities. Therefore, these tests were said to be appropriate in diagnosing students who had unequal opportunities so that interventions could be initiated (Crouse & Trusheim, 1988).

ETS benefited from government policy as well. Testing services were used in hiring, firing, and promotion policies at the federal and state level. Testing services were also required in education for “selection, placement, diagnosis and remediation, guidance, program evaluation, and more recently, certification of competence” (Crouse & Trusheim, 1988, p. 37). As a result, the financial records of ETS indicated a 1,100% increase in operating expenses; a 555% increase in staffing; and a increase in revenues of 25-fold from 1948 through 1973 (Crouse & Trusheim, 1988).

In 1965 Congress passed the Elementary and Secondary education Act (ESEA) of 1965 that provided Title I funding of educational programs for children from low-income families. The funding had strings attached that required evaluation of the effectiveness of the funded programs. Local educational agencies receiving Title I funds used a variety of different tests and analyses to evaluate program effectiveness. The markedly different analyses across the nation resulted in the Education Amendments of 1974 requiring uniform methods of evaluation to be developed by the U.S. Office of Education for the purpose of generating comparable results (Haney, 1984; Rutherford & Hoffman, 1981).

In 1966 a revised version of the 1954 Technical Recommendations was put forth by the APA, AERA, and NCME called the Standards for Educational and Psychological Tests and Manuals. While similar to the 1954 standards, the changes focused on the public role that testing played in social issues and problems associated with misuse of the tests. This revised version again emphatically warned about misinterpretations; however, reference to the use of IQ in conjunction with deviations scores was deleted from the verbiage (French & William, 1966; Haney, 1984). In addition, the 1966 Standards combined categories of test validity and dropped the use of correlation coefficients opting for “the estimation of clearly labeled components of

error variance” (French & William, 1966, p. 26; Haney, 1984, p. 620) which was considered to be “the most informative outcome of a reliability study” (French & William, 1966 p. 26; Haney, 1984, p. 620).

The impact on the testing scene was evidenced indirectly through achievement test revisions in the 1970s and 1980s as Title I programs grew in number and their required evaluations grew in diversity. The metric used for aggregation of Title I evaluations and analyses were norm-referenced tests (NRTs). These types of tests interpreted results in terms of referencing them to the performance of the norm group or standardization group. NRTs included the Army Alpha and Beta test, the SAT and various other intelligence type tests. Criticisms of NRTs came into play during this time as some researchers were pushing for criterion-referenced tests (CRTs). CRTs determine an individual’s status in reference to a specified criterion or performance standard versus performance of other individuals. Thus, CRTs gave information on what an individual could do rather than how the individual compared to others (Haney, 1984; Popham & Husek, 1969; Rutherford & Hoffman, 1981).

The important differentiation between NRTs and CRTs was their meaningfulness of the scores and how to use the information derived from them. Both demonstrate usefulness in their own right. According to Popham and Husek (1969), NRTs allow for comparisons among individuals and as such are useful in making decisions about individuals such as who should continue their education and who should pursue a vocational track. CRTs are useful in making decisions about individuals and the level of mastery of knowledge and skills. CRTs are useful in determining educational programs and the type of instruction required to facilitate learning of individuals at various levels of mastery (Popham & Husek, 1969).

The 1974 Test Standards were the result of the IQ debate and calls for the reform of testing. Major changes were evident in this new revision of the previous 1954 and 1966 Standards. The purpose of the 1974 document was to serve as a guide for the developers and the users of the tests. Three categories emerged in the revision: (a) Test manuals and reports, (b) reliability and validity research and reports, and (c) the use of the tests. Warnings were also included in the 1974 Standards stating that “interpretive scores that lend themselves to gross misinterpretations, such as mental-age or grade equivalent scores, should be abandoned or their use discouraged” (as cited in Haney, 1984, p. 623). The Standards required that the manual or research report should indicate that no biases for ethnicity, sex, or other types of subsamples be present in the test. The report should state that no differences were found among the various subsample groups (Haney, 1984). Interpretations of test scores should be used to “estimate the performance under a given set of circumstances. It should not be interpreted as some absolute characteristic of the examinee or as something permanent and generalizable to all other circumstances” (as cited in Haney, p. 624).

Controversy over standardized testing and IQ surfaces again. The IQ controversy and standardized IQ test score interpretations created a flurry of articles after an article appeared in the *Harvard Educational Review* by Arthur Jensen (1969) entitled *How Much Can We Boost IQ and Scholastic Achievement?* Jensen’s article brought back to the forefront the notion that genetic intelligence was the determining factor in racial intelligence difference, a notion that had come and gone for a short time period. IQ was considered to be the premier predictor of an individual’s scholastic achievement as well as correlations to economic and social issues. Jensen purports that IQ is genetically inheritable and along with one’s IQ level comes the inevitable class differences (Chorover, 1988; Green & Griffore, 1980; Haney, 1984; Herrnstein & Murray,

1994; Jensen, 1969; Valencia & Suzuki, 2001). His research stated that it was reasonable to hypothesize that the one standard deviation or 15 points on the average IQ difference between Whites and Blacks was primarily due to genetic factors (Chorover, 1988; Haney, 1984; Herrnstein & Murray, 1994; Jensen, 1969; Valencia & Suzuki, 2001).

The Bell Curve addresses the racial results of standardized testing. Twenty-five years later *The Bell Curve: Intelligence and Class Structure in American Life* was published. The thesis of this work focused on the intellectual inferiority of African-Americans compared to Whites. The basis for this inferiority was the same as Jensen's (1969), standardized test scores that equated to IQ scores that were 15 points lower than Whites. Herrnstein and Murray (1994) claim that the impetus for their research was "the quest for human dignity" (p. 551). Differences in human intelligence are not without certain levels of inequality. They describe the cognitive elite as those who are more intelligent and are employed in high-IQ professions such as law, medicine, and so forth. Cognitive stratification in American society was resulting in those with lower cognitive abilities not crossing paths with the cognitive elite; physical separation on the basis of cognitive abilities was evolving (Chorover, 1988; Delgado & Stefancic, 2001; Green & Griffore, 1980; Herrnstein & Murray, 1994; Valencia & Suzuki, 2001).

According to Jensen (1994), social problems are associated with intelligence. Those who exhibit undesirable social behaviors are said to be those who possess below average intelligence. Low IQ scores tend to be precursors of poverty; higher dropout rates from high school and college; unemployment, higher rate of injury and idleness; higher divorce rates; higher rates of illegitimate births; dependency on welfare; children with behavior problems, motor skills and poor social development; increased criminal activity; have no interest in political issues and are less likely to vote (Chorover, 1988; Herrnstein & Murray, 1994).

The Bell Curve addressed Affirmative Action policies in higher education and in the workplace and have resulted in psychological consequences as underprepared students end up doing poorly in college or drop out altogether. Workplace performance discrepancies result as lower IQ employees fill positions requiring higher cognitive levels. Colorblind admissions in colleges and universities and in hiring practices have been promoted such that disadvantaged groups are given preference only when their qualifications are similar (Chorover, 1988; Delgado & Stefancic, 2001; Herrnstein & Murray, 1994).

The culmination of Herrnstein and Murray's (1994) research offered up two scenarios. The first being the evolution of a custodial state or expanded state of welfare for the underclass and the second being a rethinking of what equality and inequality has come to mean:

Inequality of endowments, including intelligence, is a reality. Trying to pretend that inequality does not really exist has led to disaster. Trying to eradicate inequality with artificially manufactured outcomes has led to disaster. It is time for America once again to try living with inequality as life is lived: understanding that each human being has strengths and weaknesses, qualities we admire and qualities we do not admire, competencies and incompetencies, assets and debits; that the success of each human life is not measured externally but internally; that all of the rewards we can confer on each other, the most precious is a place as a valued fellow citizen. (pp. 551-552)

According to some researchers in behavior sciences social stratification is inevitable in any society and is not the result of "social discrimination and the preservation of privilege on a massive scale" (Chorover, 1988, p. 30). People are said to end up in the social hierarchy at the level at which their native abilities allow and they receive the inherent treatment they deserve. A prevalent interpretation of the facts is that socially subordinate members of society who reside in

inner cities and rural areas possess relatively low IQs as evidenced by standardized testing and are placed in the hierarchy according to their innate stupidity. On the other hand, the socially dominant members of society are rich, powerful, possess high IQs as evidenced by standardized testing and occupy higher levels within the social hierarchy due to their innate intelligence (Chorover, 1988; Green & Griffore, 1980; Herrnstein & Murray, 1994).

Growth of educational policy in testing. With social issues being linked to education, the use of large-scale standardized achievement testing has become the focus of educational policies. The application of these testing outcomes was for tracking students in regards to curriculum, class assignments, grade promotion, receipt of a high school diploma, career counseling, college admission, and so forth. Accountability for educational outcomes at the federal and state level has received widespread public support for accountability of school districts, schools, and educators with implications for student accountability as well. With high-stakes testing being used for high-stakes decisions, the potential for misuse was an important issue that needed addressing. The National Academy of Sciences (NAS) was asked by Congress to conduct a study on standardized testing and make recommendations as to methods, practices, and safeguards that were appropriate for assessing student performance that would balance the cost, benefits, and unintended negative consequences for individual students. The NAS committee viewed the validity of a test as being valid for its specific purpose. They acknowledged that tests are not perfect, test questions are representative of only a sample of all questions that could be asked to assess knowledge and skills, and no single test score is able to definitively measure an individual's knowledge. Therefore, no single test score should be the basis for educational decisions. The value of these tests should be used in conjunction with other

information when making high-stakes decisions (Heubert & Hauser, 1999; Wainer & Braun, 1988).

Persistent inequalities in American society were and still are reflected by lower achievement test scores for ethnic and racial groups and those from low-income families (Herrnstein & Murray, 1994; Heubert & Hauser, 1999). However, this does not reflect that the current realities of these groups of students are inalterable. It means that the use of such tools for making high-stakes decisions be used in a fair and appropriate manner. There is overrepresentation of minority groups, English as a second language groups, and low socioeconomic groups assigned to lower-track classes, denied grade promotion or graduation, or denied college admission simply on the basis of test scores. Conversely, there is underrepresentation of these same groups in talented and gifted curriculum programs. It has been noted that test performance is influenced by individuals' health on the day of the test, quality of curricula, quality of teaching, and level of expectation of the individual learner (Heubert & Hauser, 1999).

Social psychologist Claude M. Steele of Stanford University rejects most of the explanations for low SAT scores for Blacks and postulates the hypothesis of a psychological phenomenon of "racial stereotype vulnerability" (News and Views, 1999, p. 11). Expectations of Black students appeared to influence their performance on the SAT. Performing poorly would reinforce the racial stereotype of Black inferiority. As such, the power of suggestion becomes a self-fulfilling prophecy. The late John Ogbu formerly from the University of California at Berkeley proposed a similar theory about the expectations that differ between Black and White students from teachers and their parents regarding academic performance. Teachers expect more from White students and offer more challenging opportunities to learn. Black parents reinforce

the stereotypical expectation by not encouraging their children to take more challenging courses and not pushing them to work hard and succeed at higher levels. Parents' expectations on grades differed as well. White students reported a grade higher than Blacks on school work that would not make their parents angry. In addition to parental expectations, peer expectations also influenced performance. Black students were influenced by strong peer pressure not to actively participate in class and complete homework assignments or risk being accused of "acting white" (News and Views, 1999, p. 11). The racial tension that exists in some schools between Blacks and Whites make it difficult for Black students to risk alienating the group to which they identify (News and Views, 1999).

Thus, various factors appear to be influential in impacting performance rates in school and on standardized tests. Studies have demonstrated in one way or another, a certain level of validity to each. Therefore, to assume genetic intelligence is the underlying factor as Binet, Goddard, Terman, and Yerkes did, is to dismiss this growing body of evidence to the contrary (Binet & Simon, 1980; Crouse & Trusheim, 1988; Gould, 1981; Terman, 1916; Yerkes, 1920) .

Genetics as a point of origin for innate intelligence as previously discussed places those of African descent at the lower levels (Binet & Simon, 1980; Gould, 1981; Green & Griffore, 1980; Terman, 1916; Yerkes, 1920). Differences of opinion are widespread among scholars knowledgeable about IQ. There is also a widespread degree of uncertainty among scientists as to what the truth is in relation to IQ. A survey of 1,020 scientists in the 1980s revealed that genetics was not believed to be the primary factor of intelligence; instead genetics was believed to contribute 1%, environmental factors 15%, and environmental and genetics combined 45%. Nearly one quarter of the respondents perceived that data were insufficient, and 14% gave no response (Herrnstein & Murray, 1994).

The Ralph Nader Report on Educational Testing Service

The Ralph Nader Report on Education Testing Service came about as students reported how a three hour multiple choice exam had derailed educational and career opportunities even though they demonstrated good performance in grades and had successfully engaged in extra-curricular activities. Educational Testing Service (ETS) psychometricians and along with other specialists purported that the testing schema was extremely complex and that consumers of such examinations did not possess the qualifications to even begin to question the sovereignty that these tests held over their lives. As such, Nairn led a group of students to ETS headquarters to gather data for a report for a “consumer perspective and analysis of ETS as judge and gatekeeper for millions of young Americans” (Nairn et al., 1980, p. xi).

ETS provides five major examinations that are the largest source of income for the organization: the Preliminary Scholastic Aptitude Test/National Merit Scholarship Qualifying Test (PSAT/NMSQT), the Scholastic Aptitude Test (SAT), the Graduate Record Examination (GRE), the Law School Admission Test (LSAT), and the Graduate Management Admission Test (GMAT) (ETS, 2008). They also offer an array of tests including Praxis Tests for teacher licensure and major field tests to name a few (ETS, 2008; Nairn et al., 1980). Many of these tests influence the admissions and financial aid decisions made by those in higher education thereby affecting the future of every individual in terms of career and job opportunities. This in turn establishes their socioeconomic status through salaries equated with various careers and jobs (Green & Griffore, 1980; Nairn et al., 1980; Valencia & Suzuki, 2001).

ETS viewed as questionable by Nader. ETS claimed that their aptitude tests were unbiased. However, in 1971, Vice-president Richard S. Levine cited an internal memorandum to the contrary. ETS claimed their tests were impervious to improvement of scores through

coaching and cramming sessions (Nairn et al., 1980). These claims were characterized by the Federal Trade Commission's Bureau of Consumer Protection as being "unfair and deceptive trade practices" (Nairn et al., 1980, p. 57). The aptitude tests developed and offered by ETS are said to be a "specialized variety of fraud" (Nairn et al., 1980, p. 58), one that is considered respectable because ETS adheres to the rules established by the psychometric profession and has been accepted for over eighty years by powerful political and economic institutions. Nairn et al. reports that ETS has been described as being characterized as follows:

By a tolerance for obfuscation and a bedrock of assumption about the right and responsibility of the mental tester to use multiple-choice questions to define the potential for thinking, and then regardless of the evidence, to draw broad conclusions about the extent to which a person possesses it. (p. 58)

A look at these and other fraudulent aspects of ETS set forth by Ralph Nadar follows.

SAT predictive value. The predictive value for estimating first year grades by use of SAT scores has been compared to the roll of the die providing an average increase in predictive value of only eight to 15%. A study by Alexander W. Astin (1971) on Predicting Academic Performance in College revealed that that SAT scores' predictive value in estimating college attrition was between 2.9 and 3.2% (as cited by Nairn et al., 1980, p. 63). The correlation between SAT scores and grades in succeeding years has proven to be 2.6 and 5.1% (Nairn et al., 1980).

The use of SAT scores as predictors of grades and retention is inferior relative to the use of previous grades as predictors. In combination the two improve the predictive value by only 5% or less. This has been the argument in support of using standardized tests as a part of the criteria for college admissions. The ACT test offered by the American College Testing Program

(ACT) produce similar predictive results as the SAT (Crouse & Trusheim, 1988; Nairn et al., 1980).

Predictors of success in college. Psychologist Jonathan R. Warren surveyed over 300 professors in 1972 to identify qualities that students needed to possess in order to succeed in college over the long haul. His findings revealed that “motivation was the quality most frequently cited by over 300 college teachers during a recent study of academic performance. The teachers mentioned students’ academic commitment and interest even more often than intellectual ability as characteristics of their best students” (Nairn et al., 1980, p. 71). Furthermore, Astin (1970) wrote in the chapter Racial Considerations in Admission in Nichols and Mills’ book *The Campus and the Racial Crisis* that

In a very practical sense, the student’s ability to stay in college is a more appropriate measure of his ‘success’ than is his freshman GPA. Although it is true that good grades will help him gain admission to graduate school, to win graduate fellowships, and even to secure certain types of jobs, they are irrelevant to any of these outcomes if the student drops out of college before completing his degree requirements (p. 45).

Astin (1970) further stated that the use of SAT scores to predict retention was 2.9% for women and 3.2% for men versus the predictive value of college grades at 5.8% for women and 1.2% for men. Blind chance was said be as good a predictor as the SAT in predicting retention (as cited in Nairn et al., 1980, p. 73).

In 1979 Leonard Baird, an ETS researcher performed a literature review on college performance and found that “the best predictor of accomplishment in college was not the tests but accomplishment in the same area in high school, as measured by simple check lists of nonacademic achievements” (Nairn et al., 1980, p. 77). His review of the literature did not reveal

any aptitude tests that demonstrated comparable predictive capabilities. Baird's summary statement was "Information about past accomplishments is the best predictor of future accomplishments" (Nairn et al., p. 77).

Test-taker performance factors. The test-takers mastery of knowledge and skills required by the SAT multiple-choice tests is known as "testwiseness" and demonstrates similar correlations to SAT scores as SAT scores correlate to grades. A test-taker's susceptibility to "test anxiety" that encompasses fear and tension under test conditions exhibits a stronger correlation with SAT scores than SAT scores to future grades. While ETS maintains that "coaching" or "short term training in testwiseness with exercises to reduce anxiety" (Nairn et al., 1980, p. 83) does not result in higher SAT scores, a memorandum from the Federal Trade Commission states that significant gains in SAT scores were produced through coaching.

Adult test takers. Nairn et al. (1980) writes that multiple-choice test-taking rewards some and penalizes others for reasons unrelated to their ability to answer questions relating to words and numbers. While ETS tests are known to racially discriminate it also has been shown to discriminate on the basis of personality as well as age. In regards to age, ETS claims that the ability of adults to reason and solve problems beyond their early twenties is due to a decline in aptitude. The American adult is said to deteriorate into ignorance between 20 and 60 years of age on the basis of performance on common intelligence tests according to University of Wisconsin Professor Karl U. Smith. However, as quoted in Nairn et al., Professor Smith stated that research has proven that

General skill, creative productivity, learning ability and practical knowledge all increase sharply and progressively in almost identical ways beyond age 20-25 to reach varying peaks in the age range of 30-40. Thereafter, all of these real-life performances are

maintained at a high level with some slight decline between the ages of 40 and 60 (p. 85).

Thus, the implication is that aptitude tests penalize those who have been out of school for a number of years and do not have recent practice in test-taking skills.

A study performed by the College Board (n.d.) on 46,160 adult test-takers in 1997-1998 reported that adults typically had lower scores on the SAT versus recent high school graduates. However, the verbal scores of adults aged 30-39 was higher than seniors. In addition, the same study reported that test scores greater than five years old were not predictive of student success. Adult learners bring high motivation and valuable life experiences that can positively impact their success in college (College Board, n.d.; FairTest, 2007).

Personalities also exhibited an impact on SAT scores. While 80% of all test-takers experience some degree of anxiety, a certain percentage experienced severe anxiety under testing conditions and associated expectations that led to a debilitating disadvantage. ETS researcher Dr. John French performed a study in 1961 that identified several causes of concern and anxiety of SAT candidates: short time limits, expectations of family, and scholarship opportunities based on scores (as cited in Nairn et al., 1980, p. 86). Dr. Marjorie Kirkland's review of testing literature revealed a strong positive correlation between the level of aspiration of the test-taker and the level of anxiety they experienced (as cited in Nairn et al., 1980, p. 86). ETS researcher Bruce Bloxom performed a study in 1968 that also found a correlation between SAT scores and anxiety. His results suggested that SAT scores for those who suffer anxiety during testing were more reflective of how they felt taking the test versus how well they would perform in college (as cited in Nairn et al., 1980, p. 87). In contrast, there is a significant but small tendency for some test-takers to score even higher on the SAT in response to moderate stress levels during

testing. In addition, anxiety during aptitude testing has been shown to affect performance along ethnic background as well as social class lines. Ethnic minority students exhibit higher test anxiety than do Whites. Higher test anxiety has also been demonstrated in lower class students (Nairn et al., 1980).

Idiosyncrasies of multiple-choice exam questions also tend to reward certain personality types and penalize others. Those students who can learn test-taking strategies that mean sacrificing thorough reasoning and precision in mathematical calculations for speed by making quick approximations perform better. Two types of personalities were described as being “broad categorizers” and “narrow categorizers” (Nairn et al., 1980, p. 90). Those who were broad-categorizers were those who were able to use the test-taking strategy of scanning the question and answers, eliminating some choices, and selecting the answer without having to work a problem through to a precise answer. Those who were narrow-categorizers insisted on accuracy and worked problems out to a final answer. This approach is much more time consuming and thus narrow categorizers are faced with greater time constraints, answer fewer questions, and thus achieve lower scores. A review of the math section of the SAT in 1974 revealed that those candidates who failed to answer all questions actually had a higher percentage of their answered questions correct but scored lower overall because they failed to complete the test (Nairn et al., 1980).

It has been recognized that taking multiple-choice tests is a skill that can be learned. Teaching candidates test-taking strategies was proposed as a means to eliminate the disadvantage of those students who were narrow categorizers. In a study conducted by Dr. Jason Millman, Dr. Carol Bishop, and Robert Ebel, the former ETS Vice President, testwiseness was said to be independent of the student’s subject knowledge. Statistically significant gains in scores could be

achieved by instructing students in the “guessing strategy” (as cited in Nairn et al., 1980, p. 93). As a result numerous prep courses for the various types of examinations have been developed though the years. In January 2000 US Patent 6015297 was issued for a Method on Teaching an Examinee to a Take Multiple-Choice Examination (Patent Storm, 2008).

ETS had claimed repeatedly that the exam scores could not be influenced significantly by coaching. However, students viewed commercial coaching as a matter of equity. Competitiveness for admission to colleges and universities fueled the drive of families to pay for coaching programs in hopes that students’ scores could be boosted. In some respects, this was viewed as a respectable form of cheating. Students practiced test questions, many of which showed up on the exam as being nearly identical if not identical to the practice questions. As quoted in Nairn et al., 1980, an owner of an SAT coaching school in New Jersey, Robert Scheller reported that

There are about five of us who take the SAT on a frequent basis. We all have photographic memories and from this we make up our own version of these tests. Our exam is as close to the actual test as possible, without using the exact same questions (p. 97).

