CHAPTER I

Introduction

Diversity, defined as “a structure that includes the tangible presence of individuals representing a variety of different attributes and characteristics, including culture, ethnicity, sexual orientation, and other physical and social variables” (Talbot, 1996, p. 381) remains a challenge to higher education institutions. Powerful forces external to college and university campuses including federal and state governments, corporations and civil rights movements have since the civil rights era demanded that the institutions replace segregative policies and practices that have historically characterized them with inclusive policies and practices that could bring about equity in higher education access for people of all background characteristics. To some extent, the demands have been met.

Admissions policies found in public college and university catalogs suggest that public colleges and universities are now willing to accept qualified students of diverse backgrounds. The “tangible presence” of minority students in higher education has also increased to the extent that Cortes (1991) called it a revolution while Brazzell (1996) considered it a “radical” change to “the higher education landscape” (p. 60).

Despite the favorable changes in admissions policies and practices that have brought about the increased minority presence in higher education, there still exists a controversy over how colleges and universities should go about diversifying their student populations and whether they are committed to diversity. The controversy generally revolves around admissions criteria.

Public higher education institutions, like private high cost colleges and universities, claim to be selective and/or competitive and, therefore, base admission decisions on quantitative criteria because quantitative criteria provide information that can be objectively verified. Those who support this position seem to base their argument on the fact that since quantitative criteria are objective, they are more prone to be fair (Halstead, 1995; Olivas, 1993) and, therefore, more likely to assure equal opportunity in higher education access. They argue that qualitative criteria such as motivation, initiative, persistence, extenuating circumstances, talent, geographic location, or alumni connections are subjective and, therefore, less likely to provide accurate and fair assessment of those who seek admission in higher education.

The biggest disadvantage of basing admission decisions on quantitative criteria has been that through the years few applicants from minority ethnic groups fare well in the competition for freshman places. This naturally has negatively affected institutional efforts to achieve diversity "fairly." As a result, colleges and universities opted to apply affirmative action on minority admissions. The practice has been under attack since it first began. In the state of California, the opponents of the practice succeeded in getting a referendum on the practice by placing a proposal to end it in the ballot in 1996. Their complaint, among other things, was that the practice "did not create an equal playing field for all California's citizens" (Tierney, 1996, p. 122). By 54%, Californian voters passed the proposal dubbed the California Civil Rights Initiative (CCRI) (Tierney, 1996).

On the other side of the controversy are claims that it is the use of quantitative criteria such as grade point average (GPA) and scholastic aptitude tests (SAT) that is unfair. Minorities perceive quantitative criteria as discriminative against them not because of their academic abilities but because of the differences between their culture which is characterized by deprivation and the culture of the "powerful" and "dominant" group that is characterized by privilege (Talbot, 1996, p.). Their position is supported in literature by the argument that the whole educational system is so tilted against minorities that only those among them that have adopted the white culture are able to access higher education and enjoy the privileges it has to offer (Hull, 1970; Sedlacek, 1974). To them, therefore, the only way colleges and universities could demonstrate commitment to educating diverse student populations is adopting fair admissions processes that consider their cultural backgrounds.

The debate about higher education admissions is, therefore, largely a debate about what could be a fair admission process. As Hargadon (1980) argued, there are so many colleges in the United States that any one wishing to get a college degree could do so without difficulty. But as Karen (1991) contends, different colleges and universities impact differently with some able to bring about desired change in social status while others may have little or no impact at all. This is why higher education admission is still a subject worthy of investigation.

In this study, whether or not first-time freshman admissions at Virginia Polytechnic Institute and State University are fair was investigated by examining admissions practices at the university in the years 1994-1998. This was done by first, analyzing some of the data on which most public higher education institutions base their admissions decisions. They included GPA, SAT scores, and high school rank submitted to the university by first-time freshman applicants in the years 1994-1998. Second, reasons that were given for rejection of admission in 1998 were examined. Third, a personal interview was held with the Director of Admissions and the Deputy Director of Admissions for undergraduate admissions.

First-Time Freshman Admissions at Virginia Tech

Like other public higher education institutions, Virginia Polytechnic Institute and State University (Virginia Tech) is having to deal with the issue of diversity on its campus. In its 1991-1996 plan, the university adopted increasing diversity on its campus as one of its goals. One of the objectives towards achieving the goal was to expand recruiting “in order to attract and retain more people of color and women in the undergraduate and graduate student population (especially in business, engineering, mathematics and the sciences)…” (*The University Plan: Progress Toward 1991-1996 Goals,* p. 9).

Like other public higher education institutions also, Virginia Tech has declared in its undergraduate catalog that admission to the university is open to all regardless of “race, sex, disability, age, veteran status, national origin, religion, political affiliation or sexual orientation” (White, 1997, p. 13). It also states in the same catalog that its admission process is competitive and that while the minimum admission requirement is 2.0, applicants have a better chance of getting accepted if they have at least B or B+ grade because “admission to Virginia Tech is competitive” (p. 13). In the rejection letters that were sent to rejected applicants in 1998, the Director of Admission cited “keen competition among the many applicants for limited spaces in the class” as the reason for rejection. She stated in the letters that those that were “offered admission presented an average GPA of 3.53 and an average SAT score of 1194.”

This information from the university suggests that the university values diversity and that it recognizes that diversity of its student population could be increased by adopting appropriate admissions policies and practices. In its case, it chose to increase diversity of its student population by “expanding recruiting.” The emphasis on quantitative criteria remains the same for all applicants apparently to ensure “fairness” and “equal opportunity.” In this study, the university’s commitment to fair admissions and, therefore, equal opportunity, as stated in its policies was investigated by examining its admissions practices.

Purpose of the Study

The purpose of this study was to investigate the probability that in practice race was a factor in the admissions process at Virginia Tech contrary to the stated admissions policies published in the university’s *1997-1998 Undergraduate Course Catalog and Academic Policies*.

Research Question

This study was designed to address the question, “Are admissions decisions at Virginia Tech race-blind?”

Null Hypotheses

In order to address the research question, the following null hypotheses were tested:

1. There were no differences between African Americans, Asian Americans, Hispanic Americans, and White Americans with regard to probability of getting admitted to Virginia Tech in the years 1994, 1995, 1996, 1997, and 1998 given GPA, SAT scores, High School Rank (HSR), and Requested Major (RM).
2. There were no differences by race with regard to reasons given for rejection of applications.

Limitations of the Study

This study was limited to the admissions decisions stage of the admissions process. It was also limited only to fairness in admissions practices with regard to three quantitative admissions criteria, that is, GPA, SAT scores, and high school rank (HSR). The study was also based on data from one institution only and, therefore, its findings cannot be generalized to the whole higher education enterprise. Also, a large amount of data for the first part of the study were missing (see Appendix).

Definition of Terms

The meanings of the following terms as used in this study were as follows:

Dejure segregation – legal racial segregation in college and university admissions that lasted till the doctrine of separate but equal was declared illegal in the *Brown* cases of 1952 and 1954.

Defacto segregation – illegal racial segregation in college and university admissions that followed the courts' decision to outlaw the doctrine of separate but equal in the Brown cases of 1952 and 1954.

Diversity – " … a structure that includes the tangible presence of individuals representing a variety of different attributes and characteristics, including culture, ethnicity, sexual orientation, and other physical and social variables…" (Talbot, 1996, p. 381)

Separate but equal – A doctrine that advocated the separation of races in public places and sought to justify the practice by arguing that there could be equal treatment alongside racial segregation. The doctrine was legal until the Supreme Court declared it illegal in the *Brown* cases of 1952 and 1954.

CHAPTER II

REVIEW OF RELATED LITERATURE

In this review of literature both the historical perception of what constituted a fair admission process and the contemporary perception of what a fair admission process should be with regard to race are discussed. The discussion also covers the role played by both the federal and state governments in encouraging and discouraging racial discrimination in higher education admissions from the passage of the Morrill Land Grant acts to the present. The review is organized under five headings: Historical background of race and higher education admissions; affirmative action and higher education admissions; affirmative action and admissions criteria; the courts and affirmative action in admissions; and Conclusion

Historical Background of Race and Higher Education Admissions

Race, like other background characteristics including sex, socioeconomic status, disability, sexual orientation, and national origin have influenced admission to higher education institutions since the colonial period when the earliest higher education institutions were founded. At that time, there were nine privately owned colleges, all of which accepted only white male students, “mostly from prosperous well established families” (Talbot, 1996; Thelin, 1996, p.

7; Wilson, 1991). It was not until the passage of Morrill Land Grant Act of 1862 and Morrill Land Grant Act of 1890 –- acts which paved the way for the creation of institutions that would emphasize “practical branches of knowledge” as opposed to the liberal arts education hither to fore provided by private colleges –- did “ordinary white people” and black people respectively gain access to college campuses (Brazzell, 1996, p. 45; Wilson, 1991, p. 83). The location of the institutions that were created following the passage of the 1862 act denied access to black students (Brazzell, 1996), hence the passage of the 1890 act which created segregated historically black public land grant institutions for black students (Thelin, 1996; Wilson, 1991).