Issues of equity became the larger issue as opportunities for gains in SAT scores came with a price tag. Those at the lower end of the socioeconomic scale were not able to afford the cost of the coaching program. Those at the higher end of the scale were getting the benefits of coaching and advancing their position in the competitive admissions process (Nairn et al., 1980).

One other issue that resulted from coaching schools and boosting SAT scores was that of the scientific credibility of the exam. If the SAT measured aptitude that was gained over years of study and practice then how could ETS explain the significant gains on the SAT exam for

students who participated in coaching school programs? A Boston coaching school investigation ensued. Through statistical analysis, the Boston report demonstrated that SAT coaching programs had on the average raised SAT scores by more than 100 points (as cited in Nairn et al, 1980, p. 101). Reanalysis of the study by Sesnowitz and Bernhardt demonstrated that after factoring out background variables, the average SAT scores were raised by 25 points indicating that coaching can be effective (as cited in Nairn et al., 1980, p. 104).

Bias of ETS exams acknowledged. ETS acknowledged the fact that certain minority and economic students were penalized by the multiple-choice exams. Scores were below average for many minorities when compared to the scores of White middle-class students. When these scores are used to regulate access to higher education then minority students are faced with barriers that prevent access to higher learning and higher level career choices. As a result, there is underrepresentation of minorities in professional fields (Franklin, 2007; Nairn et al., 1980).

Cultural differences including language and vocabulary can negatively affect the scores of minorities (Franklin, 2007; Medley & Quirk, 1974; Nairn et al., 1980). Several experiments in the 1970s demonstrated the effect on the scores of Blacks and Whites when the language, vocabulary, and content reflected Black culture. A study using an experimental version of the National Teacher Examination (NTE) was given to Black and White examinees. Donald M. Medley from the University of Virginia and Thomas J. Quirk from ETS developed questions for the exam that reflected Black culture and questions reflective of the last several decades. Scoring of the exam revealed a dramatic increase in the scores of Black examinees for the Black item test questions. Scores of Black examinees increased 19 points relative to White examinees when there was a complete shift to Black item questions. Researchers' conclusions were that

there was a difference in the set of knowledge possessed by Blacks versus Whites in regards to conventional content areas included on the exam (Medley & Quirk, 1974; Nairn et al., 1980).

In 1972, a study was performed using the BISCH test, the Black Intelligence Scale of Cultural Homogeneity developed by Dr. Robert L. Williams of Washington University with content that came exclusively from Black culture (as cited in Nairn et al., 1980, p. 115). The test was given to 100 Black and 100 White students in St. Louis. Observation of students during the exam revealed that Black students were quite at ease during the testing period, became engaged in the test, and even found humor in some of the questions. White students on the other hand exhibited discomfort with the exam. The results demonstrated that the performance of Black students was systematically higher than that of White students by 71 %. This test demonstrated the penalty that students of different cultures experience when given an exam that is normed for a culture that is not their own (Nairn et al., 1980).

So in summary, a variety of factors may play a role in the poor performance of African American students on SAT tests. These include anxiety, lack of opportunity for coaching, lack of multiple-choice test-taking skills, personality, poor educational preparation, lower income, age, expectations, and racial discrimination. Coaching courses are said to help alleviate the stress and anxiety of test-taking, give students practice answering similar types of test questions that appear on the exam, and teach test taking strategies whereby students guess at the answers instead of thoroughly examining and reasoning through to a correct answer. These coaching programs have been shown to increase aptitude test scores. If SAT exams and other tests scores can be altered by coaching then the credibility of purpose and function is questionable in light of the fact that these exams are biased against certain personality types, age, socioeconomic backgrounds, and race (Franklin, 2007; Medley & Quirk, 1974; Nairn et al., 198).

Standardized Testing in the 80s to present

Standardized testing was widespread by 1980 up through to the present day as evidenced by the proliferation of testing instruments and their application by education institutions. While the number and use of tests had dramatically increased, there was little evidence that any progress had been made in the construction of the tests themselves (Buros, 1978; Haney, 1984). Technology had improved the ability to score, analyze, and report tests results through the use of electronic machinery but little else about the testing process changed. Tests had now become a key element in how important decisions were made regarding graduation from high school, grade promotion, acceptance into college, and so forth, all of which affected the life chances of individuals (Crouse & Trusheim, 1988; Haney, 1984). While it is true that tests generate an abundance of useful data regarding student learning and it is widely accepted and supported by the public it does have its limitations and pitfalls as noted in the previous discussion and by supporters of standardized testing (Phehls, 2005)

The rationale for using current standardized tests for college admission: SAT and ACT. College admissions officers typically use high school GPA and scores on college entrance tests such as the SAT or the ACT to predict the probability of an applicant's success in their first year of college. This success is measured by first year college GPA (Breland et al., 2002; Noble & Sawyer, 2002). The measurement of high school GPA and college GPA are not only reflective of academic achievement but also reflect non-academic characteristics such as a student's effort, motivation, conformity, attendance, work schedules, dependents, and other external influences (Goldman & Widawski, 1976; Noble & Sawyer, 2002; Stiggins, Frisbie, & Griswold, 1989). The ability to accurately predict a student's success in college is influenced by more than a student's academic abilities. Recently several states, California, Florida, Texas, and

Washington eliminated the use of race in their admissions policies. In November 2006 Michigan voters passed Proposal 2, an initiative that will ban affirmative action in college and university admissions. The impact of this proposal supersedes the 2003 victory that the University of Michigan received in the Gratz versus Bollinger and Grutter versus Bollinger cases whereby the United States Supreme Court ruling supported the flexible use of race-based admissions. With these recent legal challenges and state propositions regarding the use of race in admissions, other institutions are considering the elimination of race in their admissions criteria (Orfield & Miller, 1998).

With the advent of race-blind admissions policies, institutions are reevaluating their practices in an effort to find a policy that will help them fulfill their mission of achieving a diverse student population for the enhancement of discourse and learning at their institutions. With admission policies under scrutiny, some institutions are maintaining the use of high school rank, high school GPA, test scores, and other secondary information. Others are minimizing the use of standard admissions test scores and there are some that have eliminated the use of standardized test scores altogether.

Scholastic Aptitude Test

Purpose of the SAT. The first offering of the SAT exam was in 1926. Its creator was Carl Campbell Brigham who had previously helped in the development of the “Army Alpha” intelligence tests. The test was developed for use by the CEEB. In 1947, the ETS became the overseer and administrator of the standardized testing programs by CEEB and the Carnegie Foundation (CEEB, 1992). The purpose of the test is an assessment of innate academic verbal and quantitative aptitudes to predict college grades for graduating high school students (Stern, 2005; Popham, 2006). The test format was similar to the format currently being utilized and was

comprised of two 30-minute verbal sections that included reading comprehension, vocabulary, and verbal reasoning. There were also two 30-minute math sections which assessed basic arithmetic, algebra, and geometry. A non-graded section was also included to field test new questions for future exams as well as parallel test the current version with past versions to assess validity. All versions of the test after 1941 utilize these experimental sections to equate the exams to each other (CEEB, 1992).

The scores range from 200 to 800 points for each section, verbal and math. In the past the scores were readjusted to produce a 500 point average. The new SAT test offered in 2005 eliminated analogies, added algebra II, and a writing component. It is reported to be more reflective of what is being taught in class. Top combined SAT section scores can now reach 2400 with the addition of the writing assessment (Atkinson, 2009; Popham, 2006; Stern, 2005).

The SAT is used to predict freshman college grades. Regression equations based on the previous year's student performance are used to predict the performance of applicants. The College Board offers free online services called the Admitted Class Evaluated Service (ACES) that is available for colleges and universities to use in predicting the overall performance of admitted students as well as predict how well they will perform in specific courses. ACES offers a combination of predictive measures that can be utilized in the evaluation such as demographics, ethnicity, gender, and English speaking ability in addition to others criteria that a college or university may choose to use. Analysis is performed on these measures to determine differential performance as well as develop prediction equations. The data analysis for the Admission Validity Study uses univariate analysis for each of the individual predictors. Multivariate analysis including regressions is used to determine the predictor weights which are then used to predict the future performance of students. Due to the selectivity of students in the

studies, the analyses are also adjusted for restriction of ranges. There is also adjustment of the bivariate and multivariate statistics to account for the course-taking patterns of the students (CollegeBoard, 2006).

Validity of the SAT. In determining the validity of predictive value, a relationship between the test scores and first-year college grades is assessed and reported as the correlation coefficient or r value. A test that is considered valid would be one that could predict a person's performance with perfect prediction being 1.0 or 100%. In the College Board's Handbook for the SAT Program 2000-2001, it was reported that the SAT verbal scores and the SAT math scores had a correlation to freshman grades of .47 and .48 respectively. Correlation coefficients must be squared in order to determine the proportion of variance in student success explained by SAT scores. As such, the predictive ability, r squared for the SAT verbal and math would be .22 and .23 respectively or an overall correlation of about 22.5%. High school grades on the other hand have a correlation of .54 or a predictive ability of about 30% in comparison (FairTest, 2007). When the SAT is used in conjunction with high school grades, predictability goes up but only by about 5% (Nairn et al., 1980).

The College Board maintains that the SAT works well on its own as a predictor of college grades, however the best way to predict freshman grade point average is to look at both SAT scores and high school grade point average. The College Board also states that research has shown that the ability of the SAT to predict freshman grades is fairly consistent across all ethnic groups. According to the College Board, the test appears to be best at predicting Asian American performance. It also appears to be a better predictor of women's performance than of men's performance; however, at the most highly selective colleges, this pattern appears to be reversed (CollegeBoard, 2006). This statement by the College board on predicting women's

performance is contradictory to the findings of the Center for Women Policy Studies (CWPS) who report that women have lower SAT scores than men but their college performance is better than men (as cited in Horn, 2007, p. 35).

Several institutional studies have called into question the validity of the SAT in predicting first-year college success. A study by Baron and Norman (1992) in Educational and Psychology Measurement at the University of Pennsylvania examined the power of class rank, SAT I, and SAT II in their ability to predict cumulative GPAs in college. SAT I explained only 4% of the variation in college grades and was the weakest predictor of the three. SAT II scores explained 6.8% of the academic performance differences. Class rank gave the greatest predictive value of 9.3%. The total predictive value of class rank and SAT I give a combined is 13.3% which leaves about 87% of the variation in grades unexplained (Baron & Norman, 1992; FairTest, 2007). In 1998, a study was conducted of 10,000 students at 11 selective public and private higher education institutions. This study demonstrated that there was only a one-tenth of a grade point increase for college GPA for a 100-point increase in SAT combined scores when race, gender, and program of study were held constant (FairTest, 2007).

The University of California (UC) conducted a three-year validity study at the state's eight institutions to assess the power of the SAT I, SAT II, and high school grades in their predictive ability of student success in college. The study tracked 80,000 students from 1996-1999 and demonstrated that the SAT I accounted for only 12.8% of the variation in freshman students' GPA. SAT II and high school GPA accounted for 15.3% and 14.5% respectively. The result was that in February 2001, President Richard Atkinson of UC presented a proposal recommending that UC students take a new SAT I including a writing component plus two SAT IIs in content areas such as English, mathematics, history or social science, laboratory science, or

a non-English language. Students could also opt to take the ACT with its new writing component in lieu of the SAT I. These recommendations came about as Atkinson issued a call to higher education to re-evaluate the use of standardized tests in the admissions process stating that they should be brought closer in their alignment with the high school college preparatory curriculum (University of California, 2003).

American College Testing

Purpose of the ACT. The ACT is purported to be the most widely accepted college entrance exam in America. This test was introduced by E. F. Lindquist, a professor at the University of Iowa. The SAT was viewed primarily as being an entrance exam for the Northeast elite universities. While the SAT is said to measure inborn aptitude, the purpose of the ACT to assess the general educational development of high school students and their predicted ability to successfully complete college coursework. Thus, it is basically an achievement test (Popham, 2006). It measures the student's academic skills and knowledge attained in their typical high school college-preparatory curricula. The test covers four content areas: English, Mathematics, Science, and Reading with an optional writing component. The 30 minute Writing Test encompasses a student's ability to plan and write a short essay. The emphasis of the test focuses on reasoning, analysis, problem solving, integration, and application. Scores are reported as composite scores and test scores ranging from one to 36. Seven subscores are also reported such as usage, mechanics, rhetorical skills and so forth, ranging from one to 18. There is no direct relationship between the test score and the subscores; they are not additive (ACT, 2006a).

Validity of the ACT. Several studies were done to assess the validity of the ACT test. A study by Noble and Sawyer (2002) on the predictive value of high school GPA and ACT composite scores indicated that a high school GPA of 4.0 was not as predictive of first year

college GPA as it was for students with a high school GPA of 3.0 or less. In addition, some high school GPA values that were less than 3.0 were not able to discriminate a student's probability of achieving different first year GPAs. Evidence is suggestive that there are noncognitive factors that significantly contribute to high school GPAs that are lower than a B. Their research further indicated that ACT composite scores were equal or better as a predictive indicator of a student's success in their first year of college than just high school GPA alone. Joint assessment of high school GPA along with ACT composite scores exhibited greater predictive value than indicator alone (Noble & Sawyer, 2002).

Noble's (2003) study investigated the differential effects of using ACT composite scores alone and in conjunction with high school GPAs for African American students, Hispanic, and Caucasian American students in non-race based admissions practices. The Noble study indicated that African American and Latina(o) students having the same ACT Composite score or high school GPA as Caucasian students had slightly lower college GPAs. The use of expected college GPA and high school course work that had been taken exhibited little effect on differences in the percentage of students who would be admitted beyond the use of test scores and high school GPA. The conclusion was that admissions criteria would need to be more restrictive for African American and Latina(o) students in order to achieve the same performance in college across racial and ethnic groups. Thus, if only one admissions standard were utilized for all students, the African American and Latina(o) students would be advantaged over admissions standards that used group-specific standards (Noble, 2003).

The results of the Noble (2003) study differed from previous research that indicated a lesser predictive accuracy for African American students than it did for Whites on the basis of test scores alone or in combination with high school GPA. Noble demonstrated that ACT

composite scores or high school GPAs were more accurate indicators for African American success in their first year of college than it was for Whites. Differences in these results were judged to be on the basis of restricted samples and possible application of differential admissions policies for various racial and ethnic groups (Noble, 2003).

Overall, Noble (2003) says that using the ACT Composite and high school GPAs jointly versus using a single predictor, is more accurate in admissions decisions and serves to reduce differences in the probabilities of college success between various racial and ethnic groups. The use of both allows for a compensatory process in setting and utilizing cutoff scores for admissions. Accordingly, this approach can be used with no loss of accuracy and thus maintains a high percentage of successful students in college. Students who did not perform well in high school but scored high on the ACT Composite would still be granted admission and those who did well in high school but had lower ACT Composite scores would also still be admitted. In addition, the study noted that other variables such as math courses taken and so forth were moderately to highly correlated with success but added little to the regression beyond ACT Composite and high school GPA. Other factors such as reasons for choosing a particular institution, personal and long-term career goals are also valuable in making admissions decisions (Noble, 2003.).

Reality of the SAT and ACT scores

According to Popham (2006), the first reality is that both the SAT and the ACT have the same basic mission which is to predict students' success in their first year of college while measuring substantially different content as previously discussed. The second reality is that neither of these assessment exams have the ability to accurately predict first year college GPA and success (Popham, 2006).

Proponents of the SAT and ACT cite a .50 correlation between SAT and ACT scores and grades earned in college but in reality the exams only predicts 25% of the grades a student will achieve. Therefore, 75% of a student's grades in college are explained by factors other than the SAT innate aptitude or the ACT achievement assessments. Other factors include study habits and motivation to name a few. So in essence, these other factors contribute three times the impact on college performance as the SAT or ACT (Popham, 2006). To determine a student's success on the basis of these types of entrance exams appears to be detrimental to students who do not perform well on standardized examinations.

African American Performance on SAT and ACT

African American students' performance on SAT and ACT exams are the lowest among all races and ethnicities. A comparison of SAT scores for African Americans shows that they are lower than the scores of Whites students. In 2006 the average SAT verbal score for African Americans was 434 compared to 527 for Whites, a 17.6% difference. The average SAT math score for African Americans was 429 compared to 536 for Whites, a 20% difference. The writing scores for African Americans were 428 compared to 519 for Whites, a 17.5% difference (CollegeBoard SAT, 2006). In spite of a slight improvement in the SAT scores for African Americans over the past 13 years, the gap continues to widen (Special Report, 2000).

The ACT test exhibits similar statistics. The average median score for African Americans was 17.1 compared to 21.9 for Whites in the past three years. The college readiness benchmark scores for high school students in the class of 2006 showed that in English only 38% of African Americans and 77% of Whites met the score requirement. In math, 11% of African Americans and 48% of Whites were college ready. In reading, 22% of African Americans and 61% of Whites were college ready. In science, 5% of African Americans and 32% of Whites

demonstrated college readiness scores. Overall, 3% of African Americans and 26% of Whites were college ready according to the ACT benchmarks (ACT, 2006b).

In looking at the top scorers for the SAT and the ACT exam, the percentage of African Americans is very small. Approximately 9.5% or 119,591 African American students took the SAT test. However, only 748 and 914 scored at or above 700 on the SAT math and verbal components respectively. African American students thus comprise only one% for verbal and 1.6% for math scoring at or above 700 on each section. Nationally there were 74,043 and 58,435 students of all races and ethnicities that scored at or above 700 on the math and verbal SAT respectively. If Asians and other minorities are eliminated from the data, a comparison of Whites and African Americans yield the following percentages: 0.8% and 0.6% of African Americans compared to 5.3 and 5.8% of Whites scoring at or above 700 in the verbal and math respectively. The percentages for African Americans diminish even more at SAT scores of 750 or above (Special Report, 2000).

The Racial Gap in Scores

There are a number of reasons put forth to explain the continuing gap between SAT scores for African Americans and Whites. These include the disparity between educational resources, quality of teachers, differing academic tracks, number of math, literature, composition, honors courses, and AP courses completed. Non-academic factors include family income level, education level of parents, and self esteem level of the teen (Special Report, 2000). All of these issues may have some contributory effect on SAT or ACT outcomes but they do not satisfactorily or completely explain the gaps between African American scores and other ethnicities. Even though there is a direct correlation between income and parental education with low SAT scores for African Americans, it does not fully explain the discrepancy of Whites

with similar income levels that score much higher (Franklin, 2007; Medley & Quirk, 1974; Nairn et al., 1980).

The theory of low self-esteem in African Americans teens proposed by Charles Steele a Stanford psychologist as previously discussed, has been questioned through a meta-analysis of data performed by Professor Gray-Little (2000) a clinical psychologist at the University of North Carolina. Her analysis indicated that African American teens exhibit higher levels of self-esteem than do Whites teens as they progress through adolescence. Gray-Little's research does not support the prevailing viewpoint that each person is put in a certain place by society and that placement is influential in how one feels about themselves. Her research contends that African American students tend to ignore the negative stereotypes and get their self-esteem from family and friends (Gray-Little & Hafdahl, 2000; Special Report, 2000).

Disparity in High Schools Impacts Test Scores

The disparity in high schools across the nation at the private, rural, urban and inner city in terms of teacher experience, quality, resources, and so forth is a problem that remains ever present. According to a 2002 report by the United States General Accounting Office (GAO), higher per-pupil expenditures were due to higher staff salaries regardless of school location. At some inner city schools, the per-pupil spending was higher than in suburban schools and vice versa. The broad consensus however is that academic achievement is adversely affected by poverty and remains a primary concern. Inner-city schools that were visited by the GAO exhibited less experienced teachers as there were a high percentage of first-year teachers. There were also higher enrollments equating to more students per class, fewer resources such as libraries, and less parental involvement in the schools. All of these factors have been shown through research to negatively impact achievement (U.S. GAO, 2002). In addition, poorer

school districts have less honors and AP courses than their counterparts further limiting the opportunities for learning.

Funding and available resources. A recent study by Marlow (2000) reported that the level of funding and availability of resources excluding computers did not negatively impact student achievement. Furthermore studies by Krueger (2003) and Jebsen and Rivin (2002) on the reduction in class size did not improve upon student learning outcomes due to inexperienced teachers and uncertified teachers hired to teach the additional classes (Herzog, 2006). Of greater importance than class size was the quality of the teachers and their expertise in the subject matter that they were assigned to teach along with a climate conducive to learning as defined by focus, discipline, and scholarship. This was evidenced by the type of curriculum structure, academic rigor, and expectations. Private schools and charter schools are more likely to be ascribed these attributes than publicly funded schools (Dounay, 2006; Greene & Winters, 2006; Herzog, 2006; Raymond & Hanushek, 2003). Availability of computers in the school to teach specific skills and enhance academic development of students, demonstrated a positive association with student learning (Mayer, Mullins, Moore, & Mathematica, 2002). Funding of school systems and policies of resource allocation affect the availability of resources such as computers and may vary from district to district and state to state (Herzog, 2006).

Discrepant class rank and high school grades. A study by Kane (2000) looked at class rank, SAT scores, and college admission. For Whites and other non-Hispanic students who rank in the top 10% of their class, their SAT scores typically fall within the top 10 % as well. However for African American and Hispanics ranked in the top 10% of their class, only 18% of those students score in the top 10% for the SAT. Furthermore 53% of minorities ranked in the top 10% of their class scored below the 70th percentile on the SAT test (Kane, 2000). Minority

and female students were heavily represented in the category where their high school grade point (HSGPA) averages were at least one standard deviation (SD) above their SAT score. African American and Hispanic students were more heavily represented in the same group at a rate twice that of those found in the group with SAT scores 1 SD above their HSGPA. The commonality for students in this discrepant group was low family income and educational attainment (Kobrin, Camara, & Milewski, 2005).

A study by Willingham, Pollack, and Lewis (2002) suggested that higher socioeconomic status (SES) confers greater social advantages that would positively impact cognitive skills both in and out of school over one's lifetime. As such, SAT scores are more likely to be reflective of general skills learned versus acquisition of learning objectives in a classroom. This may in part explain why there is a discrepancy in SAT scores and HSGPA. The association between test scores and SES is recognized as a property of standardized tests (Zwick & Grief Green, 2007). Rothstein (2005) says that SAT scores are not socioeconomically neutral; they serve as proxies for SES.

A study by Zwick and Greif Green (2007) using pooled within-school analysis demonstrated family income and education were highly correlated with high school grades and class rank while SAT scores had smaller associations. Surveys performed by the College Board showed increases in the percentages of A averages and decreases in C or below averages as income rose from \$20,000 to over \$100,000. In addition, A averages for students whose parents had some high school education was at 27% versus 47% for students whose parents had some graduate level education (Camara & Schmidt, 1999).