Although the decision to pass Morrill Act of 1890 may have been well intentioned, it turned out to be the beginning of segregated public higher education which resulted in some states establishing dual systems of education, one black and one white (Brazzell, 1996). The passage of the act thus added life to the doctrine of separate but equal that had its earliest beginnings in *Roberts v. City of Boston* (1850) as, in later cases, the very existence of segregated public colleges and universities as provided for under the act was used as evidence that equal opportunity could be attained alongside segregation.

Some of the cases in which the doctrine of separate but equal gained legal standing as a result of the successful establishment of racially segregated institutions include *Plessy v. Ferguson* (1896) and *Gong v. Rice* (1927). In *Plessy* the Supreme Court ruled that the separation of races in public places was appropriate because the doctrine of separate but equal was constitutional while in *Gong* the court declared that the separation of white students from students of other races was legal.

The beginning of the end of the doctrine of separate but equal came when the courts began to prescribe conditions that had to be met in order to justify the continued existence of the doctrine. Until then, states determined what was equal. To them, qualified students of all races had equal opportunity to access higher education if provision was made for them to get on to a college or university campus. This was regardless of other factors such as the location of, or the resources available to the colleges. States such as Virginia, Georgia, Missouri, and Maryland, for example, provided qualified minority students with out-of-state tuition scholarships rather than admit them to the in-state white institutions. (Olivas, 1993). The courts began to take the position, however, that merely defining separate but equal in terms of getting minority students on campuses was not adequate.

One of the cases in which the doctrine of separate but equal was subjected to scrutiny was *Gaines v. Canada* (1938). In it, for example, the court ruled that the existence of the doctrine could be justified only if white institutions and black institutions had equal resources and if students did not have to go out of state to find institutions of their racial background. Other conditions that had to be met to justify the continued existence of the doctrine were stated in Sweat v. Painter (1950). The court ruled in that case that the segregated institutions had to, among other things, enjoy equal prestige and equal influence to be considered equal. As it turned out, these tests only helped expose the disparities that existed between the racially segregated institutions with the white students enjoying privileges that black students did not have. The result was the findings in the *Brown* cases of 1952 and 1954 that declared the doctrine of separate but equal illegal.

The rulings in the Brown cases thus ended legal segregation in public institutions. They unfortunately, did not end the practice of segregation. Instead, they paved the way for *defacto* segregation under which colleges and universities made little movement toward accepting students from groups they historically denied access to their campuses. It was not until Congress, enlightened by the civil rights movement of the 1960s, intervened by passing the Civil Rights Act of 1964, that colleges and universities made some meaningful movement toward desegregation of their campuses. The act, under Title VI, tied federal funding, a phenomena that few colleges and universities could do without, to desegregation. The act demanded that all institutions receiving federal funds desegregate or lose the money. (Wilson, 1991). The results were immediate.

In 1965, colleges and universities began to scramble for minority students (Williams, Ewers, Gooden, Daniels, & Brewington, 1983). Diversity, a term which has been defined as “a structure that includes the tangible presence of individuals representing a variety of different attributes and characteristics, including culture ethnicity, sexual orientation, and other physical and social variables” (Talbot, 1996, p. 381) became the guiding spirit in the quest for minority student enrollment. The scramble was further reinforced by affirmative action, a federal government program mandated by Executive Order 11246 signed in 1965 (Wilson, 1991).

No sooner did colleges and universities open their doors to minority students than it was realized that segregation still existed, only this time it was “subtle,” harder to prove, and, therefore, harder to prosecute because it was “made up of covert, ephemeral, or apparently trivial events that are frequently unrecognized by the perpetrator and often not evident to the person injured by them” (Rowe, 1993, p. 38). In admissions, subtle discrimination was apparent when colleges and universities decided to base the assessment of the suitability of minority students on quantitative criteria that they traditionally used to assess the suitability of white students. This was despite the differences between the two groups in their previous educational experiences. As minorities found out, it was hard to prove legally that the use of quantitative criteria discriminated against them especially when the criteria were applied to all applicants. Since they could not win the war against the new form of discrimination in courts, they resorted to supporting affirmative action, the only avenue through which they could increase their chances of accessing the best colleges and universities they could find (Karen, 1991) and, therefore, overcome higher education policies intended to maintain “minority disadvantage and white privilege.” (Olivas, 1993, p. 18).