Courses taken. Other studies indicate that it is not so much what high school a student attended but rather what they did while they were in high school in terms of courses taken in

preparation for advancing on to college (Herzog, 2006). Of particular importance was higher level math and AP courses taken. Low enrollment of minority students in these courses was cited as being due to poor mentoring in the schools and lack of support in the home more so than a lack of course offerings across high schools (Herzog; Klopfenstein, 2004; Perna & Titus, 2005).

Extracurricular activities. A study by Everson and Millsap (2004) reported measurable gains in college admission test scores for all students who participated in extracurricular activities offered by the schools. The higher scores occurred for all students regardless of their academic achievement performance in high school. It was surmised that important reasoning skills were developed outside of the classroom as well as inside (Everson & Millsap, 2004).

Disciplinary problems in education. High schools also vary in the type and intensity of disciplinary incidences that occur within and outside of the classroom. One of the major risk factors for disruptive behavior in the school setting is poverty. Those schools that serve low-income families are faced with greater challenges that are associated with physical, psychological, behavior, social, cultural, and educational problems compared to schools that serve higher income families (Barton, Cooley, & Wenglinsky, 1998). Poor performance in school is associated with behavioral problems that can negatively impact all students as teachers lose control of their classrooms and spend more time trying to control disruptive behavior instead of teaching. Teachers suffer burnout, depression, low morale, apathy, and absenteeism (Canadian Education Association, 1998). Positive learning outcomes are exhibited in schools that enforce standards of discipline that are supportive of a learning environment free from disruptive outbursts (Barton et al., 1998).

Variables affecting individual students. Variables that directly impact each individual student are associated with the family. Parental involvement with the student at school and high expectations of the student's academic performance positively impact student success (Fan & Chen, 2001). Other factors include the education level of the parents, family income as previously discussed, and social capital. Family network of social capital include those who value education and encourage and support students to prepare for college. Those students lacking social capital have been shown to be at a disadvantage in their educational achievements (Herzog, 2006; Okagaki & Frensch, 1998). Negative factors impacting student achievement also include those who had behavioral issues during childhood and adolescence as well as exposure to other environmental factors in the home that are difficult to pin-point and measure. Overall these differences translate into poor performance on standardized tests (Herzog, 2006).

Consequences of inadequate preparation. Inadequate preparation of students through the K-12 system of education has been identified as a barrier to accessing higher education by the U.S. Department of Education. The U.S. Department of Education (2006) report notes that several national studies have confirmed that the academic preparation of high school graduates has insufficiently prepared them to perform at the college level as evidenced by standardized testing or to perform in today's ever changing workforce (U.S. Department of Education, 2006). The report states that standardized test scores reveal that only 17% of graduating seniors are math proficient and 36% are identified as being reading proficient. Approximately 25% of students in public high schools fail to graduate with a higher proportion coming from low income, minority, and rural students. Of those that do graduate, 40% need at least one remedial course. Students across geographical areas are in need of remediation: 40% of students in rural schools, 38% of students from suburban schools and 32% of students from urban schools.

Socioeconomic rungs at both ends of the scale exhibit remediation needs with 52% and 24% of students in the lowest and highest socioeconomic rungs respectively. The rigor of curriculum was also evaluated and evidenced that 14% and 32% of the top and second quartiles in curriculum rigor needed remedial coursework respectively (Attewell et al., 2006). The study by Attewell et al. (2006) found that equivalent students at 2-year and 4-year institutions took no remedial course work yet were successful in their college courses. While remediation did improve a student's probabilities for successful completion of their program at 2-year institutions that success was dependent upon the type of remedial course. The impact on graduation rates for students needing a remedial course in math was a negative 3%. Positive impacts were seen writing remedial courses at 7% and for those taking a remedial course in reading there was an increase of 11%. For 4-year institutions there were negative impacts in graduation rates for students needing remediation with an 11% decline. However, students needing remediation in reading at 4-year institutions demonstrated that 40% of those students did complete their degrees (Attewell et al., 2006).

Evaluation of remedial needs. In looking at these statistics, it would appear that quite possibly there is a flaw in the standardized testing evaluation of students' remedial educational needs. If equivalent students are able to succeed without remediation, are they really under-prepared to participate at the college level? In addition, the evaluation tools other than SAT or ACT differ among institutions and Attewell et al. (2006) has identified a greater percentage of remediation required for equivalent students at 2-year institutions versus 4-year institutions and has indicated that equivalent students identified as needing remedial coursework can be successful without remediation (Primrose, 2006).

The data from Attewell et al. (2006) appears to call into question the efficacy of the ACT and SAT examinations used as a criterion for college admission, college required entrance examinations, and high school assessment tools. Are these tests identifying true deficiencies of entry level knowledge for college or are they identifying students who do not perform well on standardized tests? The answer is probably a resounding yes and no to both sides of the question. If students are misidentified as to needing remediation or having less than acceptable scores for admissions criteria to certain institutions, then a revamping of assessment of student knowledge is in dire need. These types of evaluations tools are subjective to student interpretation of questions and content leading students to possibly misconstrue the intent of the question and thereby lead to errant answers and lower scores. In addition, the exams are timed further compounding students' abilities to read, comprehend the author's intent, and select a correct answer. Thus, institutions of higher education are basing their selection of students on these evaluation tools that may not be truly reflective of a student's potential and ability. Accessibility to higher education is then impeded by a flawed system (Primrose, 2006).

In terms of accessibility to colleges and universities students identified as needing remediation whether it be from the ACT, SAT, or college administered entrance examination are being deterred in their access to higher education. According to Attewell et al. (2006) private institutions have less than 2% of their students taking remedial coursework. Is this related to the fact the private institutions admit those students with the highest GPAs and SAT or ACT scores and thereby eliminate a student population that would require remedial coursework by simply taking only the top tier of students based on quantitative indicators? This brings up the issue of egalitarianism and meritocracy in regards to accessing higher education. It is maintained that there is a postsecondary institution for all who seek to avail themselves of the offerings of higher

education. However, this availability is hierarchal in nature and students are relegated to various rungs in the hierarchy on the basis of meritocracy. Selection process for colleges almost exclusively utilizes high school grades and standardized ACT or SAT test scores. As such, minority students and socioeconomically disadvantaged students are disproportionately under-represented at 4-year public and private institutions while being over-represented at 2-year institutions. Students are thus being systematically placed into the different strata of higher education: private universities and private 4-year colleges, public universities, and lastly, public colleges where three minority groups African American, Hispanics and Native Americans are consistently finding themselves at rates of with 27% Anglos, 37% Black, and 45% Hispanic (Shom, 2006).

Impact on institutional choice and economic future. Why is the use of SAT and ACT examinations scores in admissions criteria a critical barrier? Some higher education leaders and policy makers may not see a problem with SAT and ACT testing, stating that those students who do not do well on these types of examinations can always go to a less prestigious institution. Open-access colleges and universities as well as community colleges are viable options for those who do not meet the cutoff scores for institutions with selective admissions criteria. Other students simply do not take the SAT or ACT examination quite possibly because they cannot afford it, feel that college is not an option for them, or feel that they are not prepared to take such an exam. Poor performance on these examinations may be a reflection of inadequate preparation and poor alignment of college expectations to high school products (Attewell et al., 2006; Special Report, 2000; Nairn et al., 1980).

However, the exams themselves have been called into question as being a biased tool to assess student success in college (Attewell et al., 2006; Green & Griffore, 1980). Older students

who have been out of school for a number of years are also returning to school because they may have been displaced from their previous job, are newly entering the job market, or are forced to seek employment because of family circumstances. These people find they need an education to obtain gainful employment. They may have outdated SAT or ACT scores or none at all and as such are missing a required admissions criterion from their applications. In addition, many of these potential students may be in need of remediation in reading, writing, and mathematics.

What are their options? If students are not prepared for college level work or have not completed the requirements to be considered for admission are they totally cut off from access to a college or university? While it is true that these students may not be accepted to institutions that are highly competitive and selective in their admissions process, open-access institutions such as community colleges are again identified as providing an alternative for these students to prove their abilities with the option of transferring to four-year institution later (Shom, 2006).

The accessibility issue then becomes one of equality of educational opportunities. If students are not permitted access to institutions on the basis of meritocracy, then they may be unable to access certain programs of study that may only be available at those institutions. While it is well known that community colleges are able to provide the first years of college coursework with matriculation into the 4-year institution the reality of that transition is strikingly low. Statistics show that 74% of these full-time students, minorities included, say they intend on transferring to a 4-year institution to earn a bachelor's degree but fewer than 5% actually do. There appears to be some element of influence that the community college exudes that negatively impacts the aspirations of students to continue on to 4-year institutions (Shom, 2006). Is this due to the community college environment and experience or is it a reflection on the

student population that may have life circumstances that impede their ability to progress beyond the associate degree level?

Thus, students who desire a bachelor's degree but are systematically denied access to the 4-year institutions are thus almost virtually denied the attainment of their educational aspirations (Kane & Rouse, 1999). Furthermore, community colleges which offered transferable liberal arts programs are being transformed into institutions that offer terminal vocational degrees. Students completing the majority of these types of programs have no transitional mechanism into a bachelor's degree because their coursework will not transfer and are thus denied access to completion of a bachelor's degree. Thus, with the relegation of minorities to lower level institutions, it would appear that there is a de facto type of tracking system within the American higher educational system (Shom, 2006).

What difference does it make if a student goes to an open-admissions college or community college versus a more selective and prestigious college or university? Researchers from the University of Michigan, Brand and Halaby (2006) completed a study of 1,733 men who entered college within two years of high school graduation and assessed the outcome of their education at either an elite or less prestigious college or university up to 35 years later. Brand and Halaby matched students according to mental ability, high school GPA, completion of college preparatory courses, and family background. The outcomes of their study revealed that students who attended an elite institution had a greater chance of graduating and pursuing a graduate degree at a rate of about 6% and 12.5% respectively. Through use of the matching technique, Brand and Halaby found a fourfold increase in graduation rates if equivalent students at less prestigious institutions had gone to an elite school.

In regards to occupational status, the study revealed that students who graduated from elite colleges did not show any significant gains in their career stages: early, mid or late. However, those students who went to less selective and less prestigious colleges would have realized gains in occupational status throughout the stages of their careers. In terms of wages, the study revealed that there was no difference in income earned on the basis of whether one went to an elite college or lesser institution (Brand & Halaby, 2006). Relegation of students to less prestigious institutions does result in a post-college stratification effect in terms of occupational outcomes for those students. Occupations are tiered according to the type of institution a person attends. When factors such as ability, socioeconomic background, educational and college goals, number of years of education are controlled, evidence indicates that the type of college that students attend is related to their eventual income level and occupational status (Furr, 1998). Students who are denied access to four year institutions are denied access to potential occupation choices requiring a bachelor's degree. Thus, their future income potential is limited by their lack of access to a four year institution. Nationally, the median income differences for people with an associate's degree are \$7,200 more than those with just a high school diploma. For students who have attained a bachelor's degree the national differential in median income is about \$13,300 more than an associate's degree (NCHEMS, 2002).

Successful Alternative Admissions Criteria

The use of SAT or ACT tests for admissions decisions is currently being abandoned by some colleges and universities making submission of scores optional. Currently more than 830 four-year institutions have discontinued the use of SAT I or ACT in their admission practices (FairTest, 2007). Research demonstrates that with the use of race-neutral admissions practices in

California, Texas, Florida, Georgia, and Washington, the admission of African American students has greatly diminished because there are very few African American students who score at the top of the SAT and ACT tests (C. Alexander, personal communication, November 22, 2006; Special Report, 2000). If race-neutral admissions policies become a nation-wide practice, the representation of African Americans at the top colleges and universities across the nation would drop from 6% to approximately 2% (Special Report, 2000). The impact of this dilemma as previously discussed results in stratification of African American students to lower tiers in the educational hierarchy and severely limits their eventual career choices and opportunities.

Bates College in Maine recognized early on that standardized testing held little utility for them and as such has made submission of SAT I, SAT II, or ACT test scores optional since 1984 (Bates College, 2006). The college was concerned that the SAT was restricting their applicant pool because the published SAT median for Bates was high. Those students who were interested did not feel that they could be successful at the college. In addition, there was concern that the SAT may not be presenting a true picture of the student's academic abilities. Knowing that there is close correlation of the SAT and family income, Bates' faculty wanted to encourage those students whose SAT scores were operating against them, such as minorities, first generation immigrants, blue-collar students, and so forth, to apply. Bates College offers the option of a personal interview to students across the country and abroad as a part of their admissions process. There was also concern in regards to test coaching which has become rampant through the years, possibly jeopardizing high school curriculum as teachers taught to the test. The upsurge in test coaching through professional organizations has impacted the test scores as well. Minority students and low income students may not have access to those types of test preparation

activities due to cost and thus do not perform as well as students who have taken test preparation courses (FairTest, n.d.a).

Bates College made the submission of SAT and ACT optional and began to include interviews. With over 4,000 applicants, Bates held approximately 3,000 interviews in 2003-2004. After a period of five years, a comparison was made between students who submitted SAT scores and those who did not. Non-submitters averaging about 160 points less on their SAT scores, had a freshman GPA that was only five one-hundredths of a point less than that of submitters. In addition, the non-submitters' academic survival rate of 99.8% was actually better than those who submitted SAT scores. In addition, academic dismissal during the five year period resulted in only 1 of 14 students being a non-submitter while 93% of those academically dismissed were SAT submitters. Benefits to this practice was realized through an increase of nearly one-third the number of applications previously received during a time when many colleges were experiencing a decline (Bates College, 2006; FairTest, n.d.a).

According to Bates 2005 Stories, Bates College was ranked 22nd among liberal arts college in U.S. News and World Report's American's Best Colleges in 2005. Bates is cited among other colleges and universities with outstanding opportunities for undergraduates in research and creative projects and for its service-learning program. Bates ranks 10th in U.S News and World Report's listing of study abroad programs. Bates was also ranked 18th in the category of student retention with a 94% persistence rate for freshman to sophomore year and an 88.5% six year graduation rate. They were also 19th in the category of alumni giving. It was reported in the Wall Street Journal on September 26, 2003 that Bates was identified in a listing of 50 top colleges and universities that have graduates that go on to elite grad schools (Bates, 2005). It

appears that their admissions policy minus the SAT or ACT component has not negatively impacted their reputation and it has enhanced their diversity.

California recognized the need to revamp their admissions criteria when Proposition 209 went into effect in 1998, prohibiting the use of race in admissions decisions. Requirements for high school graduates for guaranteed admission into California State University (CSU) or the University of California (UC) now include completion of 15 college preparatory courses with a GPA of 3.0 or greater in their 10th, 11th, and 12th grade coursework. Physical Education and Military Science are not included. No SAT or ACT submission is required, however the exams must be taken. If students have a GPA of 2.0 to 2.99 they would also need an SAT or ACT score that qualifies them based on the University's Eligibility Index. Eligibility at UC requires minimum high school GPA of 3.3 and no SAT or ACT. Students with a GPA below 3.3 would need to submit an SAT or ACT score (CaliforniaColleges, 2008; FairTest, n.d.a).

One problem that CSU has been faced with is an increase in the number of students needing remedial education even though they meet the state's GPA eligibility requirements. Approximately 72% of the nation's four-year colleges with 80% of those being public institutions, offered remedial classes for their students. Thus it is not a problem unique to the CSU system. However, the admissions process does afford the option if necessary of adjusting the high school GPA and test score index for students with GPAs that are less than 3.0 in lieu of altering the exemption of the SAT or ACT test for students who meet the GPA criteria (FairTest, n.d.a).

The Texas Public University System also employs race-neutral admissions practices as a result of the Hopwood versus the University of Texas School of Law decision. The Advisory Committee on Criteria for Diversity was established by the Texas Higher Education

Coordinating Board (THECB) to analyze different admissions policies and criteria in an attempt to offset the negative impact that the *Hopwood v. Texas* (1996) decision had on diversity. Their charge was to maintain diversity at the Texas public institutions of higher education. The report released by the Committee identified standardized tests as one barrier indicating that SAT and ACT scores were better predictors for some groups of students but not others and except at the extreme ends, did not predict freshman GPA in core courses adequately. In addition, the scores were not accurate in predicting college graduation (FairTest, n.d.b).

A key recommendation by the Committee was that SAT, ACT, or other standardized test should not be used as a major criterion in determining student admission or financial aid awards. It should only be used in counseling students regarding their curriculum development. They further recommended that these tests should not be used as a sole criterion in screening applicants when the score alone would eliminate an applicant from being admitted. Other qualifying factors and achievements should be considered. Based on these recommendations, Texas legislators filed about two dozen bills addressing admission rules for public universities. The top 10% of students graduating from accredited Texas public or private high schools would be automatically admitted within two years of graduation. An addition to the automatic admissions criteria was that the governing board of each institution could determine whether to adopt an admission policy that would include admittance of a first time college applicant who graduated from a Texas high school with a GPA in the top 25% of the applicant's high school. No SAT or ACT scores are needed for these automatic admissions. Applicants who did not qualify for automatic admission under the new law would be evaluated on the basis of criteria specific to an institution that could include a combination of 18 factors that were specified within that law. Factors include not only high school GPA and curriculum but socioeconomic

background, first generation college student, and personal interviews (FairTest, n.d.b; Walker, 2007).

Recruitment activities were intensified by the Texas public institutions to explain the 10% rule, financial aid options, and alternate routes of gaining access to college. The results reported to the Higher Education Committee of the Texas House of Representatives indicated that there was a more diverse pool of applicants than in the previous year. These changes allowed for some mitigation of the adverse effects that the Hopwood (2003) had on admissions policies. The goal of maintaining a diverse student population and increasing access to underrepresented groups was moving forward (FairTest, n.d.b).

Thus, colleges and universities are starting to recognize that SAT and ACT scores are a barrier to diversity of their student bodies. There is recognition that these test do not necessarily predict with great accuracy freshman student performance and retention. Campbell and Dickson (1996) conducted a 10-year study using integrative review and meta-analysis review of factors that influence student success. Their research showed that demographic predictors having the greatest impact on student success were age and parental education. In terms of cognitive predictors, GPAs in science and nursing courses had the greatest impact on student success (Campbell & Dickson, 1996). Elimination or mitigation of the weighting of required SAT and ACT scores in admissions decisions does not appear to have negatively impacted the academic performance and retention of students that are admitted without reference to the SAT or ACT scores (Bates College, 2006; FairTest, n.d.a, b)

Current Standardized Tests for RN Associate Degree Admission

Admission to colleges and universities as discussed is tied to performance on standardized tests such as the SAT and ACT. Open-admission colleges do not require such

testing but require testing to assess the need for remediation in reading, writing, and math. There are also a number of different assessment tests that colleges and universities use as a criterion in the selection of applicants into RN nursing programs. These include the RN Pre-Entrance Test, the PSB RN Test, the HESI A2 Test, the NET Test, and the TEAS Test. Each of the tests is designed to assess the educational achievements in skills, knowledge, and attitudes that are deemed necessary to be successful in nursing programs. In addition each test includes a mix of math, science, and verbal skills. Some tests also include personality profiles and learning styles. Assessment of mathematics includes basic calculations, word problems, algebra, geometry, conversions, graphs, and applied mathematics. Verbal assessment includes spelling, word knowledge, and reading comprehension. The science assessment includes chemistry, general biology, physics, earth science, health, personality profile, and learning style (ATI, 2007b; Evolve Reach, 2007; National League for Nursing, 2007; Psychological Service Bureau, 2007; Test Prep Review, 2007). A request for the technical manual and validity studies for each of the tests was requested by email and phone calls. Only one company responded with information, Assessment Technologies Institute, LLC (ATI, 2007a). However, emails sent to ATI regarding questions for clarification of some of the content contained within the manual have continued to go unanswered. The TEAS Test by ATI is the test of interest in this study as it is the test used in the nurse entrance admission criteria for the community colleges in question.

Overview of the TEAS Test: Test of Essential Academic Skills

In 1999, Dr. John Poggio and Douglas Glasnapp, nationally recognized for their work in assessment and testing, developed the Test of Essential Academic Skills (TEAS) for ATI, LLC (2007a). Discussion of the Overview of the TEAS Test is in direct reference to ATI's Technical Manual. The purpose of the TEAS test was for measuring the essential basic skills in cognitive

areas of reading, mathematics, science, English, and skills in language usage. According to the ATI Technical Manual (n.d.), the test was developed with no intended use in mind. A panel of curriculum experts in nursing programs identified entry level skills deemed necessary for entry level nursing applicants and then selected the skills that were to be assessed. Furthermore, ATI states that the focus of the construction of the TEAS test was on the selection and development of items that would allow for objective measurement of specific knowledge and skills whereby students could demonstrate their attainment of such knowledge and skills. Even though the development of the TEAS test had no intended purpose, it is now primarily used for testing adults seeking entrance into nursing programs. The primary point of entry into college for the adult student and the majority of minority students is at the Community College (ATI, n.d.).

The TEAS test is comprised of four content domains: 40 questions in reading, 45 questions in mathematics, 30 questions in science, and 55 questions English and Language Usage for a total of 170 assessment items. All questions are multiple choice with four response options. Each section of the test is timed: 50 minutes for reading, 56 minutes for mathematics, 38 minutes for science, and 65 minutes for English and Language Usage for a total of 209 minutes (ATI, n.d.).

The TEAS test may be administered by content domain in any combination. Scores are generated for those domains tested. A total TEAS score is reported on the basis of the subtests or content domains that were administered. The TEAS is offered in two formats, paper-and-pencil or a web-based computer format. ATI reports that about 15% of the test-takers use the web-based format. The tests are said to be identical except for the order of presentation of questions within the content areas. For security purposes, the web-based format produces five different orders of presentation of the domain items through random scrambling (ATI, n.d.).

Developmental process of the test item. The TEAS test was developed to become a part of a mandated state achievement assessment program and the content is therefore considered to be representative of basic essential skills and knowledge that would be acquired from a typical educational experience. The measured outcomes and the associated items were examined by a panel of nursing program curriculum experts who then selected what they considered to be the most appropriate and relevant outcomes and items to be measured. The items and outcomes selected were those perceived to be important entry level skills and abilities that applicants admitted into nursing programs should possess (ATI, n.d.).