Minority Disadvantage versus White Privilege

As suggested above, the debate about admissions criteria is about minority disadvantage and white privilege. Haro (1983) argued that minority grades and test scores were reflective, not of their academic abilities, but of the abject conditions that they were subjected to. He said, for example, that minorities presented low GPAs because they attended “segregated, under-financed, overcrowded and poor quality primary and secondary schools that did not meet their educational need” while their poor SAT scores were because the tests were “culture bound and founded on the society’s dominant Anglo culture” (p. 57). Hudson (1994) echoed the same sentiments when he said that differences in scores between minority and white students were the product of different treatments that the American society offers its people. Haro (1983) asserted, therefore, that the use of “traditional admissions criteria” did not make admissions processes “fair and neutral.” (P. 57).

<u>Affirmative Action and Higher Education Admissions</u>

To some scholars, the fact that it took intervention by the federal government to get minority students in the doors of colleges and universities may not have been a surprise. Berry (1994), Hudson (1994), and Hacker (1992) all believe, for example, that the freedom of African Americans to exercise their rights has historically been contingent upon government support. They argue, for example, that other than the civil rights era which lasted from about 1957 till 1965, the only other time that African Americans were able to exercise their rights was when the government supported their cause during the radical reconstruction period that lasted from 1870 to 1877. During all other times, African Americans were not able to exercise their rights either because they did not have them as was the case before 1870, or because of the withdrawal of federal protection of their rights as was the case between about 1877 and about 1957 and between “about 1965 and the present” (Hudson, 1994, p. 223).

As already stated, affirmative action was one of the measures taken by the federal government during the civil rights era to end discrimination against African Americans and, later, other minority ethnic groups (Hoffman, 1993). The measure was initially intended to end discrimination in hiring but colleges and universities later began to apply it to undergraduate admissions as they struggled to promote diversity of their student populations (Spence, 1993; Yates, 1993). Since then, a heated debate ensued regarding the merits and demerits of affirmative action in higher education admissions. Those for affirmative action want it in place because it “has brought demonstrable improvements” in the efforts to narrow the gap between the minority and the majority in education and employment (Hacker, 1992; Olivas, 1993, p. 16;). They consider the United States to be an unjust society in which racism is institutionalized in an effort to explicitly or implicitly “restrict the rights of others” through “covert and inconsistent acts” (Lerner, 1981; Simmons, 1982, p. 2; Tierney, 1996). Jordan (1968, in

Hudson, 1994, p. 224) considered this institutionalization of racism to be the result of “racial myths and stereotypes … embedded in the “deep-structure of American culture.” In their view, therefore, mandated “action-based” programs such as affirmative action are necessary if minority groups are to be able to exercise their rights (Tierney, 1996, p. 124).

To those on the opposite side of the debate, affirmative action is nothing but reverse discrimination against white males. (Olivas, 1993; Seabury, 1972, in Tierney, p. 124; Spence, 1993). More over, they argue, mandated programs such as affirmative action cannot bring about the desired change. Rowe (1993, p. 35) for example argued that “compliance-oriented” programs such as affirmative action cannot by themselves bring about “healthy diversity” because they deal “with the outermost layer of the onion.” The arguments on both sides of the debate are valid depending upon their basis. To understand them, an understanding of the principles upon which affirmative action is based is necessary.

The Original Goal of Affirmative Action

Yates (1993), in tracing the original concept of affirmative action found that it was never intended to offer preferential treatment to minorities. Instead, it was an order to government contractors and subcontractors obligating them “… to refrain from employment discrimination on the basis of race, color, religion, sex, or national origin and to take *affirmative action* to assure that employees and applicants for employment are treated without regard to these factors…" (p. 40). Under affirmative action, therefore, the principles of fairness to all were to be adhered to by ensuring that hiring policies and practices did not work to the disadvantage of minorities and women as had previously been the case (Yates, 1993). In higher education, Spence (1993) argues that affirmative action was never intended to replace "qualification criteria" (p. 28). Rather, he contends, the goal of affirmative action was to "offset the effects *on qualified applicants* of historic and continuing patterns of race, ethnic, and gender bias" (p. 28). It would be expected, therefore, that when higher education institutions applied affirmative action to admissions, their goal would be to bring about fairness to all applicants in the admissions process. This was not the case, however. They decided to use it as a means to increase diversity "for its own sake" on their campuses thus portraying it as a social program geared towards increasing minority representation on college campuses (Hoffman, 1993, p. 30; Spence 1993). This misuse of affirmative action naturally led to confusion within higher education and in the larger society over just what affirmative action goals in admissions were.