“Content validation development approach” (ATI, n.d., p. 2) was used as the model for item development. This approach used experienced teachers selected from an appropriate grade and content level who were knowledgeable about the content area, teaching methodology of the content area, and realistic outcomes. Those selected underwent training in techniques and rules in writing test items prior to generating test questions. (Researcher Note: It is important to note that details were not delineated regarding how teachers were assessed for experience and expertise). A development group then reviewed and edited all test items for redundancy, accuracy, and so forth. A second group then provided further review and revision of content depth, representativeness, and appropriateness of questions, correct answers, and distracter options. Content specialists and testing experts review all input of revisions and comments to finalize each item to a form that is sound and defensible. Field-based personnel selected on the basis of experience and commitment to state and local curriculum and content activities review the product for final edits (ATI, n.d.).

Each item is assessed for bias, offensiveness, and insensitivity by the four largest ethnic, cultural, and racial groups that would be impacted: African Americans, Hispanics, Asian

Americans, and Native Americans. Disability and gender advocates are also involved in the review at this stage. On the average, four to six representatives for each group were involved in the review process. The minimum allowed was three individuals. Pilot testing of those questions exhibiting psychometric properties as identified through classical item analysis and limited Item Response Theory (IRT) were retained in the pool. Those items in question were removed. Some minor editing also occurred. Statistical analysis of the test items as well as student interviews to assess clarity, familiarity, readability, and so forth of general and specific reactions to questions were performed. Items were dropped from the pool if they exhibited problems during actual test administration or subsequent post-testing analysis or from differential item functioning analyses (ATI, n.d.).

ATI differential item functioning (DIF) analysis. ATI performed logical judgment review of all test items and found them acceptable in regards to bias, insensitivity, and offensiveness. ATI further states that all items included in the reading, mathematics, and science content areas of the TEAS test and “a portion” (p. 4) of the items included in the English and Language Usage section were subjected to empirical DIF analyses for ethnicity and gender bias using the Mantel-Haenszel procedure. Standard criteria with a statistical significance level set at .01 and a value greater than 1.5 for an absolute C index were used to flag any pool item demonstrating a bias. Items that exhibited DIF values below the threshold were included in the TEAS. Those items that had DIF values above the threshold were discarded. Thus, ATI (n.d.) states that the TEAS test items “do not function differently with regard to any of the ethnic or gender groups studied” (p. 5).

TEAS test scores: ATI psychometric characteristics. The TEAS test psychometric properties are evidenced by the collection and analysis of data from nursing applications at

colleges and universities across the nation. Data from the paper-and-pencil (PP) format of the TEAS test is derived from 146 colleges and universities from 34 states. Data from the web-based (WB) format is derived from 47 colleges and universities from 20 states. Data on scores for all subsets of the TEAS test do not exist as schools require differing combinations of the content domains for their students (ATI, n.d.).

The following represent the data sets used by ATI to generate their psychometric properties: 13,174 Reading scores (11,490 PP and 1,684 WB); 11,614 Mathematic scores (10,178 PP and 1,436 WB); 12,288 Science scores (10,578 PP and 1,710 WB); and 12,502 English and Language Usage scores (10,783 PP and 1,719 WB). Total scores representing a composite of all four subsets of content domains were reported for 10,135 students (8,944 PP and 1,191 WB) (ATI, n.d.).

The data were reported out by demographics of gender, ethnicity and program type for each format of testing PP and WB and the percentage of students applying to the different types of nursing programs such as associate's degree, bachelor's degree, practical nursing, and diploma programs. Means and standard deviations were reported for WB testing and were said to indicate that randomization of item presentation exhibited little if any effect on the scores of test takers as the means were within the expected random sampling error ranges across all test forms. However, ATI includes a caveat that there should be no comparative inferences made between those test takers who took the PP and those who took the WB as there was no control over students taking either format. ATI indicates that studies should be conducted to determine the equivalency of the PP and WB administrations of the TEAS test (ATI, n.d.).

The means for each TEAS score in each subset of content domain in the PP format are highest for White students and lowest for African American students. Hispanic students had the

second highest composite scores, followed by Native Americans, and then Asian Americans. For the WB format of the TEAS test, Whites again exhibited the highest composite scores with African American students having the lowest scores. Asian Americans had the second highest composite scores followed by Hispanics. There was no data available for WB testing for Native Americans (ATI, n.d.).

ATI evidence of score reliability. The reliability of the TEAS test scores have been estimated by two methods: (a) test-related procedures and (b) internal consistency. Estimates of internal consistency of score reliabilities were established through computation of Cronback's alpha coefficients for PP and WB formats. In addition, approximately 300 to 400 students retook the TEAS test to raise their scores. A correlation between the scores for the first and second attempts was calculated. The correlation scores for this group of test takers were corrected for restriction of range due to the fact that these test takers had lower performance and range of scores. The corrected coefficients were then used as the estimates of score reliability for the test-retest group (ATI, n.d.).

The reliability for the composite test score for all subsets for both PP and WB exceeds .90 and differing combinations of two of the four subsets have reliability estimates in the mid to upper .80's. The reliability measures for each single subset varies with science estimates in the upper .60's, English and Language Usage estimates in the upper .70's, and mathematics in the low to mid .80's. The data reported included test-retest takers and assumed no intervention between test administrations. However, ATI presumes that some students will seek additional instruction before retaking the test which would differentially affect their scores across time between test one and test two thereby underestimating the true value of the stability coefficients. The data on stability estimates between the first and second attempts at the TEAS test

demonstrate reliability estimates for reading in the high .70's, mathematics in the high .60's, science in the high .60's, and English and Language Usage in the mid .70's. The composite reliability estimate was in the high .80's. ATI does not indicate if all data collected was used in the generation of these statistical analyses. In reality what the reliability estimates indicate is that students in all demographics consistently score in similar fashion in relation to each other on the TEAS test (ATI, n.d.).

ATI score validity evidence. ATI states that the usefulness of the TEAS scores depends upon the appropriate use at the local level in terms of the alignment of the skills and knowledge measured by the TEAS test and the skill and knowledge viewed as being critically important at the local level. Validity claims at the local level require that alignment studies be performed at the local level during the process of selecting which subtests or combinations of subtests to administer. Some nursing programs use the TEAS as a screening tool to determine admission into the nursing program. Other programs use the TEAS as a diagnostic tool to identify deficiencies in areas that are deemed necessary for successful completion of curricular requirements for nursing programs and thus require remediation prior to admission. Either application of the TEAS would require the establishment of a link between the TEAS scores and other measurements of skills needed for success in nursing programs. Criterion-related validity designs would need to be implemented in order to establish linkages (ATI, n.d.).

ATI claims the existence of data measuring student success that serves as an external criterion. It markets materials to assess specific skills that are taught in nursing programs. They produce and market curriculum review materials for specific achievement tests to assess skills taught in nursing programs. These materials are used by nursing programs to assess the knowledge of their students in specific course content and then use the information generated to

identify program deficiencies and to remediate any deficiencies with students. ATI also produces and markets comprehensive assessment test said to mirror the licensure exam and is to be given to students who have completed their nursing curriculum. These scores can be used as external indices of a nursing program's success. ATI also claims that linking TEAS test scores that students attain prior to entry into their nursing program with specific content tests and the comprehensive test will address the criterion-related validity of the TEAS test scores (ATI, n.d.). While there may be a correlation between success on the TEAS test and other ATI achievement tests, they do not necessarily explain a student's success or lack thereof in a nursing program.

ATI did analyses and generated data that would appear to link TEAS scores with ATI end-of-course achievement tests and the comprehensive end-of-program achievement test for the RN program and the Practical Nursing (PN) program. The data that was generated from this study indicate that the TEAS scores are more useful in predicting nursing program and course achievement success for students who are seeking enrollment in or are already enrolled in the PN program than for the RN program. While the scores for both groups are positive, there is greater utility for the PN versus the RN program (ATI, n.d.).

ATI (n.d.) recommendations for use of the TEAS test are as follows:

1. Institutions and programs should not use test score as sole criteria for selection decisions but should implement a variety of non-test data sources, such as high school or college grades, class rank, interview, essay or other indicators of the student profile.
2. Institutions should conduct validity studies to determine the relationship between test scores and intended use for future admissions decisions.

3. Institutional validity studies should be conducted at least every three years with data pooled to obtain adequate sample sizes.

Program Initiatives to Increase the Number of Minorities in Nursing

The charge to increase diversity in nursing has been met with a variety of grants and studies to identify a successful means to increase the number of minorities in nursing programs. The U.S. Department of Health and Human Services (n.d.) through Health Resources and Services Administration has issued grants for the purpose of increasing this workforce diversity. Several universities and nursing schools located in Alabama, District of Columbia, Florida, Michigan, Montana, New York, Oklahoma, and Texas have been awarded grants.

The grant project titles are reflective of the primary objective of the grants and include “TU Nursing Workforce Diversity”, “Health Alliance – Creating Workforce Diversity” and “STAND” (Seamless Transition Achieving Nursing Diversity) to name a few. The projects for each of the universities strive to increase diversity in nursing with focus not only on retention but on pre-entry preparation at the high school level; marketing to target groups by increased marketing to high schools, enrollment, retention, and graduation rates of disadvantaged minority students; creating pathways for access to nursing programs for minority students; family orientation programs; tutoring, enrichment resources, and mentors; stipends or paid jobs and internships through hospital partnerships; and increased cultural competence and sensitivity courses and programs that will also provide affirmation and accommodation of the culture-specific learning needs of the students. This affirmation and accommodation is something that is relatively new in process of increasing diversity aside from increased recruitment and retention (U.S. Department of Health and Human Services, n.d.). There are currently no studies focusing on admissions practices.

The Need For Diversity In Nursing

According to the U.S Census 2000 report, there were 281,421,906 registered citizens with 37.3% of them being listed as minorities across the nation. The national demographic distribution shows 12.3% Blacks or African American, 0.9% American Indian or Alaskan Native, 3.6% Asian, 0.1% Hawaiian Native or Pacific Islander, 5.5% some other race, 2.4% two or more races, and 12.5% Hispanic or Latino. The latest report of the Census 2000 Population by Race: Indiana Counties reports a breakout of 87.5% whites, 8.4% blacks, 0.3% American Indian and Alaska Native, 1.0% Asian, 1.6% other, two or more races are recorded at 1.2% and Hispanic or Latino at 3.5%. While it is apparent that the majority of Indiana's citizenry is White, the fact remains that even though the total percentage of minorities is low at 12.7%, that percentage represents 760,463 out of 6,004,813 total residents in Indiana that deserve to have healthcare providers that are representative of their respective races and ethnicities (U.S. Census Bureau, 2006).

Total enrollment of minorities in nursing programs nationwide in 2001-02 were as follows: White at 173,586, Black at 26,026, Hispanic at 10,886, Alaskan Native or American Indian at 2,516, and Asian or Pacific Islander at 8,321. This represents 47,749 minority nursing students out of 221,335 or 21.6% well below the national percentages for minorities living in the United States (U.S. Census Bureau, 2006).

Conclusion

Notable efforts are being made in some states across the nation to address the disparate representation of minorities in the nursing workforce. A focus on exposure of minority students to healthcare professions in middle school and high school not only for recruitment but also to target pre-entry college preparation is being addressed in some of the programs and is crucial in

preparing potential nursing students with the requisite skills to be successful at the college level. All programs have retention measures developed that include some mode of tutoring, enrichment resources, minority mentors, and so forth that will serve to meet the needs of their minority students both academically and emotionally. These intervention methods may help to retain students who exhibit difficulty with their coursework or with their interactions with students and faculty who differing from them culturally. By increasing the recruitment, retention, and graduation rate of minority nursing students, the face of nursing will begin to mirror that of the population.

However, none of the previous studies or program initiatives addresses the issue of admissions criteria for nursing programs. As such, this study looks at program admission criteria for RN associate degree nursing programs, how it is used in admission-making decisions, and the impact that it has on African American student admission into the RN program.

Specifically, the study assesses the use and impact of the TEAS Test as a decision-making tool alone and in conjunction with completion of specific courses identified by the colleges and their respective course grades to ascertain if there is a disparate impact on African American students who seek admission into RN associate degree nursing program.

CHAPTER 3

Study Design and Methodology

This investigation evaluated nurse entrance criteria for RN associate of science degree nursing programs (ASN) at two-year institutions using an ex post facto design to determine if nurse entrance criteria provides for equal opportunity for admission or results in de facto discrimination. The research examined the effect of nurse entrance criteria of overall Quality Points for general education and math and science courses and nurse entrance exam scores to determine how they impacted the admission of minority students, specifically African American students, into the nursing program. The researcher examined the student demographics and admission criteria data for students who were admitted and those who were not admitted into the associate degree nursing (ASN) program for the three years 2005 and 2006.

Students in the study came from all walks of life and educational backgrounds. They had been granted admission to two-year colleges that are open-access institutions. The only requirement for admission was a high school diploma or a GED. The study was designed to investigate the opportunity that students had to be accepted into the ASN program once they had met all of the required prerequisites set forth by the program in an open-access institution. Students had been accepted into the colleges but also had to apply and be accepted into the nursing program. A barrier in the form of required admissions criteria had been established by nursing programs nationwide that possibly impeded the admission of African American students.

All students seeking admission into the nursing program stood at the threshold of having met the required criteria. But was there a specific criterion that prevented African American students from being included in the pool of applicants or if included in the pool was detrimental to their overall ranking for admission? This study was designed to investigate the different criteria used and identify which criteria if any would maximize the admission of African American students into the ASN program.

Research Questions

Based on the objectives of the present study, the following research questions were established:

First research question. Were there significant differences in the admission rates between Whites and African American students for the four admission criteria evaluated in this study based on (a) TEAS and TQP separately, (b) TEAS only, (c) TEAS + TQP COMBINED , or (d) Total Quality Points only?

Second research question. For African American students, how was admission into an associate degree nursing program influenced by three admissions criteria TEAS only, TQP only, and TEAS + TQP COMBINED test after controlling for first generation student, age, high school rigor, high school grade point average, class rank, gender, and ethnicity?

Participants

Identification of institutions, samples, participants. Institutions were two-year community colleges that offered an ASN program. The use of two-year institutions within the community college system ensured uniformity of standard admissions requirements for students at each campus per a state nursing program mandate. Admissions standards required applicants to complete the TEAS test as a part of their entrance criteria. In addition, institutions were

selected on the basis of the demographic population of the city in which they were located being at a threshold of an African American population at 20% or greater. Three cities where the community colleges offered the RN associate degree program and that were identified as meeting the demographic criteria are: City A at 84%; City B at 25.5%; and City C at 24.6% (U.S. Census Bureau, 2006).

The state and the city locations of the community colleges in this study were given pseudo-names to protect their identity as requested by the institutions. State X was the pseudo-name for the state and Campus A, Campus B, and Campus C were the pseudo-names for the three community colleges located in City A, City B, and City C respectively within State X. Each institution was looked at individually and aggregated when appropriate. There were two groups of participants in the study. One group was the applicant pool of students who had applied for entrance into the ASN program but were denied admission. The second group included students from the applicant pool who were granted admission.

The study population originally included all applicants for each of the years 2005 and 2006 who completed the TEAS test as a part of their entrance requirements. In addition, data for the multiple regression study was not available for the 2005 applicant pool at two of the institutions. As such, multiple regression analysis was only performed on the Campus B 2006 applicant pool.

The number of students admitted in the ASN program at each campus is dependent upon approval from the State Boards of Nursing and was based on clinical availability for each institution. The campus located in City A was approved for 30 students, the campus located in City B was approved for 100 students, and the campus located in City C was approved for 50 students. These admissions numbers applied to each of the academic years of interest.

Criteria for applicant pool and admitted class. The nurse entrance test required at each of these institutions had previously been the NET Test. The use of this test was discontinued in 2004 and was replaced by the Test of Essential Academic Skills or TEAS Test. Thus, the participants will be limited to those students who had taken the TEAS test. Those students who had previously completed the NET test were required to complete the TEAS test to be eligible for the application review process.

Identification of students in the applicant pool and those admitted into the nursing program was accomplished by searching archival data in the SIS system of each institution's data bank for each year indicated. Students in the applicant pool were designated UND/NUR and those admitted into the fall class were designated NUR/NUR.

Variables

The variables in this study have been identified as appropriate for answering the question of how nurse entrance criteria impacted admission of minority students into ASN programs. The implied cause and effect relationship that is implicit with ex post facto designs examined the independent variables' effects on the dependent variable's likelihood of African American students being admitted into the nursing class each year.

The variables that will be analyzed in the present study are (a) ethnicity of the student and (b) whether he or she would have been admitted under each of the three possible admission criteria (TEAS only, TEAS + TQP COMBINED, TEAS + TQP separately or TQP only).

Independent variables: Student profile. Student ethnicity was operationalized as a categorical variable with three levels: White, African American, and Other (Latino, Asian, Native American, and so forth). This was appropriate for the study; it aimed at assessing

differences primarily between African American and Whites. The category Others included all other ethnicities that were present but in much smaller numbers.

Other independent variables were used in the multiple regression study and included first generation status, age, high school rigor, high school class rank, high school GPA, and gender. Ethnicity variables were included as the primary variable of interest in the study. High school rigor was ranked on a system by ETS that evaluates type of school private, public, or catholic; the percentage of seniors going on to college, and the SAT score range. A score of one indicates the highest rigor of with 95-100% of the seniors going on to college and SAT scores greater than 1200. A score of six indicates the lowest rigor with less than 30% of high school seniors going on to college and no recorded SAT data. Unit increases or decrease in high school rigor refer to one level upward or downward based on statistical measures. High school class rank was determined by rank place divided by class size. Unit increase or decrease refers to one place higher or lower in class rank as determined by statistical measures. High school GPA is based on a four point grading scale. A unit increase or decrease refers to one point higher or lower based on statistical measures.

Dependent variable: Admission status under each criterion. There were four dichotomous variables measuring admission status; one for each of the criteria. Each variable only took on values corresponding to *Yes* (coded with a 1) or *No* (coded with a 0). Therefore, variable “Admission under ‘TEAS only’ criterion” took on the value of 1 if the student was admitted if only the TEAS score was used as admission criterion and 0 otherwise. Variable “Admission under ‘TEAS + TQP COMBINED separately’ criterion” took on the value of 1 if the student was admitted if TEAS + TPQ separately was used as admission criterion, and 0 otherwise. Variable “Admission under ‘TEAS + TQP COMBINED’ criterion” took on the value

of 1 if the student was admitted if TEAS + TQP COMBINED was used as admission criterion, and 0 otherwise. Finally, variable “Admission under ‘TQP only’ criterion” took on the value of 1 if the student was admitted if only Total Quality Points was used as admission criterion and 0 otherwise.

The variables were selected on the basis of the published admissions criteria for selection into the ASN program. Sections A and C from the admission/selection criteria for the ASN program were applicable to this study and were as follows per the college state-wide Admissions Steps for the ASN Program. The admission steps required that ASN program applicants take the ATI Test of Essential Academic Skills (TEAS) exam and that selection of applicants be made utilizing an established point system for TEAS test scores (See Table 1).

Table 1

Applicant Selection

Required TEAS Scores	TEAS Point System
Reading – 85%	Total percentage (raw score) will equate to awarded points – 71% equals 71 points.
Math – 60%	
Science – 60%	
English – 73%	Points will be rounded up using standard rounding practices (i.e., 1-4 rounded down and 5-9 rounded up).

If there were a greater number of eligible applicants than there were clinical spots available, the grades of required general education courses completed were considered utilizing

the following scale: (*Per ISBN 848 IAC1-2-22, all courses in the curriculum must be completed with a grade of “C” or higher*).

General Education credits were evaluated in the context of Quality Points (similar to GPA calculation). Quality Points used the following calculation (see Table 2):

Table 2

Grade Calculation

Courses	Point Criteria Based on Course Grade	
Science/Math 3 credits each:	<u>GRADE</u>	<u>POINTS</u>
	A	24
ANP 101, ANP 102, MAT 111, SIL 211	B	18
	C	12
	Calculation: A = 8 points per credit hour B = 6 points per credit hour C = 4 points per credit hour	
Science 4 credits:	<u>GRADE</u>	<u>POINTS</u>
	A	32
ANP 201	B	24
	C	16
	Calculation: A = 8 points per credit hour B = 6 points per credit hour C = 4 points per credit hour	
Non-Science/Non-Math 3 credits each:	<u>GRADE</u>	<u>POINTS</u>
	A	12
HEW 101, APS 142, APS 201,	B	9
HHS 143 OR HSS 148	C	6
	Calculation: A = 4 points per credit hour B = 3 points per credit hour C = 2 points per credit hour	
Test-Out Courses: (CLEP, DANTES)	Score required in each subject: 50	
College Algebra, Introduction to Psychology, Human Growth and Development, English Composition without Essay (HEW 101), English Composition with Essay (HEW 102)	Points awarded equivalent to grade of C: 6	

Applicants were rank ordered (highest to lowest score) and applicants with the highest scores were offered admission to the program based on the number of available clinical spots. Successful completion of the general education courses did not imply admission into the ASN Program.

The application of these admission criteria was modified for statistical analysis in this study. The TEAS test score was the primary criterion for admission into the ASN program. Since the TEAS test required the minimum passing score to be considered for admission, the raw scores were totaled for each individual student. In the event that there were equivalent scores resulting in more qualified applicants than clinical slots, general education courses were considered. The variable for general education courses was a total number of assigned Quality Points for general education courses and math and science courses as indicated in the criteria above. The TEAS + TQP COMBINED was computed by adding the raw scores to calculate the total TEAS score with the TQP.

Procedures

The Office of Institutional Research on each of the three campuses was contacted to request retrieval of data on applicants for the ASN program and students who were admitted into the program for the years 2005 and 2006. Upon approval, the requested data set was generated in raw data format via CD. The data set was used to establish a profile for both the applicants and the admitted classes for each of the three years. The profile included information on race, gender, GPA, courses completed with grades, and TEAS test score.

Missing TEAS data for any student resulted in exclusion from the final applicant pool. The remaining students in both the applicant pools and the admitted classes were students who

were eligible to be reviewed for admission into the ASN program on the basis of successfully passing each section of the TEAS test per published criteria for admission into the ASN program.

Data Analyses

Descriptive profiles were analyzed using chi-square tests. Analyses were conducted to determine the presence of any significant differences in terms of the student records for grades and TEAS scores, TEAS test passage for TEAS total and by subtest between African American and White students. The chi-square test for contingency tables was used to evaluate experimental designs where categorical data was summarized in an $r \times c$ table. Each cell of a contingency table equated to the number of observations or subjects categorized in each cell. The design employed in this phase of the study was the chi-square test of independence where a sample categorized on dichotomous variables. One of the variables was designated r ($r \geq 2$) and was represented by the rows. The other variable was designated c ($c \geq 2$) and was represented by the columns. The chi-square test of independence evaluated whether or not the two variables were independent of each other; they exhibit zero correlation (Gravetter & Wallnau, 2004; Sheskin, 2007).

Chi-square test for independence employed two hypotheses: the Null Hypothesis and the Alternative Hypothesis. The Null Hypothesis is $H_o: o_{ij} = e_{ij}$ for all cells. This hypothesis indicated that for each $r \times c$ cell the observed cell frequency equaled the expected cell frequency. The Alternate Hypothesis is $H_o: o_{ij} \neq e_{ij}$ for at least one cell. This hypothesis indicated that for each $r \times c$ cell the observed cell frequency did not equal the expected cell frequency. A rejection of the Null hypothesis would be the result of a discrepancy one or more cells. The hypotheses could also be written to reflect proportions of observations. The Null Hypothesis would then be $H_o: \pi_{ij} = (\pi_i)(\pi_j)$ for all $r \times c$ cells. The Alternative Hypothesis would be $H_o: \pi_{ij} \neq (\pi_i)(\pi_j)$ for at

least one cell. The proportion in the population was represented by π (Gravetter & Wallnau, 2004; Sheskin, 2007).

The computation of chi-square test for independence was as follows: The observed frequencies for each cell (O_{ij}) were compared to the expected frequency (E_{ij}) through data arrangement in a contingency table. The employed protocol required multiplying “the sum of observations in the row in which the cell appears by the sum of the observations in the column in which the cell appears” (Sheskin, 2007, p. 625). This number was then divided by the total number of observations, n . The following equation summarizes the computation:

$$(E_{ij}) = \frac{(O_i)(O_j)}{n}$$

(Sheskin, 2007, p. 625). The expected cell frequencies were then used to determine the test statistic for chi-square contingency tables as follows (Sheskin, 2007, p. 626):

$$x^2 = \sum_{i=1}^r \sum_{j=1}^c \left[\frac{(O_{ij} - E_{ij})^2}{E_{ij}} \right]$$

The x^2 value was then evaluated using the Table of the Chi-Square Distribution using degrees of freedom: $df = (r - 1)(c - 1)$. Rejection of the Null Hypothesis required the obtained chi-square value to be equal or greater than the specified critical level of significance .05 or .01 (Gravetter & Wallnau, 2004; Sheskin, 2007).

Research Question 1

Assessment of Research Question 1 was conducted using the correlation analysis of logistic regression which is an alternative to discriminant analysis. The purpose of logistic regression was the same as discriminant analysis with the classifications of the participants into groups. While this statistical analysis offered more flexibility and versatility than discriminant

analysis, mathematically it was more cumbersome (Mertler & Vannatta, 2005). This allowed for determining whether there were significant differences in the admission rates of African American students and White students for each of the admission criteria. An unbiased admission criterion was defined as one for which the admission rates of Whites and African Americans was not significantly different.

Logistic regression is useful when the dependent variable (DV) is not a continuous or quantitative variable but was categorical or discrete. Such categories may be inclusive of membership or nonmembership in a specific group, completer or noncompleter of a specific academic program, and so forth (Mertler & Vannatta, 2005). For this particular study, the DV was admitted or not admitted into the RN associate degree nursing program.

The goal of logistic regression was to predict values on the DV of two or more categories or more specifically membership into one of two or more groups. In logistic regression, the resultant value that was predicted was probability with a range from zero to one. It specified the probability of the designated outcomes admitted or not admitted for each participant in the study. Thus, logistic regression produced a regression equation that predicted the probability that participants would fall into one of the DV categories with accuracy. The ultimate model produced by logistic regression was that of a nonlinear function (Mertler & Vannatta, 2005).

The basis of logistic regression is probabilities, odds, and the logarithm of odds. Probabilities are representative of the proportion of the total number of outcomes that are possible for a specific type DV. In logistic regression, the ratio of the probability of an event occurring divided by the probability that it will not occur is defined as *odds*. The equation would be represented as:

$$Odds = \frac{p(X)}{1 - p(X)}$$

$$1 - p(X)$$

(Mertler & Vannatta, 2005, p. 318).

The probability of the event X occurring was $p(X)$ and the probability of the event not occurring was $1 - p(X)$. The value of probabilities would always be in the range of zero to one but the odds may be greater than one. Thus, for this study, the concept of odds for the working logistic regression was as follows:

$$Odds_{admitted} = \frac{p(admitted)}{1 - p(admitted)}$$

An odds ratio was used to represent the effect of the predictor variable or IV effect on a dichotomous outcome. The symbol used to represent the odds ratio is $Exp(B)$ or ψ which was defined as the ratio of the odds of two different IV values being classified into one of two DV categories (Mertler & Vannatta, 2005). Thus, the odds of being classified as admitted was $Y = 0$ and the odds of being classified as not admitted was $Y = 1$.

There were several advantages of using logistic regression over multiple regression. Logistic regression did not require any assumptions to be made about the distribution of the independent variables' (IV) or predictor variables. The IVs did not have to be normally distributed. They did not have to be linearly related nor did they have to have equal variances within each of the designated groups. All predictive probabilities were positive ranging from zero to one; there were no negative values. Logistic regression also lends itself to analysis of all types of predictor variables such as discrete, continuous, or dichotomous. Its flexibility includes the ability to produce nonlinear models (Mertler & Vannatta, 2005).

The logistic regression output was presented in three parts: (a) statistics for the overall fit of the model, (b) classification table, and (c) summary for the model variables. Each part of the output is summarized below.

Logistic regression results were evaluated using goodness-of-fit analytical tests such as chi square. The model allowed for the inclusion of four variables to be compared from the original set of variables. Each step in the analysis compared the actual case value for the DV with the predicted DV value with significance set at $< .050$. The analysis also generated the percentages of correct classifications at each step of the analysis (Mertler & Vannatta, 2005).

Several indices indicating overall fit of the model were included in a second table. The *-2 Log Likelihood* indicates model fit of the data. A value of zero indicated a perfect fit model. A measure *Goodness-of-fit* compared the actual DV values with the predicted DV values and was similar to the chi-square value generated in the first set of data. The *Cox & Snell - R²* and *Nagelkerke - R²* and served essentially in the same capacity of R^2 representing the proportion of variability of the DV that can be accounted for by all IV or predictor variables that were a part of the equation (Garson, 2009a; Mertler & Vannatta, 2005).

The classification table for the DV compared the DV values with the actual observed values from the data set on the basis of the logistic regression model. The predicted values for the DV was derived from the computation of the probability of a specific participant and then classified into one of two categories, admitted or not admitted based on the probability. If the probability was less than .50 the participant was classified into the first category of the DV, admitted (Mertler & Vannatta, 2005).

A table of coefficients for the variables was generated that include β , *S.E.*, *Wald*, *df*, *Sig.*, *R. Exp(B)*. The label β represented the regression coefficient values or weights for each of the

variables used in the equation. The standard error of β was represented by *S.E.* The significance of each of the variables β was then tested with the *Wald statistic* and the associated *df* and significance value. It was recommended that a more liberal significance level be applied for the interpretation of this value such as $p < .05$ or $p < .1$. The *R* value that was calculated represented the partial correlation coefficient between each of the IV or predictor variable and the DV when all other predictor variables in the equation were held constant. *Exp(B)* was the calculated odds ratio for each of the variables and was representative of the increase in odds for a participant being classified in a category as the IV or predictor variable increased by one. If *Exp(B)* was less than one, the odds ratio represented the decrease in odds for a participant being classified in a category (Garson, 2009a; Mertler & Vannatta, 2005).

Research Question 2

Assessment of Research Question 2 was performed using multiple regression. This statistical test sought to determine if the variance associated with the dependent variable could explained at a significant level by a set of independent variables. The relative importance of these independent variables was then established (Lomax, 2001). The independent variables to be used in the multiple linear regression analyses included first generation student, age, high school rigor, high school grade point average, class rank, gender, and ethnicity. The dependent variables, TQP + TEAS COMBINED, TQP, and TEAS were regressed onto each of these variables.

The regression equations were as follows: (a) Raw score regression equation: $Y_i = b_1X_{1i} + b_2X_{2i} + \dots + b_mX_{mi} + a$ and (b) standard score regression equation: $z(Y_i) = b_1*z_{1i} + b_2*z_{2i} + \dots + b_m*z_{mi}$. The true dependent was designated *Y*; the regression coefficients were designated *b* for each corresponding *x*. Dummy variables were used to add ordinal variables to the regression

equation and included African American, White, and Other. The variables were coded 0 or 1 with 1 meaning that a particular variable was present and 0 the variable was not present. One of the variables is typically dropped from the equation; the largest categorical group is the non-coded group. In this study the non-coded group was Whites. All interpretations will be referenced back to White (Lomax, 2001; Garson, 2009b).

Assumptions for multiple linear regression included linearity, homoscedasticity of variance, random and independent errors, normality, and multicollinearity. It was assumed that the regression of Y on the X_k s is linear or that there was linearity in the model parameters and thus the partial slopes of the sample and the y -intercept were then unbiased estimators of the partial slopes and intercept of the population. The assumption of homoscedasticity of variance was that the conditional distribution of the prediction errors would have a constant variance s_{res}^2 for each value of X_k . The errors in the prediction were assumed to be random, independent errors. The assumption of normality maintained that the conditional distribution of the prediction errors was normal in their shape; the predictor errors for all values of X_k were normally distributed. If present, the effect of multicollinearity would lead to instability of the regression coefficients as they are applied across samples. There should be none present (Lomax, 2001; Sheskin, 2007).

The model summary provided information on the overall model fit. Output values included R , R^2 , adjusted R^2 , and standard error of the estimate values. R represented the Multiple Correlation Coefficient which indicated the degree or strength of relationship from zero to one between a set of predictors and a criterion and it is also represented a correlation between observed and predicted values of the criterion. R^2 is the Coefficient of Multiple Determination and represented the proportion of total variance in the criterion Y that was shared with or

explained by a linear set of predictors $X_{1,...,m}$ as evidenced in a linear regression equation and more or less describes the goodness-of-fit or amount of the variance that was explained by a particular set of predictors. Standard Error of the Estimate, also called prediction errors, where the value represented the average size of the error of prediction of the criterion Y from the Prediction Equation. It represented that portion of Y that was not able to be predicted from the predictors, $X_{1,...,m}$. The test of significance of R^2 was evaluated from the F -test and tested the significance of the model. It assessed the linearity relationship between y and the predictors (Garson, 2009b, Lomax, 2001).

Output values for individual predictors included β (unstandardized), Beta (standardized), r_p (partial correlation coefficients), and r_{sp} (semi-partial correlation coefficients). β – unstandardized partial regression coefficient represented the raw value increases in the value of the criterion Y given an increase of 1 unit in each of the predictors after statistically controlling for the impact on the criterion due to the predictors $X_{1,...,m}$. The t -test assessed the significance of each of the β coefficients with a null hypothesis stating that the regression coefficient equals zero (Garson, 2009b).

Beta – standard partial regression coefficient represented the standardized z-score value increases in the value of the criterion Y given an increase of 1 unit in each of the predictors after statistically controlling for the impact on the criterion due to the predictors $X_{1,...,m}$ (Garson, 2009b, Lomax 2001).

Partial correlation coefficients, r_p represented the strength and direction of correlation of a particular predictor $X_{1,...,m}$ and the criterion Y after the effects of all the other predictors were partialled out for both the predictor of interest and the criterion. If std. partial regression

correlation was significant as determined by the t-test then the partial correlation coefficient was also significant and vice versa (Garson, 2009b, Lomax 2001).

Semi-partial correlation coefficient r_{sp} represented the strength and direction of correlation between a particular predictor $X_{1...m}$ and the criterion Y after the effects of all the other predictors were partialled out of the predictor of interest but not the criterion. Again, the value did not indicate significance or non-significance of the predictors in relation to the criterion. If std. partial regression correlation was significant as determined by the t-test then the semi-partial correlation coefficient was also significant and vice versa (Garson, 2009b, Lomax, 2001).

CHAPTER 4

Results

The findings presented in this chapter are organized around research questions. Per the admission criteria at each of the three campuses A, B, and C, successful completion of the TEAS test is required to remain in the applicant pool. Completion of the required general education courses provides additional points in the admissions formula with science and math courses being weighted more heavily than non-science and non-math courses. The more courses completed, the higher the number of TQPs attained, and the higher the TEAS test score the better the chances are for admission into the RN associate degree nursing program (ASN).

The data collection process in this study provided thousands of pieces of information. Upon organization of the data to aid in the distinction of the qualified applicant pool versus the total number of students in the applicant pool, varying levels of student pre-program academic progress was noted for each of the three cities' community colleges.

Admissions Descriptive Statistics

Ethnicity demographics. A total of 4,795 student records from cohorts 2005 and 2006 were used in the study. Table 3 summarizes the 2005-2006 combined cohort gender data by ethnicity for each Campus A, B, and C as self-identified by students on their college applications. Ethnicities are designated African American, White, and Other. The designation Other includes all other races combined: Latino(a), native American, Asian, and so forth.

Gender data was incomplete for all student records in the combined Cohort 2005 and 2006. Data was missing for 45 students and was indicated for 4,742 students. The largest ethnic applicant pool was White females, followed in descending order by African American females, Other females, White males, and Other males for all Campuses A, B, and C. Within ethnic and gender groups, White females and males had more students admitted into the ASN program based on percentages followed by Other females, and African American females in descending order. Percentages admitted from the White female applicant pool were 9.5%, 6.5%, and 9.1% for Campuses A, B, and C respectively. Percentages for White males were 23.8%, 6.6%, and 11.1% for Campuses A, B, and C respectively. Percentages for Other females were 19.4%, 2.9%, and 2.9% for Campuses A, B, and C respectively. African American female percentages were 4.3%, 1.2%, and 1.1% for Campuses A, B, and C respectively. Both ethnic and gender categories African American males and Other males had zero applicants admitted into the ASN program.

Table 3

Ethnic and Gender Demographics for Applicant Pool and Admit Cohort 2005-2006

	Campus A		Campus B		Campus C	
Ethnicity	<i>N</i>	Admitted	<i>N</i>	Admitted	<i>N</i>	Admitted
African Amer.	92	4 (4.3%)	801	10 (1.2%)	175	2 (1.1%)
Females						
African Amer. Males	7	0	61	0	29	0
European Amer.	252	24 (9.5%)	1972	128 (6.5%)	673	61 (9.1%)
Females						
European Amer. Males	21	5 (23.8%)	196	13 (6.6%)	72	8 (11.1%)
Other Females	36	7 (19.4%)	209	6 (2.9%)	102	3 (2.9%)
Other Males	5	0	27	0	12	0

Table 4 summarizes the age demographics for gender and ethnicity. The applicant pool was predominately female at 91% at Campuses A and B and 89% at Campus C. White students comprised about 67% of the applicants and were the largest group for all three campuses followed by African Americans at about 25%. The median age for female students was mid-twenties and for males the median age was late 20s. Age by ethnicity was as follows: Whites mid-20s, African Americans mid to late 20s, Latino/a early to mid-20s, Mixed race late teens to early 20s and late 20s, Pacific Islanders mid to early 30s, and Native Americans late 20s or late 30s.

Table 4

Gender/Ethnicity Median Ages for Cohorts 2005 and 2006 Campuses A, B, C

Gender/Ethnicity	Campus A			Campus B			Campus C		
	<i>N</i>	%	Median	<i>N</i>	%	Median	<i>N</i>	%	Median
	Age			Age			Age		
Female	248	(91)	27	1179	(91)	25	354	(89)	26
Male	24	(9)	30	112	(9)	29	44	(11)	28
White	179	(66)	27	868	(67)	26	272	(68)	26
African American	68	(25)	29	318	(25)	25	76	(19)	27
Hispanic (Latino)	17	(6)	26	37	(3)	23	22	(6)	23
Mixed	1	(0)	33	18	(1)	23	7	(2)	23
Other	3	(1)	19	7	(0.5)	21	9	(2)	28
Native American or American Indian				7	(0.5)	29	1	(<1)	39
Pacific Islander				17	(1)	26	2	(<1)	33
Unknown	4	(2)	23	19	(2)	23	9	(2)	20
Valid <i>N</i>	272	(100)		129	(100)		39	(100)	

**N* = 272

***N* = 398

****N* = 1291

Table 5 summarizes the number of student records for each Campus A, B, and C and the ethnic percentages for African Americans, Whites, and Others. Twenty-six percent of the

student population seeking admission into the ASN program at Campus B was African American and that percentage is reflective of the demographic of the African American population (25.5%) for the city in which Campus B is located. Campus A records document that 23.7% of the student population seeking admission into the ASN program in City A was African American. That percentage was 60.3 percentage points lower than the African American population (84%) for the city in which Campus A is located. Campus C documented 18.9% of the student population seeking admission in the ASN program was African American. That percentage was 5.7 percentage points lower than the African American demographic (24.6%) for the city in which Campus C is located.

Table 5

Ethnicity Demographics by Campus

Ethnicity	<u>Campus A</u>		<u>Campus B</u>		<u>Campus C</u>	
	<i>N</i>	%	<i>N</i>	%	<i>N</i>	%
No. of student records	417	100	3299	100	1079	100
African American	99	23.7	862	26.1	204	18.9
White	273	65.5	2168	65.7	745	69.0
Other	45	10.8	269	8.2	130	12.1

Admission data sets. The admissions criteria process assigned points based on the TEAS score and grades earned on the general education courses. Review of records revealed that not all students have complete data sets for admission into the ASN program. These data were provided by Campus A, B, and C and were the contents of the institutional data management systems of each campus. Students in the applicant pools were designated by a code

in the data management system for each campus that identified them as seeking admission into the associate degree nursing program. The designation UND/NUR is used in this study to indicate students in the applicant pool. Some students were identified as being UND/NUR but had no associated data, some students had grades in their data set but no TEAS score, some students had no grades in their data set but had a TEAS score, and other students had both grades and a TEAS score. Tables 6, 8, and 10 present the number and percentage of students by ethnicities who had no data (no grades and no TEAS score), grades only (no TEAS score), no grades but had a TEAS score, and those students who had both grades and TEAS scores recorded for Campus A, Campus B, and Campus C respectively. Tables 7, 9, and 11 present the Chi Square analysis of the records for each of the campuses A, B, and C respectively.

The record data for Campus A in Table 6 showed that overall African Americans had the lowest percentage of complete data for both general education courses and the TEAS test. That could be because they did not, in fact, complete general education courses or the TEAS test or because their data were not captured and transmitted at the same rates as for other ethnic groups. Only 34.3% of African Americans completed both versus 48.4% of White and 40.0% of Other students. The data also indicated that the majority of students had not yet taken the TEAS test but had completed some general education courses at the time of the applicant review process for all ethnicities. The percentage range between ethnicities was 5.5%. Very few students had taken the TEAS prior to completing some or all of the general education courses. Records with no recorded grades or TEAS were noted for all ethnicities with African Americans having the highest percentage at 16.2% and Whites the lowest at 7.3%. At Campus A, African Americans had higher than expected percentages for no data; grades only; and lower than expected percentages for TEAS only and both TEAS and grades.

Table 6

Campus A UND/NUR Records by Ethnicity

Ethnicity	No Data	Grades Only	TEAS Only	Both	Total
African American:					
Record count	16	49	0	34	99
%	16.2	49.5	.0	34.3	100.0
White					
Record count	20	120	1	132	273
%	7.3	44.0	0.4	48.4	100.0
Other					
Record count	5	22	0	18	45
%	11.1	48.9	0.0	40.0	100.0
Total					
Record Count	41	191	1	184	417
%	9.8	45.8	0.2	44.1	100

Note. No Data refers to student records that had no recorded TEAS score or grades.

Chi-Square tests results as shown in Table 7 for Campus A indicated that the difference between African American students versus White and Other students who had complete data for both general education courses and the TEAS test was not statistically significant, $\chi^2(6, N = 417) = 10.397, p = .109$. The likelihood ratio or G test also revealed that the test model inclusive of ethnicities indicated the difference between African American versus Whites and Others who completed general education courses and the TEAS test for Campus A was not statistically significant, $G(6, N = 417) = 10.366, p = .110$. Linear-by-linear association for Campus A did not

identify any significant difference between African Americans (34.3%) and Whites (48.4%) who completed both the TEAS test and general education courses ($p = .101$).

Table 7

Campus A UND/NUR Chi Square Records by Ethnicity

Chi-Square Statistics	Value	df	Sig. (2-sided)
Pearson Chi-Square	10.40	6	.109
Likelihood	10.37	6	.110
Linear-by Linear association	2.69	1	.1017

valid cases = 417

Table 8 summarized the data for Campus B and showed that overall African Americans had the lowest percentage of complete data for both general education courses and the TEAS test. Again, that could be because they did not, in fact, complete general education courses or the TEAS test or because their data were not captured and transmitted at the same rates as for other ethnic groups. Only 16.7% of African American students complete both versus 35.4% of Whites and 27.9% of Others. The data also indicated that the majority of students had not yet taken the TEAS test but had completed some general education courses at the time of the applicant review process for all ethnicities. The percentage range between ethnicities was 9.0%. Very few students had taken the TEAS prior to completing some or all of the general education courses. No data records were noted for all ethnicities with African Americans having the highest percentage at 22.7% and Whites the lowest at 9.1%. At Campus B, African Americans had higher than expected percentages for no data; grades only and lower than expected percentages for TEAS only; and both grades and TEAS.

Table 8

Campus B UND/NUR Records by Ethnicity

Ethnicity	No Data	Grades Only	TEAS Only	Both	Total
African American:					
Record count	196	521	1	144	862
%	22.7	60.4	0.1	16.7	100.0
White					
Record count	198	1196	6	768	2188
%	9.1	55.2	0.3	35.4	100.0
Other					
Record count	36	156	2	75	269
%	20.	51.5	0.8	27.7	100.0
Total					
Record Count	430	1873	9	987	3299
%	13.0	56.8	0.3	29.9	100

Note. No Data refers to student records that had no recorded TEAS score or grades.

Chi-Square tests results as shown in Table 9 for Campus B indicated that the difference between African Americans versus Whites and Others who had complete data for both general education courses and the TEAS test was statistically significant, $\chi^2(6, N = 3299) = 166.317, p = .001$. The likelihood ratio or G test also revealed that the test model inclusive of ethnicities indicated the difference between African American versus Whites and Others who completed general education courses and the TEAS test for Campus B was statistically significant, $G(6, N = 3299) = 162.784, p = .001$. Linear-by-linear association testing for Campus B revealed that there

was a significant statistical difference between African Americans (16.7%) versus Whites (35.4%) who completed both general education courses and the TEAS test ($p = .002$).

Table 9

Campus B UND/NUR Chi Square Records by Ethnicity

Chi-Square Statistics	Value	df	Sig. (2-sided)
Pearson Chi-Square	166.32 ^a	6	.001*
Likelihood	165.78	6	.001*
Linear-by Linear association	80.40	1	.002*

^a# valid cases = 3299

* $p < .05$

Table 10 Campus C showed African Americans also showed that overall African Americans had the lowest percentage of complete data for both general education courses and the TEAS test. Again, that could be because they did not, in fact, complete general education courses or the TEAS test or because their data were not captured and transmitted at the same rates as for other ethnic groups. Only 19.6% of African Americans completed both versus 35.2% of Whites and 27.7% of Others. The data also indicated that the majority of students had not yet taken the TEAS test but had completed some general education courses at the time of the applicant review process for all ethnicities. The percentage range between the ethnicities was 3.0%. Very few students had taken the TEAS prior to completing some or all of the general education courses. No data records were noted for all ethnicities with African Americans having the highest percentage at 31.4% and Others the lowest at 20.0%. At Campus C, African Americans had higher than expected percentages for no data and lower than expected percentages for grades only; TEAS only; and both grades and TEAS.

Table 10

Campus C UND/NUR Records by Ethnicity

Ethnicity	No Data	Grades Only	TEAS Only	Both	Total
African American:					
Record count	64	97	3	40	204
%	31.4	47.5	1.5	19.6	100.0
White					
Record count	101	376	6	262	745
%	13.6	50.5	0.8	35.2	100.0
Other					
Record count	24	67	1	36	130
%	20.0	51.5	0.8	27.7	100.0
Total					
Record Count	191	540	10	338	1079
%	17.7	50.0	0.9	31.3	100

Note. No Data refers to student records that had no recorded TEAS score or grades.

Chi-Square tests results shown in Table 11 revealed the difference between African American students versus Whites and Others who had complete data for both general education courses and the TEAS test for Campus C was statistically significant, $\chi^2(6, N = 1079) = 43.299$, $p = .001$. The likelihood ratio or G test also revealed that the test model inclusive of ethnicities predicted the difference for record types between African American versus White and Other students who completed both general education courses and the TEAS test for Campus C was statistically significant, $G(6, N = 1079) = 41.046$, $p = .001$. Linear-by-linear association testing

for Campus C revealed that there was a significant statistical difference between African Americans (19.6%) and Whites (35.2%) who completed both general education courses and the TEAS test ($p = .001$).

Table 11

Campus C UND/NUR Chi Square Records by Ethnicity

Chi-Square Statistics	Value	<i>df</i>	Sig. (2-sided)
Pearson Chi-Square	43.30 ^a	6	.001*
Likelihood	41.05	6	.001*
Linear-by Linear association	9.49	1	.001*

^a# valid cases = 1079, * $p < .05$

Passage of the TEAS test by campus and ethnicity. Figure 1 summarizes the successful completion of the TEAS test by ethnicity for each Campus A, B, and C. A total of 1,529 students took the TEAS test: 185 students in Campus A, 996 students in Campus B, and 348 students in Campus B. Students who successfully completed all subtests of the TEAS were in the final applicant pool for admission into ASN programs in the study.

For all campuses African Americans had the lowest pass rate for the TEAS test. Campus C had the lowest African American pass rate at 14.0% followed by Campus A at 14.7% and Campus B at 42.1%. Whites at Campus B had the highest pass rate for all campuses at 81.7% followed by Campus C at 62.3% and then Campus A at 42.1%.

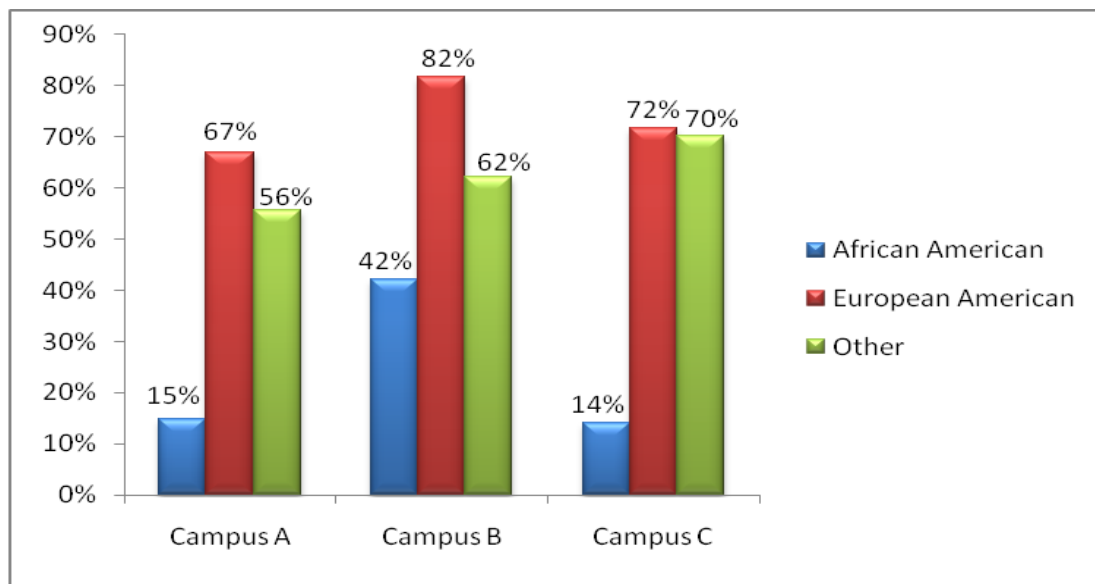


Figure 1. Campus TEAS pass rates by ethnicity for combined cohorts 2005 and 2006

Note. All TEAS subtests must be successfully completed.

Chi Square analyses results for TEAS pass rates are shown in Tables 12 for Campuses A, B and C. The difference between African Americans who successfully passed the TEAS test versus White and Others was statistically significant for Campus A, $\chi^2(2, N = 185) = 29.99$, $p = .001$; Campus B, $\chi^2(2, N = 996) = 106.84$, $p = .001$; and Campus C, $\chi^2(2, N = 348) = 54.40$, $p = .001$.

The likelihood ratio reveals that the model inclusive of ethnicities predicted a significant difference between observed and expected outcomes for African American versus White and Others who successfully passed the TEAS test for all campuses: Campus A, $G(2, N = 185) = 31.63$, $p = .001$; Campus B, $G(2, N = 996) = 96.024$, $p = .001$; and Campus C, $G(2, N = 348) = 53.88$, $p = .001$.

Linear-by-linear association testing for all campuses revealed that there was a significant statistical difference between African Americans and Whites who passed the TEAS test versus Whites and Others ($p = .001$).

Table 12

Chi Square Statistics for TEAS Pass

Chi-Square Statistics	Value	df	Sig. (2-sided)
Campus A ^a			
Pearson Chi-Square	29.99	2	.001*
Likelihood	31.63	2	.001*
Linear-by Linear association	15.64	1	.001*
Campus B ^b			
Pearson Chi-Square	106.84	2	.001*
Likelihood	96.02	2	.001*
Linear-by Linear association	34.10	1	.001*
Campus C ^c			
Pearson Chi-Square	54.40	2	.001*
Likelihood	53.88	2	.001*
Linear-by Linear association	30.98	1	.001*

^a# valid cases 185, ^b# valid cases 996, ^c# valid cases 348, * $p < .05$

Median TEAS test scores. Figure 2 presents the median scores for each TEAS subtest and overall TEAS score by ethnicity for the combined cohort groups 2005 and 2006. The median score for TEAS total exhibited a positive skew and negative kurtosis. The median scores for all ethnicities in each subtest were fairly close in number with the exception of math. The

average score was in most cases less than the median score with the smallest difference being 0.3 and the largest difference being 2.9 and indicated a positive skew of the distribution. Overall, African Americans had the lowest median and average score for all TEAS subtests of reading, math, science, English, and overall TEAS score with Whites scoring the highest in all subtests and overall.

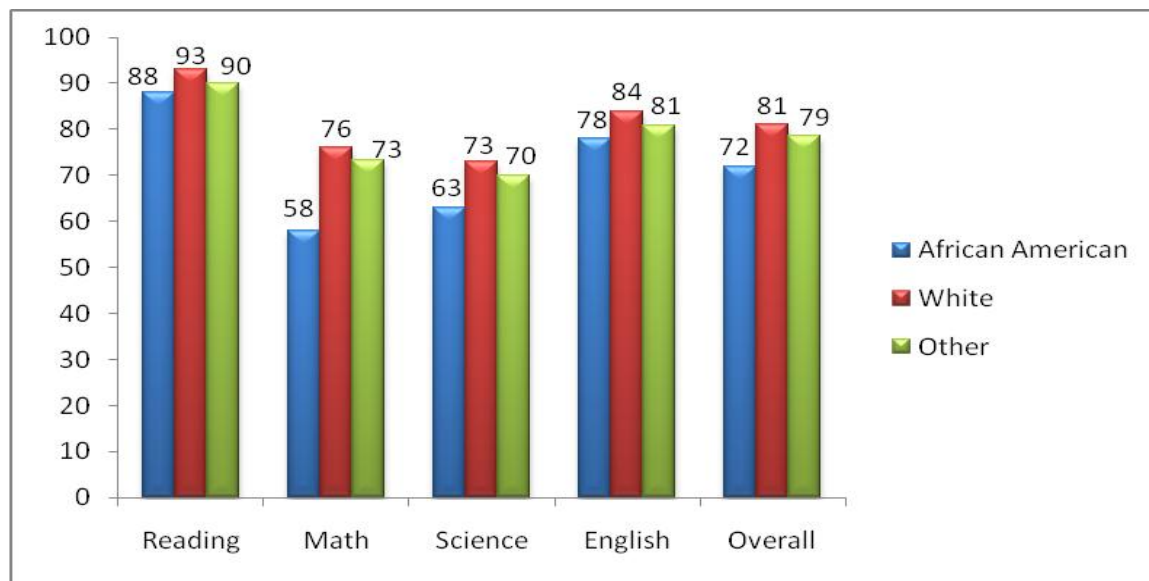


Figure 2. Median scores for TEAS subtests for combined Cohorts 2005-2006. Passing scores for each subtest were as follows: reading 85%; math 60%; science 60%; and English 73%. All subtests must be successfully completed to pass the TEAS.

TEAS subtest pass rates by ethnicity. Figure 3 depicts the percentage pass rates for each TEAS subtest by ethnicity. African Americans had the lowest percentage pass rate for all subtests and TEAS overall. Whites had the highest percentage pass rate for all subtests and TEAS overall. The math subtest had the lowest percentage pass rate for African Americans and Whites. For Other the lowest percentage pass rates were identical for both math and English. The subtest with the highest pass rate for African Americans was English and for Whites and

Other was science. Pass rates for African Americans subtests were reading 68%, math 46%, science 69%, and English 77% versus pass rates for Whites were reading 94%, math 88%, science 93%, and English 91%. Pass rates for Other were reading 80%, math 80%, science 91%, and English 80%. African America pass rates for TEAS overall was 32%, Whites 78% and Other 64%.

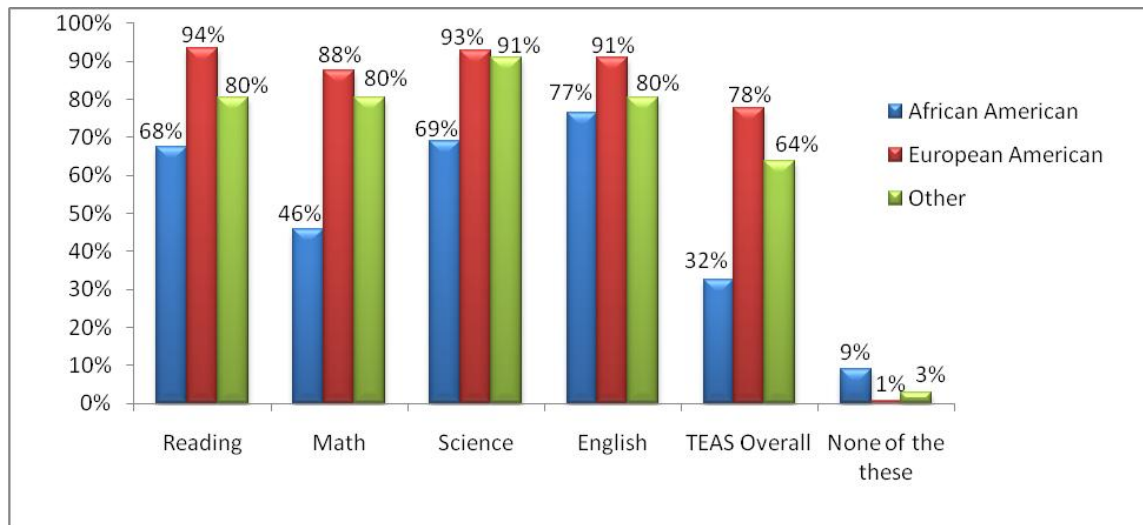


Figure 3. Percentage pass rates for teas subtests by ethnicity: All subtests must be successfully completed to pass the TEAS.

Chi-Square analysis of pass rate percentages for TEAS subtests and overall TEAS test using combined data for all three campuses A, B, and C by ethnicity is presented in Table 13. Chi-square analyses indicated that the differences among ethnic groups in passage rates for all TEAS subtests and TEAS overall are statistically significant for reading: $\chi^2(2, N = 1529) = 134.73, p = .001$; math: $\chi^2(2, N = 1529) = 209.46, p = .001$; science: $\chi^2(2, N = 1529) = 110.18, p = .001$; English: $\chi^2(2, N = 1516) = 52.69, p = .001$; and TEAS overall: $\chi^2(2, N = 1529) = 184.63, p = .001$.

The likelihood ratio revealed that the model inclusive of ethnicities predicts a significant difference between observed and expected outcomes for passing TEAS subset tests and TEAS overall. The likelihood ratio for reading is: $G(2, N = 1529) = 109.77, p = .001$; math: $G(2, N = 1529) = 171.90, p = .001$; science: $G(2, N = 1529) = 84.68, p = .001$; English: $G(2, N = 1516) = 46.01, p = .001$; and TEAS overall: $G(2, N = 1529) = 170.38, p = .001$. The Linear-by-Linear Association analysis revealed that there is a statistical difference in pass rates for TEAS subset tests and TEAS Overall between ethnicities ($p = .001$).

Table 13

Chi-Square Analyses of Combined Ethnic Pass Rates on TEAS Subtests (N = 1529)

Chi-Square Statistics	Value	df	Asymp. Sig. (2-sided)
Reading			
Pearson Chi-Square	134.73	2	.001*
Likelihood	109.77	2	.001*
Linear-by Linear association	36.34	1	.001*
Math			
Pearson Chi-Square	209.46	2	.001*
Likelihood	171.90	2	.001*
Linear-by Linear association	109.44	1	.001*
Science			
Pearson Chi-Square	110.18	2	.001*
Likelihood	84.68	2	.001*
Linear-by Linear association	66.05	1	.001*
English			
Pearson Chi-Square	52.69	2	.001*
Likelihood	46.04	2	.001*
Linear-by Linear association	7.02	1	.008*
TEAS Overall			
Pearson Chi-Square	184.63	2	.001*
Likelihood	170.38	2	.001*

* $p < .05$

Logistic Regression Analyses.

Model descriptions. There are four models for this study. Each model was generated using the preferred enter method that produces a model with all of the independent variables for each model included in one step. Table 14 depicts the dependent variable and independent variables for each model. The largest group in the data set, Whites in this study, was the omitted category of the categorical variable of ethnicity (African American and Other included). As independent variables increase in correlation the standard errors of the logit become larger indicating possible multicollinearity (Garson, 2009a). Standard errors that are greater than 2.0 indicate numerical errors problems such as multicollinearity. All standard errors for predictors were less than 2.0 indicating the absence of multicollinearity (Hair, Anderson, Tatham, & Black, 1998). Each model was run separately for each campus checking for differences in effects across the campuses, which will be noted below in model results.

The models were designed to assess the impact that being African American versus White had on admission into the ASN program while controlling for the impact of TEAS and TQP separately, TQP, TEAS overall, and TEAS + TQP COMBINED on admission into the ASN program. Four different models were used to assess what the effect would be on the coefficient for African American in various combinations of the test and grade inputs.

Table 14

Logistic Regression Models: 1, 2, 3, 4

Model	Dependent Variables	Independent Variables
Model 1	Admission	TEAS and TQP separately African American Other
Model 2	Admission	TEAS African American Other
Model 3	Admission	TQP African American Other
Model 4	Admission	TEAS + TQP COMBINED African American Other

Model fit. There is little agreement among researchers of how to best describe goodness of fit for logistic regression models. Pseudo R^2 using Cox-Snell R^2 and Nagelkerke's R^2 can be used to provide an index for the fit of the model as well as -2 Log Likelihood from SPSS®. Cox and Snell R^2 and Nagelkerke's R^2 more appropriately measure the strength of association. A limitation of Cox and Snell R^2 is that it cannot achieve a maximum value of one. In regards to Nagelkerke's R^2 , it is larger than Cox and Snell R^2 but with logistic regression summary measures being much smaller than those of linear regression studies, it is difficult to interpret and

should be used with caution. The values of Nagelkerke's R^2 are not comparable in magnitude to those values that are reported with linear regression and may be inappropriately viewed by those unfamiliar with this measure (Norusis, 2000; Pampel, 2000). These two measures, Cox and Snell R^2 and Nagelkerke's R^2 are not reported very often in logistic regression studies (Garson, 2009a; Pampel, 2009). The -2 Log Likelihood value of zero reflects a perfect model and lower values reflect a better model fit. However, values in the hundreds are not uncommon and most likely still indicate a good fit. Extremely high values would be considered questionable. The Likelihood ratio Chi-square goodness of fit may also be used to assess model fit but is not in the SPSS® logistic regression output (Mertler & Vannatta, 2005). The Omnibus Tests of Model Coefficients provide information on model fit as well and can be used as an alternative to the now obsolete Hosmer-Lemeshow test (Garson, 2009a; Pampel, 2000). The larger the Chi-square value, the more significant it is given the same degree(s) of freedom. On that note the -2 Log Likelihood and Omnibus Tests of Model Coefficients will be used to assess the goodness of fit for the four logistic regression models.

Results for Model 1. Logistic regression using the enter method was conducted to determine which independent variables (African Americans, Others, TEAS and TQP) were predictors of admission into the ASN program. Regression results indicated that the overall model fit of the predictors African Americans, Others, and TEAS and TQP was good (-2 log likelihood or goodness-of-fit value for Campuses A, B, and C are 113.16, 614.03, and 225.73 respectively). Model 1 for each campus A, B, and C was statistically significant, $\chi^2(4, N = 104)$, 20.15, $p = .001$; $\chi^2(4, N = 741)$, 143.21, $p = .001$; and $\chi^2(4, N = 224)$, 57.83, $p = .001$ respectively, indicating that the independent variables increased predictability of admission into the ASN program. Model 1 correctly classified 73.8%, 81.6%, and 73.6% of the admissions

cases for Campuses A, B, and C respectively. The generated model added 8.8, 2.7, and 8.6 percentage points for Campuses A, B, and C respectively in comparison to the base model. Wald statistics for Campus A, B, and C were not statistically significant for African Americans ($p = 0.731$; $p = .944$; and $p = .647$ respectively) and Other ethnicities at Campus B and C ($p = .111$; $p = .074$ respectively) but were significant for Other ethnicities at Campus A ($p = .021$). Wald statistics were significant for TQP for Campuses A, B, and C ($p = .000$). Wald statistics were significant for TEAS for Campus B ($p = .000$). Wald statistics were not significant for TEAS for Campuses A and C ($p = .268$ and $.420$ respectively). Regression coefficients are presented in Table 15.

Table 15

Model 1: Admission Regressed on TQP and TEAS Separately Regression Coefficients

Ethnicity	β	Wald	df	Sig.	Exp(β)
Campus A					
African American	0.35	0.12	1	.731	1.42
Other	1.91	5.32	1	.021*	6.74
TQP	0.03	12.12	1	.000*	1.03
TEAS	0.06	1.23	1	.268	1.06
Campus B					
African American	- 0.03	0.01	1	.944	0.97
Other	-0.73	2.54	1	.111	0.05
TQP	0.03	80.54	1	.000*	1.03
TEAS	0.13	30.47	1	.000*	1.13
Campus C					
African American	0.45	0.21	1	.647	1.57
Other	-1.11	3.20	1	.074	0.33
TQP	0.04	36.82	1	.000*	1.04
TEAS	-0.01	0.65	1	.420	0.99

Note. Data for combined Cohorts 2005 and 2006.

* $p < .05$

Results for Model 2. Model 2 Logistic regression using the enter method was conducted to determine which independent variables (African Americans, Others, and TEAS) were predictors of admission into the ASN program. Regression results indicated that the overall

model fit of the predictors African Americans, Others, and TEAS was questionable for Campus B and good for Campuses A and C (-2 log likelihood or goodness-of-fit value for Campuses A, B, and C are 128.36, 721.95, and 277.62 respectively). However, Model 2 for each campus B and C was statistically significant, $\chi^2(3, N = 741), 43.40, p = .001$; and $\chi^2(3, N = 224), 9.35, p = .025$ respectively, indicating that the independent variables increased predictability of admission into the ASN program. The model was not statistically significant for Campus A, $\chi^2(3, N = 104), 5.81, p = .121$. Model 2 correctly classified 64.4%, 78.7%, and 67.9% of the admissions cases for Campuses A, B, and C respectively. The generated model show a decrease of 1 and 0.1 percentage points for Campuses A and B compared to the base model. The value added by the generated model for Campus C was 1.8 percentage points in comparison to the base model. Wald statistics for Campus A, B, and C were not statistically significant for African Americans ($p = .784$; $p = .914$; and $p = .177$ respectively) or Other ethnicities at Campus A and B ($p = .074$ and $p = .064$ respectively). Wald statistics were significant for Other at Campus C at ($p = .047$). Wald statistics were significant for TEAS at Campus C ($p = .000$) and were not significant for Campuses A and B ($p = .106$ and $p = .165$ respectively). Regression coefficients are presented in Table 16.

Table 16

Model 2: Admission Regressed on TEAS Regression Coefficients

Ethnicity	β	Wald	df	Sig.	Exp(β)
Campus A					
African American	0.27	0.08	1	.784	1.30
Other	1.24	3.19	1	.074	3.44
TEAS	0.08	2.61	1	.106	1.08
Campus B					
African American	-0.04	0.01	1	.914	0.96
Other	-0.80	3.43	1	.064	0.45
TEAS	0.12	1.93	1	.165	0.99
Campus C					
African American	1.20	1.82	1	.177	3.32
Other	-1.13	3.96	1	.047*	0.32
TEAS	-0.01	37.46	1	.000*	1.13

Note. Data for combined Cohorts 2005 and 2006.

* $p < .05$

Results for Model 3. Logistic regression using the enter method was conducted to determine which independent variables (African Americans, Others, and TQP) were predictors of admission into the ASN program. Regression results indicated that the overall model fit of the predictors African Americans, Others, and TQP was questionable for Campus B but a good fit for Campuses A and C (-2 log likelihood or goodness-of-fit value for Campuses A, B, and C were 114.38, 647.22, and 226.39 respectively). However, Model 2 for each campus A, B, and C

was statistically significant, $\chi^2(3, N = 104), 18.93, p = .001$; $\chi^2(3, N = 741), 57.23, p = .001$; and $\chi^2(3, N = 224), 110.02, p = .012$ respectively, indicating that the independent variables increased predictability of admission into the ASN program. Model 3 correctly classified 65.0%, 78.9%, and 65.5% of the admissions cases for Campuses A, B, and C respectively. The value added by the generated model added 7.4, 2.6, and 7.7 percentage points for Campuses A, B, and C respectively in comparison to the base model. Wald statistics for Campus A, B, and C were not statistically significant for African Americans ($p = .662$; $p = .350$; and $p = .661$ respectively) and Other ethnicities at Campus B and C ($p = .323$; $p = .080$ respectively) but were significant for Other ethnicities at Campus A ($p = .021$). Wald statistics were significant for TQP for Campuses A, B, and C ($p = .000$ for all three campuses). Regression Coefficients are presented in Table 17.

Table 17

Model 3: Admission Regressed on TQP Regression Coefficients

Ethnicity	β	Wald	df	Sig.	Exp(β)
Campus A					
African American	0.44	0.19	1	.662	1.55
Other	1.88	5.30	1	.021*	6.54
TQP	0.03	13.03	1	.000*	1.03
Campus B					
African American	-0.36	0.87	1	.350	0.70
Other	-0.44	0.98	1	.323	0.65
TQP	0.03	85.90	1	.000*	1.03
Campus C					
African American	0.50	0.26	1	.611	1.64
Other	-1.07	3.06	1	.080	0.34
TQP	0.04	37.56	1	.000*	1.04

Note. Data for combined Cohorts 2005 and 2006.

* $p < .05$

Results for Model 4. Logistic regression using the enter method was conducted to determine which independent variables (African Americans, Others, TEAS overall plus TQP) were predictors of admission into the ASN program. Regression results indicated that the overall model fit of the predictors African Americans, Others, and TEAS overall plus TQP was questionable for Campus B but good for Campuses A and C (-2 log likelihood or goodness-of-fit value for Campuses A, B, and C are 113.46, 631.83, and 243.59 respectively). However, Model

4 for each campus A, B, and C was statistically significant, $\chi^2(4, N = 104)$, 19.85, $p = .001$; $\chi^2(4, N = 741)$, 125.41, $p = .001$; and $\chi^2(4, N = 224)$, 40.03, $p = .001$ respectively, indicating that the independent variables increased predictability of admission into the ASN program. Model 4 correctly classified 65.0%, 78.9%, and 65.5% of the admissions cases for Campuses A, B, and C respectively. The value added by the generated model added 9.8, 3.3, and 6.8 percentage points for Campuses A, B, and C respectively in comparison to the base model. Wald statistics for Campus A, B, and C were not statistically significant for African Americans ($p = 0.697$; $p = .482$; and $p = .292$ respectively) and Other ethnicities at Campus B and C ($p = .249$; $p = .102$ respectively) but were significant for Other ethnicities at Campus A ($p = .021$). Wald statistics were significant for TEAS + TQP COMBINED for Campuses A, B, and C ($p = .000$ for all three campuses). Regression coefficients are presented in Table 18.

Table 18

Model 4: Admission Regressed on TEAS + TQP COMBINED Regression Coefficients

Ethnicity	β	Wald	<i>df</i>	Sig.	Exp(β)
Campus A					
African American	0	0.15	1	.697	1.48
Other	1.91	5.34	1	.021*	6.72
TEAS + TQP	0.03	13.66	1	.000*	1.03
COMBINED					
Campus B					
African American	-0.27	0.50	1	.482	0.76
Other	-0.52	1.33	1	.249	0.59
TEAS + TQP	0.03	26.99	1	.000*	1.03
COMBINED					
Campus C					
African American	1.00	1.11	1	.292	2.71
Other	-0.96	2.67	1	.102	0.38
TEAS + TQP	0.03	94.03	1	.000*	1.03
COMBINED					

Note. Data for combined Cohorts 2005 and 2006.

* $p < .05$

Multiple regression analyses

The logistic regression analyses established that there were slight ethnicity effects on admissions. However, most of the differences in admission were accounted for by differences in

TEAS and TQP. Therefore, it was important to see if there were any ethnicity effects on the TEAS and TQP. These analyses required a move from logistic regression to multiple linear regression due to the fact that the dependent variables changed from dichotomous to continuous variables.

A multiple linear regression analysis was performed on Campus B Cohort 2006 only, as Campus B Cohort 2005 and Campuses A and B Cohorts 2005, 2006 did not have complete datasets available to perform analyses. The multiple linear regression studies were run with dependent variables of TEAS + TQP COMBINED, TQP, and TEAS. Only those independent variables that were statistically significant were included in each model. The independent variables included first generation student status, high school rank, high school rigor, and age. The coefficients for gender and high school GPA were not significant for any of the models and therefore not included in forward entry model building process. Independent variables African American and Other were force entered into the model because ethnicity was the primary variable of interest for the study and because all dummy variables for categorical variables should be entered together in a regression model. Variables that are blank in Table 20 indicate that the independent variable did not contribute significantly to the model during the forward entry model building process and thus were not included in the model. First generation contributed significantly to model TEAS + TQP COMBINED but was not included in TQP or TEAS only models. High school rank and age were not included in TEAS + TQP COMBINED but were included in TQP and TEAS only models. High school rigor was not significant in the TEAS only model but was included in the TQP only and TEAS + TQP COMBINED models. Gender and high school GPA did not contributed significantly to any of the models.

Table 19

Multiple Regression Models: TEAS + TQP COMBINED, TQP, TEAS

Model	Dependent Variable	Independent Variables
TEAS + TQP COMBINED	TEAS + TQP COMBINED	First Generation High School Rigor African American Other
TQP	TQP	Class Rank Age High School Rigor African American Other
TEAS	TEAS	Class Rank Age African American Other

Note. Omitted category for ethnicity was White. High school class rank was determined by rank place divided by class size. Age is years. High school rigor was based on a ranking from 1 through 6 used by the ETS, 1 being lowest and six highest. Gender was tested but did not emerge as being significant due to the small number of males in the dataset. High school GPA was included but did not emerge as significant.

Using the stepwise forward entry method three models were produced for the regression study. A significant model for TEAS + TQP COMBINED emerged with Adjusted R square = .089; $F_{4,88} = 3.16$, $p = 0.018$. A significant model emerged for TQP with Adjusted R square =

.192; $F_{5,278} = 14.24, p = 0.001$. A significant model emerged for TEAS with Adjusted R square = .357; $F_{4,91} = 13.65, p = 0.001$. Significant variables and coefficients are shown in Table 20. The coefficient for African Americans is statistically significant in Models TQP and TEAS.

Table 20

Multiple Regression Coefficients

	TEAS + TQP			TQP ^b			TEAS ^c		
	COMBINED ^a								
Predictor	β	<i>Beta</i>	Sig.	β	<i>Beta</i>	Sig.	β	<i>Bet</i>	Sig.
Variables	<i>a</i>								
First Generation	-40.95	-.22	.044						
High School Rank				.38	.31	.000*	.16	.52	.000*
Age				.72	.20	.000*	.17	.18	.032*
High School Rigor	15.47	.24	.022*	14.41	.21	.000*			
African American	-11.71	-.10	.328	-10.05	-.12	.028*	-6.68	-.24	.006*
Other	6.86	.07	.497	.57	.01	.921	-1.58	-.06	.485

Note. Omitted category for ethnicity was White. High school class rank was determined by rank place divided by class size. Age is years. High school rigor was based on a ranking from 1 through 6 used by the ETS. Gender was included in the model but did not emerge as being significant most likely due to the small number of males in the dataset. High school GPA was included in the model but did not emerge as being significant. $N^a = 89, N^b = 279, N^c = 91$

* $p < .05$

Summary

Descriptive profiles of the ASN applicant pool were presented and included gender, age, ethnicity, median TEAS scores, subtest pass rates, and overall TEAS pass rates. Logistic

regression studies were conducted to determine differences in the rate of admission into the ASN program between African Americans and Whites after controlling for TEAS and TQP. Multiple regression studies were conducted to determine how admission into the ASN program was influenced by TEAS, TQP, and TEAS + TQP COMBINED after controlling for first generation, age, high school rigor, high school GPA, high school class rank, gender, and ethnicity.

Discussion of the results is presented in Chapter 5.

CHAPTER 5

Discussion

Most of the women in nursing, and in nursing schools, are White women. Few of the women in nursing and nursing schools are African American. Do nursing school entrance exams, in particular the TEAS test, have a negative effect on African American women seeking to enter nursing programs and become nurses, that result in unintended discrimination against African American women? This study looked at three nursing programs in community colleges in the Midwest and assessed whether or not the current admission practice of requiring nurse entrance examinations as a part of admission criteria into associate degree nursing (ASN) programs negatively impacted minority students through de facto discrimination. Discussion of the ethnicity demographics, student data records, TEAS records, logistic regression coefficients, and multiple regression coefficients provided evidence of the impact of nurse entrance criteria on minority students' admission into ASN programs, in particular African American students.

The findings indicated that nurse entrance exams did impose disparate impact toward African Americans seeking admission into associate degree nursing programs. Standardized tests such as the TEAS are exclusionary particularly of African Americans and are not predictive of student success. How can such a test predict success in nursing programs when it was not developed for that purpose? The majority of test questions used in TEAS “were initially developed as part of a state’s mandated achievement assessment program” (ATI, n.d., p. 1), had

no specific intended use, and were “not specifically developed for the TEAS” (ATI, n.d., p. 2). The knowledge and skills assessed are what students are expected to have acquired in a typical K-12 education. TEAS was not intended as a tool to determine success in nursing programs. According to ATI’s statistical analyses linking TEAS scores with end of program achievement measures, TEAS only has a predictive value for success in ASN program courses at 6% – 14% (ATI, n.d., p. 12).

So why are these three community colleges using TEAS as a measure to predict success in the ASN program by requiring it as a major criterion in the admission process when it has minimal utility if any in predicting success? Where is the evidence that African American students will not be successful in the program if they do not pass all subtests? The majority African American students seeking admission are not admitted into the ASN program on the basis of a test that was not designed to predict nursing success. While it may correctly identify students would not be successful, it also excludes those who would be successful.

The ATI Technical Manual for TEAS does not specify minimum pass scores for any subtest. The percentage cutoffs established by the three colleges for passing each subtest appear to be arbitrarily based on data from studies performed by ATI relative to the mean number of correct answers. The cutoffs used in the admission criteria do not appear to be based on any evidence, statistical or otherwise documenting that those students who score below the cutoffs in one or more subtests would not be successful in the ASN program.

Aside from evidence that standardized tests such as the SAT, ACT, and TEAS have been shown to be biased against African Americans, numerous studies have been done to try to identify the reason their scores are lower than any other ethnic group. Studies have not definitively set forth a cause for underperformance and it would appear that multiple factors are

at play. As previously presented, in addition to test bias, testwiseness, anxiety, personality types such as broad-categorizers or narrow-categorizers, age, and so forth all play into a students' ability to perform on standardized tests (Nairn et al., 1980). Simply put, for whatever reason, African American students underperform on or are unable to pass the praxis of standardized tests. To use standardized testing as a criterion for admission in light of this knowledge, is discriminatory.

The TEAS, a test not intended for predicting student success in nursing programs, a test with arbitrary cutoffs, a test that imposes a disparate impact on African American students, a criterion that gives advantage to White students, is being used by three community colleges in this study to determine who gets in and who does not get into the ASN program. The end result is that African Americans are shut out of the ASN program right at the starting gate if they do not successfully pass all subtests of the TEAS. How can it be said that African American students will not be successful if they are not admitted to the ASN program? The study indicated that once African American students passed the TEAS and were included in the final applicant pool, they had the same chance as any other student given the same TEAS + TQP COMBINED score. However, the majority of African American students, 78%, never made it into the final applicant pool on the basis of the TEAS test. Of the 71 African American students who did make it into the final applicant pool, only 16 were admitted across the three campuses.

What is needed in terms of admission criteria is a model that will play to the strengths of African American students if ASN programs are to meet the needs of the community and the nation by increasing the number of African American graduates. What is that model? Those criteria would need to be researched and analyzed to determine a process that would ensure that

students admitted into the ASN program were academically prepared with the necessary skills to be successful.

Equally important in identifying an admission model that is nondiscriminatory is ensuring that students coming down the pipeline are academically prepared. TQP were identified by the study as negatively impacting African American students' admission into the ASN program. High school academic rigor is important in preparing students for college level coursework. Students attending high schools less academically rigorous than others may not be as competitive in the ASN application process if their TQP are low. The study revealed that the pipeline of African American students seeking admission into the ASN program progressed at a slower rate than other ethnicities with some students never reaching the point of true readiness. It is not enough to assess the need for remediation, provide remedial courses, and then pronounce students academically prepared to move to college level coursework. While some may truly just need a refresher course, there are others for whom these courses fall short in an attempt to fix a defective foundation of basic skills for reading, writing, and mathematics. Some students are not academically ready for college level work even after successful completion of remedial coursework. The foundations for success in college are built upon and strengthened throughout K-12. Faulty foundations cannot be fixed and sustained by one or two remedial courses in areas of deficiency. School systems need to increase academic rigor; get students, especially girls involved and retained in STEM courses by providing mentors; offering after school programs and extra-curricular activities related to STEM; getting students involved in science fairs; collaborating with colleges and universities to engage minority students in programs to learn about STEM careers; and so forth.

Creating and maintaining the ASN pipeline of incoming academically prepared African American students depends upon a strong foundation of basic skills and initiatives and programs to introduce and foster interest in nursing. In addition, diversity in nursing requires nurse educators develop and implement the use of nondiscriminatory admission models in order to meet the needs of the community and the nation. Until these issues are addressed and corrected, the nursing profession will continue to be a profession dominated by White females.

The following is a discussion of the study findings. Descriptive analyses included ethnicity, gender, and age. Logic regression studies analyzed the impact of TEAS, TQP, TEAS + TQP individually and TEAS + TQP COMBINED on admission of African American students into the ASN program. Multiple regression studies analyzed the impact of first generation student, age, HS GPA, HS class rank, HS rigor, and ethnicity on TEAS, TQP, and TEAS + TQP COMBINED. The results indicated the presence of discrimination in ASN program admission practices for the three community colleges studied.

Ethnicity, Gender, and Age Demographics

Ethnicities by campus. The demographic analyses of student records for students seeking admission into the ASN program at Campuses A, B, and C mirrored the current state of affairs regarding a lack of minorities in nursing. With a national proportion of African Americans at 12.1%, they are underrepresented in nursing on a national level at only 4.9% (Kimball & O'Neill, 2002). This number is not sufficient to meet the needs of the nation (Villarruel et al., 2001). The applicant pools and pipeline for the ASN program at Campuses A and C had lower percentages of African American student representation than their surrounding communities and thus were not meeting the need for minority nurses in their respective communities even if the entire applicant pools were admitted and graduated. While the African

American population for Campus B in City B was nearly a match in percentages for the applicant pool and pipeline and the surrounding community, it only meets the needs of the community if the entire African American applicant pool was admitted and graduated from the ASN program. Thus, the number of African American students seeking admission into the ASN programs at all three Campuses A, B, and C fell short of heeding the call of the U.S. Department of Health and Human Services, the National League for Nursing, and the American Association of Colleges of Nursing, and other professional and governing bodies of nursing such as the AACN, JACHO, the IOM, and APHA for the nursing profession to increase the number of minority nurses so that it is reflective of the diversity of the nation's population of 12.1% African American instead of the current 4.9% (AACN, 2003; APHA, 2006; JACHO, 2002; Kimball & O'Neill, 2002; Smedley et al., 2004).

Ethnicity of the applicant pool and admitted students. The descriptive analyses for ethnicity in this study indicated that ethnic admissions numbers were similar to other studies that examined the disparity between the number of White and African American students enrolled in nursing programs (Aiken, Cervero, & Johnson-Bailey, 2001; Fearing, 1997; Fletcher et al., 2003; Kane & Rouse, 1999; Shom, 2006). The analyses mirrored the general national trend for underrepresentation of minorities.

Gender of the applicant pool. It is also well known that nursing is primarily a female driven career and the applicant pools at all three campuses mirrored that prevailing trend. The majority of applicants were female with White females representing a great proportion of applicants at all three campuses followed by African American females. On the average, 8.7% of all applicants were male.

Median age. The median age of students seeking admission into ASN programs at all three Campuses A, B, and C was primarily in the mid to late twenties with males being slightly older than females. African American students were slightly older than Whites. Students appear to be selecting nursing as a career option on the average of seven or more years after high school graduation. Whether or not these students had any prior college coursework or had completed a college degree at the associate, bachelor's or master's level was undetermined. A gap of seven or more years between high school and college may possibly impact some students' readiness for college courses, rate of completion of nurse entrance criteria, and success in courses. Some students may also have completed a GED during that gap between high school attendance and college. Students who had previous college coursework or degrees prior to selecting the ASN program may have had an advantage over those who did not. Further research using previous education plus age as a predictor would need to be completed in order to fully identify the impact that being a non-traditional student would have on progression of completion of admission requirements and admission into the ASN program.

Records by ethnicity. For Campuses B and C, chi-square analyses of the record datasets used in this study identified a statistically significant difference between African Americans and Whites who were identified as having completed some general education courses and the TEAS test. The Chi-square analysis of the record data set for Campus A did not identify any statistically significant difference between African Americans and Whites who were identified as having completed general education courses and the TEAS test. Again, data from Campus A was missing information in many of the records.

Record analyses included identifying student records that had recorded scores for the TEAS test and grades for general education courses such as English Composition, anatomy and

physiology, psychology, and so forth. The category no data (no grades and no TEAS) most likely represented those students who were just starting their education at each of the three Campuses A, B, and C. Since students identified their program of study as nursing when they applied to the college their designation was UND/NUR, the same as those who had already completed general education courses and the TEAS test. These students may also still be enrolled in remedial coursework and thus not have any required general education courses completed. Students may also have applied to Campus A, B, or C with the intent to pursue nursing and were designated UND/NUR but for one reason or another did not pursue their education that particular semester.

The category TEAS only (no grades) might be indicative of potential transfer students who took the TEAS test and but never submitted a college transcript for evaluation of transfer courses. It is also possible that a student may not have been properly advised and took the TEAS test before attempting to take any general education courses.

Campuses A, B, and C reported that students are encouraged to complete their anatomy and physiology, math, and English courses before taking the TEAS Test. The majority of students fell into the category grades only (no TEAS). It would appear that these students were working on their general education courses before taking the TEAS test. African Americans had a higher than expected percentage of students in this category versus Whites. Further research would be necessary to identify the reason. The possibility exists that African Americans were taking remedial courses which would prevent them from taking certain general education courses until pre-requisite remedial coursework was completed. Previous studies on barriers to minority student participation in nursing programs have indicated that minority students are academically underprepared (Amaro et al., 2006; Childs et al., 2004; Villarruel et al., 2001; Yurkovich, 2001).

As such, those students would require more remedial coursework than those who were adequately prepared for college level coursework. For example, remedial math would prevent a student from taking anatomy and physiology and delay a student by one or two semesters. Other possible explanations for a higher percentage of African American students who have not progressed as far in their pre-nursing education may be identical to those identified in previous studies such as part-time versus full-time student status, financial responsibilities to family, work schedules, family related issues, and so forth (Amaro et al., 2006; Childs et al., 2004; Villarruel et al., 2001; Yurkovich, 2001). Another possibility for the high number of no TEAS scores is that these scores were not input into the campus database and thus no record of the score exists in students' official online records.

For Campuses A, B, and C, White students exhibited the highest percentage of records with both TEAS scores and grades recorded. African American student records exhibited the lowest percentage of records with both TEAS scores and grades recorded. This would be expected as African American students had the highest percentages in the category grades only with the exception of Campus C where there were slightly more Whites in this category versus African Americans. Again, further research would be necessary to determine possible reasons for this outcome such as slower progression in completing general education courses prior to taking the TEAS test.

TEAS pass rates and scores. African Americans had the lowest TEAS test pass rates at all three Campuses A, B, and C. Whites had the highest percentage pass rates on all three campuses. African Americans' TEAS overall pass rates and pass rates by subtests for these three campuses were statistically significant and mirrored reported performances of African Americans and Whites on SAT and ACT tests (ACT, 2006b; CollegeBoard SAT, 2006; Special

Report, 2000). ATI psychometric analyses for the TEAS test also reported African Americans scoring lower than all other ethnicities (ATI, n.d.).

African Americans also posted the lowest median scores for all TEAS subtests of reading, math, science, English, and TEAS overall score. Whites scored the highest in all subtests and overall. Again, these results mirrored reported scores for SAT and ACT subtests; African Americans scoring the lowest, Whites scoring the highest (ACT, 2006b, CollegeBoard SAT, 2006). Not only did African Americans have the lowest median scores, but the median math subtest score was below the pass rate, meaning that at least half of the African Americans did not pass the TEAS based on that subtest alone. However, medians for the other subtests were just barely over the pass rate, indicating that math was not the only problem encountered by African American students in passing the TEAS test.

In summation of student records, several possibilities exist. Either African American students are not getting to the point of true readiness for consideration for admission into the ASN program or they are taking much longer than their White counterparts. African American students may become discouraged by the number of remedial courses if required prior to enrolling in general education courses. They may become discouraged if a general education course is not successfully completed or a competitive grade is not earned. They may also become discouraged if they do not pass the TEAS test and may not attempt to retest at a later date. These conditions present obstacles to admission because African American students may not be reaching the point of readiness in the pipeline. They may step out of their program temporarily or permanently as a result. Thus, increasing diversity in nursing programs and nursing is not attainable or is occurring at a much slower pace than is needed to meet the needs of communities and the nation.

Logistic Regression Interpretation

All models for all campuses with the exception of Campus A Model 2 (TEAS) passed the omnibus test for model significance. The analyses dropped those students who did not pass the TEAS test because students must have successfully completed all subtests to be in the applicant pool. Since TEAS scores and TQP were to predict the likelihood of admission and after dropping students who did not pass the TEAS, the remaining number of students in the applicant pool for Campus A which had a small *N* to begin with, would have only a small variance remaining to explain the differences in admission rates due to the TEAS test.

Model 1. This model was used to assess admissions rates based on TEAS scores and TQP being looked at separately as opposed to looking at the combined total points of TEAS + TQP as a single factor by those making admission decisions. For Model 1 TQP and TEAS separately, Wald statistics for all Campuses A, B, and C indicated that African Americans are neither more nor less likely than Whites to be admitted into the ASN program taking TEAS scores and TQP into account. Other racial ethnicities are more likely than Whites to be admitted into the ASN program at Campus A. Other ethnicities (Latinos, Asians, Native Americans) at Campus A had a 6.7 times greater chance of being admitted into the ASN program than Whites. Based on the number of applicants being admitted who should not have been admitted but were admitted and those who should have been admitted but were not, it appeared that other factors were being looked at versus the total TEAS and TQP separately. Quite possibly students had very high grades and a lower TEAS score or vice versa and the decision-maker admitted the student based on parameters outside of the admission criteria as published. TQP emerged as a significant factor in this model indicating that grades played a significant role in admission. These phenomena were noted at all three Campuses A, B, and C. For every unit increase of one

point in TQP, the odds of being admitted increased by 1.03, 1.03, and 1.04 for each Campuses A, B, and C respectively. TEAS and TQP separately were only significant for Campus B and depicted an increase in the odds of being admitted at 1.13 for each unit increase of one point in TEAS and TPQ separately.

Model 2. For Model 2 TEAS, Wald statistics for all Campuses A and C indicated that neither African Americans nor members of any other ethnic group are more or less likely than Whites to be admitted into the ASN program taking TEAS scores into account. The TEAS test was a significant factor in admission decisions taking into account variables for ethnicity for Campus C but not Campuses A and B. The odds ratio indicated that for every unit increase of one point in the TEAS score, the odds of being admitted into the ASN program increased 1.13 times. For Campus B, Wald statistics for Others was marginally significant and indicated that Others were less likely than African Americans or Whites to be admitted into the ASN program. However, the odds ratio of 0.32 did not indicate any difference in the likelihood of African Americans or other ethnic groups being admitted into the ASN program relative to Whites for Campus B. Each student regardless of ethnicity had the same chance of admission into the ASN program given the same TEAS score.

Model 3. For Model 3 TQP, Wald statistics for all Campuses A, B, and C indicated that African Americans are neither more nor less likely than Whites to be admitted into the ASN program taking TQP into account. Other racial ethnicities were more likely than Whites to be admitted into the ASN program at Campus A. Other ethnicities (Latinos, Asians, Native Americans) at Campus A had a 6.54 times greater chance of being admitted into the ASN program than Whites. TQP emerged as being significant in the chance of being admitted into the ASN program taking into account variables for ethnicity. For every unit increase of one point in

TQP, the odds of being admitted into the ASN program increased by 1.03, 1.03, and 1.04 times three Campuses A, B, and C respectively. The better a students' grades in general education courses the better their chance of being admitted into the ASN program.

Model 4. For Model 4 TEAS + TQP COMBINED, Wald statistics for all Campuses A, B, and C indicated that African Americans are neither more nor less likely than Whites to be admitted into the ASN program taking into account a combined value of TEAS + TQP . Other racial ethnicities are more likely than Whites to be admitted into the ASN program at Campus A. The odds ratio indicated that Other ethnicities (Latinos, Asians, Native Americans) had a 6.72 times greater chance of being admitted into the ASN program than Whites. TEAS + TQP COMBINED was significant for all three campuses taking into account variables for ethnicity. For every unit increase of one point in TEAS + TQP COMBINED the odds of being admitted into the ASN program increased 1.03 times for all three campuses. The higher the TEAS score and grades for general education courses, the higher the combined points for TEAS and TQP COMBINED, and thus the greater the chance of being admitted to the ASN program.

Model summation by campus. In summation, the logistic regression analyses for all four models for Campus A found that African Americans were neither more nor less likely than Whites to be admitted into the ASN program taking into account TEAS scores and or TQP. Members of Other ethnic groups (Latino, Asians, and Native Americans) were more likely than Whites to be admitted unless the only input taken into consideration was the TEAS score. If the TEAS score was the only consideration, then no differences in the rates of admission were evidenced.

Logistic regression analyses for all four models for Campus B found that regardless of which admission criteria was being used, TEAS, TQP, TEAS + TQP COMBINED, or TEAS and

TQP separately, the students' chances of being admitted were neither greater nor less than those of any applicant once they passed the TEAS test. Students were all on equal footing with other students who had the same TEAS score and total quality points once in the final applicant pool.

Logistic regression analyses for all four models for Campus C found that for the most part once the applicant pool was limited to those who passed the TEAS test, neither African Americans nor members of other ethnic groups were more or less likely to be admitted into the ASN program than Whites with identical TEAS test scores and TQP. The only exception was if the TEAS score was the only input being considered, then members of Other ethnic groups were slightly less likely than Whites to be admitted. The means that with the same TEAS scores, a White applicant is more likely than a member of another ethnic group to be admitted, excluding African Americans.

The odds of being admitted into the ASN program for all three Campuses A, B, and C had slight ethnicity effects for Others but not for African Americans given the same TEAS score, TQP, and TEAS + TQP COMBINED. Whites and African Americans were on equal footing but Others had a greater chance at being admitted than Whites given the same TEAS score and TQP being looked at separately. The odds of admission taking into account ethnic variables also correlated with higher TEAS scores and higher TQP (better grades). Those students with the highest TEAS scores and highest TQP have a greater chance at being admitted into the ASN program. With African Americans typically having lower TEAS scores and being less academically prepared than Whites and Other ethnicities, the study moved to the analyses of the effect of ethnicity on TEAS scores and TQP (grades).

Multiple Regression Interpretation

Multiple regression studies were run with dependent variables of TEAS + TQP COMBINED, TQP, and TEAS. Having established that there were some, albeit slight, differences in the chances that a student in one ethnic group would be admitted over an equally qualified student from another ethnic group, the question shifted to whether there were differences between ethnic groups in their qualification levels. That is, the logistic regression evidence indicated that TQP was overwhelmingly a factor that distinguished between those who were and were not admitted. TEAS scores also played a significant role in distinguishing who was and was not admitted. Students who earned higher grades in their general education courses had higher TQP. High TQP did not necessarily translate into high TEAS scores. However, high TQP and high TEAS scores correlated with a greater chance of being admitted into the ASN program. But were African American and White students equally well prepared?

Model TEAS + TQP COMBINED. After controlling for all other independent variables in the study, first generation student, and high school rigor were statistically significant in Model TEAS + TQP COMBINED. Being a first generation student negatively impacted a student's performance on the TEAS and grades achieved in general education courses. First generation students had combined TEAS + TQP COMBINED totals that were 40.9 points lower than those who were not first generation students, other factors being taken into account. High school rigor also impacted total combined points. For every level up on the on the high school ranking scale 1 through 6 used by the College Board, students' TEAS + TQP COMBINED scores were 15.5 points higher than the previous lower level ranking. Students who attended high schools that were less academically rigorous performed lower on the TEAS test and had lower grades in their general education courses, taking other factors into account. These results

parallel previous studies that identified disparity in high schools across the nation at the private, rural, urban and inner city in terms of teacher experience, quality, resources, and so forth (GAO, 2002; Herzog, 2006; Special Report, 2000; Klopfenstein, 2004; Perna & Titus, 2005). Academic achievement is adversely affected by poverty. Inner-city schools have less experienced teachers with a high percentage being first-year teachers, more students per class, fewer resources, less parental involvement, all which negatively impact academic achievement (GAO, 2002).

Model TQP. African American students had lower TQP than Whites and other ethnicities. After controlling for all other independent variables in this model, African American applicants had TQP scores 10.05 points lower than Whites and emerged as being statistically significant with a coefficient of -10.05. After controlling for all other independent variables, high school class rank, high school rigor, and age were statistically significant in Model TQP. Class rank positively impacted TQP. For every unit increase, one place higher in high school class rank, TPQ increased by 0.38 points. This supports Fearing's (1997) research that identified high school rank and high school GPA as barriers that prevent minorities from accessing nursing programs. Students who earn poor grades in high school have lower class ranks and are less likely to score well on the TEAS. This outcome cannot definitively be supportive or contradictory of Kane's (2000) previous study that indicated 53% of minorities ranked in the top 10% of their class scored below the 70th percentile on the SAT test due the low *N* value for this model. A study by Zwick and Greif Green (2007) demonstrated family income and education were highly correlated with high school grades and class rank.

High school rigor also positively impacted TQP. For every level up on the high school rigor scale 1 through 6, students' TQP were 14.41 points higher than those who attended high schools that were less academically rigorous. Previous discussion on academic rigor and its

impact on academic achievement were presented in Model TEAS + TQP COMBINED. African American students are more likely to live in poverty, attend inner city schools in poorer districts, and be faced with the associated academic disadvantages and challenges that negatively impact academic achievement (GAO, 2002).

Older students also had higher TQP. For every additional increase in one year of age, students' TQP increased by .72 points. Again the question is whether or not this finding reflects students who had previous college coursework and or a college degree at the associate degree, bachelor's or master's level versus students who did not further their education after high school until the point in time that they entered college to pursue the ASN program pre-requisites.

Model TEAS. African Americans had lower TEAS scores. After statistically controlling for all other independent variables in this model, African Americans scored 6.68 points lower than Whites. For every unit increase of one point in TEAS score, African Americans scores were 6.68 points lower. After controlling for all other independent variables, high school rank and age were statistically significant in Model TEAS. High school class rank positively impacted TEAS scores. For every unit increase in high school class rank, TEAS increased by 0.16. Age was also a significant factor in TEAS scores and supports previous studies as indicated in Model TQP. For every unit increase in age by one year, TEAS increase by 0.17 points. The significance of age in this model adds to the mixed results from previous studies that document adult students who were out of school and out of practice in test-taking skills being penalized by standardized tests but on the other hand had higher scores in some subtests such as verbal (College Board, n.d.; FairTest, 2007; Nairn et al., 1980).

Model summation. For all three models after controlling for several other independent variables in the study, the coefficient for African Americans was not statistically significant

when predicting the combined value of TEAS score and TQP, but was significant in predicting TEAS in one model and TQP in the other. The size of the coefficient in the TEAS+TQP COMBINED model (-11.7) was in line with what it was in the other models (TEAS at -6.6 and TQP at -10.1), but did not reach statistical significance. This may be an artifact due to the low *N* values particularly for TEAS + TQP COMBINED and TEAS at 89 and 91 respectively in comparison to TQP at 278. Almost every student had TQP but not everyone had a TEAS score, thereby reducing the number of students in each model that included TEAS.

Research Questions Answered

First research question. Based on the logistic regression analyses of valid student datasets for each of the three Campuses A, B, and C, controlling for TEAS and TQP, once the applicant pool had been reduced to include only those students who had successfully passed the TEAS test, African Americans were no more or less likely to be admitted than Whites with identical qualifications for each of the three admission criteria evaluated in this study whether it was (a) based on TEAS only, (b) TEAS + TQP COMBINED, or (c) TQP only.

Second research question. Based on multiple linear regression analyses of valid student datasets for Campus B cohort 2006 admission into the ASN program, being African American had a statistically significant negative effect on both TEAS scores and TQP, controlling for first generation status, age, high school rank, and high school rigor. African American TQP were 10.1 points less than Whites with the same or similar characteristics as defined by high school class rank, high school rigor, and age. African American TEAS scores were 6.7 points less than Whites with the same or similar characteristics as defined by high school class rank and age.

Moreover, being a first generation student, the academic rigor of high school attended, class rank, and age did statistically influence students' performance on the TEAS test and in the general education courses

Limitations of the Study

There are several limitations to the study that may have an unknown impact on the admissions or denial of students into the ASN program. These limitations may serve to further expand the evaluation of nurse entrance criteria for admissions into the ASN program to ensure equality for all students.

Sample. A limitation of the sample includes differences in demographics of the city locations for each campus. City B and City C have similar demographics for African American students at 25.5% and 24.6% respectively while City has a large African American population of 84%. These differences may impact the magnitude of the dependent variables between the campuses. Furthermore, the number of African American students that are enrolled at each campus may not be reflective of the demographics of the city. In addition, the proportion of African American students applying to the RN associate degree nursing program may not mirror the city and campus demographics.

The data set for Campus A was very limited as numerous data pieces were missing from student records making them invalid for inclusion in the study. As such Campus A exhibited small *N* values which were limited to only those student records with complete datasets. Interpretation, conclusions, and generalizations drawn from Campus A analyses are thereby limited and apply only to that subset of student records. Similarly, student records for Campus B and C had incomplete datasets for some students but *N* values were much higher than for Campus A.

The multiple regression analyses could only be performed on Campus B for Cohort 2006 only. The lack of complete datasets for students impacts the generalizations for TEAS and TEAS + TQP COMBINED regression coefficients.

The number of African American students seeking admission into the ASN program was 41, 42, and 51 percentage points less than Whites for Campuses A, B, and C respectively. The *N* values were further reduced after data set analyses identified that African American students were more likely to be missing TEAS and TQP such that a smaller proportion of African Americans than Whites were included in the analyses. The fact that the admission criteria required successful completion of all TEAS subtests for inclusion in the final applicant pool again reduced *N* values for all three Campuses A, B, and C. The study included all cases for which there was pre-requisite information (TEAS, TQP) in the logistic regression models. The study included all cases for which there were TEAS, TQP, first generation, high school class rank, high school rigor, age, gender, and ethnicity information for the multiple regression models. This information was limited to Campus B, 2006 cohort.

Data set. Limitations of the data set were impacted by the accuracy and completeness of the data records in the database for each institution. If data was incorrectly input or if data was missing such as students in the applicant pool or admissions pool, the statistical analysis would not accurately reflect the impact of the TEAS test and TQP.

Other independent variables. There are other independent variables that will not be statistically analyzed such as other races and ethnicities that are not of interest in this particular study. Socioeconomic status while of interest was not available for inclusion in the study. Previous health care experience is a variable that was not collected in the demographics of the student population. The role that these independent variables play in the performance of students

on the TEAS test and in their general education and math and science courses will not be evaluated. As such, the outcomes of the statistical analyses of the TEAS test, QP, and the combination of TEAS test scores and QP may not fully explain admission or denial of African American students and all other students into the RN associate degree nursing program.

Summary

The study included only those students who had successfully completed all subtests of the TEAS test as specified in the published admission criteria. TQP emerged as a stronger predictor of admissions than TEAS scores. The study bore out the fact that once African American students passed the TEAS test there were no statistically significant differences in admissions into the ASN program based on TEAS and thus no de facto discrimination at that point in the process. This conclusion however, is based solely on the student records that were valid for inclusion in the study for all three Campuses A, B, and C. There were fewer valid student records for TEAS and TEAS + TQP COMBINED than for TQP alone and thus, generalizations are limited.

The significance of TQP reflected that African American student academic achievement in general education may be less than Whites. TQP are calculated on grades multiplied by assigned points per grade of A, B, or C with double points being assigned for science and math courses. The lower the grades, the lower the points assigned. Lower TQP negatively impacts African American students' chances of being admitted into the ASN program.

Lower TEAS pass rates for African Americans negatively impacted their representation the final applicant pool and consequently their consideration for admission into the ASN program. Out of 222 African American students who were in the applicant pool having both TEAS scores and general education courses, only 32% or 71 students made the cut to be in the

final applicant pool based on the nurse entrance criteria. Thus, TEAS test passage is a serious hurdle for African American students seeking entrance into the ASN program at all three Campuses A, B, and C. These students do not get the opportunity to be considered for the ASN program because of performance on the TEAS test; failing to pass all TEAS subtests. They may have excellent, above average, or average grades or a combination of grades in their general education courses. They may have a good TEAS score but failed in one or more particular subtests by a small, moderate, or large margin but may have performed exceptionally well in the other subtests. But this single criterion, the TEAS test, eliminated them from the final applicant pool and thus they never had the opportunity to be considered for the ASN program. There may well be students who were not well qualified to be in the ASN program but the TEAS test was eliminating not only those students but students who might have been academically prepared but were barred by this criterion.

As previously discussed in this paper, increasing diversity in nursing programs is a major concern. Standardized exams are biased against certain personality types, age, socioeconomic backgrounds, and race, namely African Americans (Franklin, 2007; Medley & Quirk, 1974; Nairn et al., 198). SAT and ACT exams have been called into question as being biased tools to assess future success in college (Attewell et al., 2006; Green & Griffore, 1980). Furthermore, ATI itself determined that TEAS scores were not predictive of performance in ASN programs and that African Americans scored lower on it than any other ethnicity group (ATI, n.d.). The analyses of this study suggest that there could be some bias in the TEAS test. African American students have the lowest SAT, ACT, TEAS test, and other standardized test scores than Whites and all other minorities (ACT, 2006b; ATI, n.d.; CollegeBoard SAT, 2006; Crouse & Trusheim, 1988; Special Report, 2000; Nairn et al., 1980). Thus, African American students are already

faced with inequalities for educational opportunities at institutions of higher learning due to lower SAT and ACT exam scores, class rank, and so forth (Aiken et al., 2001; Fearing, 1997; Kane & Rouse, 1999; Shom, 2006). Open-admissions colleges, typically community colleges do not require SAT or ACT testing, although some open-access institutions have instituted another institutional policy barrier, the TEAS or other entrance exam that prevents access to nursing programs. African American students are again faced with inequality of access; the opportunity to enroll in nursing (Breland et al., 2002; Crouse & Trushein, 1988; Haney, 1984; Nairn et al., 1980; Noble & Sawyer, 2002). The result is stratification of African American students into lower tiers of health care careers for students seeking careers in the health field.

Those who support the use standardized tests point to review programs and courses that help students prepare for, practice, and improve their scores on the SAT, ACT, TEAS test, and others tests. However, if these exam scores can be altered by coaching then the credibility of purpose and function of these exams is highly questionable in terms of what it is actually measuring: knowledge the students possess or their ability to take a test (Franklin, 2007; Medley & Quirk, 1974; Nairn et al., 1980).

In light of the fact that previous studies have documented that African American students underperform on standardized tests, using the TEAS test as a criterion to determine admission into the ASN program appears to have a disparate impact on African American students' eligibility for inclusion in the final applicant pool and possible admission into the ASN program. Students' success in college is influenced by more than their academic abilities (Orfield & Miller, 1998). As such, use of assessments that are known to adversely impact the rate of admissions into nursing programs for African American students should be abandoned and

replaced by a tool that would provide a valid measure of their ability to perform in the ASN program or one that measures the ability to perform as a nurse.

Implications for Practice

The study noted that the percentage of African American students seeking admission into the ASN program at the community college level did not mirror their representation in African American population of the respective surrounding communities. As such, initiation of programs to increase the pipeline of African American and other minority students towards nursing should be researched and implemented at these campuses.

Furthermore, nurse educators need to identify barriers that prevent African American students in their communities from successfully progressing along the educational pathway to become viable candidates for admission into associate degree nursing programs. Once identified, intervention, and support services should be employed to assist students along the pathway to success.

Most importantly, the presence of de facto discrimination toward African American students by use of the TEAS test as a criterion in admission decisions for associate degree nursing programs, demands that nurse educators across the nation examine their entrance criteria for similar results and if found, admissions criteria should be modified in a manner that provides equal opportunity for admission to students of all ethnicities. Through identification of factors that may present barriers to enrollment of minorities in nursing programs such as the TEAS test (which ATI states does not predict success in the ASN program) and other standardized tests, removal of these barriers, and implementation of policies that are supportive of minority student

enrollment and success, the face of health care will begin to mirror the face of the nation's population.

Implications for Future Research

The unexplained variances were as follows: TEAS + TQP COMBINED was 91%, TQP was 81%, and TEAS was 64%. Thus, performance on TEAS and general education courses are impacted by other factors much more so than high school rank, high school rigor, age, being African American, or being another ethnicity such as Latino, Asian, Native American, and so forth. Again, the small *N* values for TEAS + TQP COMBINED and TEAS may be unduly influencing the variances. Further research would need to be conducted with data from a larger *N* population.

Moreover, being a first generation student, the academic rigor of high school attended, class rank, and age did statistically influence students' performance on the TEAS test and in the general education courses. Further research would be needed to determine if being African American in combination with any of these independent variables influenced admission into the ASN program.

The study should be repeated in an expanded format to include data collection for students' gender, race, age, first generation, class rank, high school GPA, extra-curricular activities in high school, high school rigor, private or public school, GED, household income, education level of parents, work, married with children, married without children, single with children, single without children, previous college coursework, and so forth. Accurate and complete data collection must occur at the community college level in order to provide a more

accurate picture of the implication of the use of the TEAS test on African American students. Accurate and complete data collection must occur at the community college level in order to provide a more accurate picture of the implication of the use of the TEAS test on African American students and its influence on admission into the ASN program.

Identification of admission criteria that are non-discriminatory in nature and provide equal opportunity of accessibility using criteria other than standardized test scores should be researched, tested, and implemented. These criteria should be evaluated for predicting successful completion of the ASN program.

Research should also focus on identification of academic weaknesses of African American students and other minorities so that pre-nursing courses can be developed and implemented that would strengthen students' academic and professional skills in mathematics, critical thinking, interpersonal communications, and so forth. For example, math appears to be an academic barrier to successfully passing the TEAS for almost 50% of the African American students. As such, research should focus on identifying specific math deficiencies that persist after remediation or required math courses, since dosage calculations in nursing practice depend on such skills.

Research assessing the impact of being a non-traditional student, the length of time out of high school, previous college experience, and college degree status for ASN program applicants may be useful in identifying factors that positively and negatively influence the progression of African American students in the completion of admission requirements and admission into the ASN program. If previous college experience or completion of college degrees are significant in predicting admissions into ASN programs, further research to identify characteristics that students acquire during those experiences may help in developing programs or courses to

assist students who have no previous college educational experiences to develop similar characteristics.

If a standardized test is to be used as an admission criterion to identify who will be successful in an ASN program, then the test should be assessed to determine if it is predictive of students' program performance and nursing performance. A study of students' tests scores, didactic and clinical performance while in the program, and annual evaluations on nursing practice after graduation should be performed to validate and justify the use of high-stakes testing.

Conclusion

To knowingly use a standardized test that disadvantages a particular group of individuals moves the notion of disparate impact to a higher level; discrimination whether de facto in nature or by choice. Many universities and colleges are now moving away from SAT and ACT exams as criteria for making admission decisions in the face of race neutral admissions policies for the purpose of promoting diversity within their student populations. Removal of a known barrier, the TEAS as identified in this study, may assist these three community colleges as well as colleges and universities across the nation in heeding the calls from professional and governing bodies of nursing to increase diversity in their nursing program to the point that the diversity of their associate degree nursing programs is reflective of the racial and ethnic diversity of the nation.

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