The Current Goal of Affirmative Action

Affirmative action is currently perceived to be synonymous with targeted admissions or quotas. This new meaning was coined when both minorities and higher education institutions realized that under the original meaning of affirmative action only a few minority high school graduates gained access to college campuses. Minority groups began to demand equal outcomes that could only be achieved through targeted admissions (Lerner, 1981). Colleges and universities on the other hand considered targeted admissions to be the way through which they could achieve student diversity that they could not achieve through normal selection procedures. Opponents of affirmative action argue, for example, that if the program were not there to facilitate discrimination, college campuses would not be able to attain diversity (Olivas, 1993). It was this transformation of affirmative action from an equal opportunity goal oriented program into targeted admissions for minority applicants that led to the attacks that have since been leveled against an otherwise well intentioned program.

Affirmative Action and The Admissions Criteria

Admissions criteria for college and university admissions are at the center of the affirmative action controversy. (Spence, 1993). As discussed under *“The courts* *and Affirmative Action in Higher Education Admissions*," this argument is lent credence by the fact that the arguments in lawsuits challenging the application of affirmative action in admissions have always been about alleged differences in admissions qualifications that colleges and universities ask of minority and majority applicants. The allegations in the cases litigated so far have been that minority applicants are accepted with lower standards in quantitative criteria compared to the majority and that the double standards would not have been there if it were not for affirmative action.

Evidence that admissions criteria are at the center of the affirmative action debate is also found in literature that argues the merits and demerits of the use of qualitative admissions criteria. Affirmative action critics such as D'Souza (1991) are generally opposed to the use of qualitative criteria in admissions processes. They want admissions to be based on merit alone (Halstead, 1995). This position may be attributed to the fact that those opposed to affirmative action perceive African American students and students from other minority ethnic groups to be accepted by higher education institutions based more on race, a qualitative criteria, than quantitative criteria. This being the case, qualitative criteria such as extenuating circumstances, motivation, initiative, persistence and geographic location that would normally be helpful in admissions processes are instead perceived to be operational definitions of race. This association of qualitative criteria with race, and, therefore, affirmative action, encouraged those opposed to affirmative action to take the position that higher education admissions be based on quantitative criteria alone. In the state of California, for example, the fight against affirmative action that culminated in the banning of affirmative action in higher education admissions included the demand that admission to the state's public institutions be based strictly on quantitative criteria (Tierney, 1996).

The proponents of affirmative action are generally supportive of the use of qualitative criteria in admissions processes mainly because they perceive them to be better predictors of minority performance in higher education. This perception stems from the fact that unlike quantitative criteria, qualitative criteria are sensitive to the effects of discrimination on the educational experiences of minority students. Given that quantitative criteria are useful in establishing previous scholarship of an applicant (Williams, Gooden, Ewers, Daniels, & Brewington, 1983), the argument for qualitative criteria seems to be that they are useful in explaining the possible reasons for an applicant's academic record. For example, as already discussed, affirmative action proponents would like culture and socioeconomic status to be considered as valid explanations for the disparities between the information presented by majority and minority applicants with regard to GPAs, SAT scores, schools attended and other background educational characteristics (Haro, 1983; Hudson, 1994). To the proponents of affirmative action, therefore, an admission process can be fair only if both qualitative and quantitative criteria are used.

In most part, the affirmative action proponents do not understand why anyone should be opposed to the use of qualitative criteria in admissions as they have historically been used alongside quantitative criteria even by “most prestigious schools” (Garrison, 1981; Murphy, 1992; Scott, 1991, p. 36). Yet until the advent of affirmative action, there were no complaints when, because of qualitative criteria, applicants with lower qualifications were shown preference over better-qualified ones (Spence, 1993). Some of the qualitative criteria that colleges and universities have traditionally used in their admissions processes are “athletic skill, wealth, geographic location, family connection to alumni, the famous, and the powerful” (Scott, 1991, p.36). Others include “initiative, motivation, persistence, or commitment to service” (Murphy, 1992, p. 24); and “personal statements from applicants, letters of recommendation, work experience, and an applicant’s prior success in overcoming disadvantage” (Olivas, 1993). The argument here is that the fact that these qualitative factors have always been used suggests that higher education has never been strictly for the best as argued by those opposed to affirmative action (Hargadon, 1981; Hartnett & Fieldmesser, 1980; Spence, 1993; Terney, 1996).

The Courts and Affirmative Action in Higher Education Admissions

Lawsuits challenging the use of affirmative action in admissions have not always been without merit. The most celebrated was *Bakke v. Regents of the University of California* (1978). The Supreme Court found that in this case, the university’s process which provided for “a special admissions program to increase the representation of “disadvantaged” students in each medical school class” was reverse discrimination and, therefore, unconstitutional (438 U.S. at 272-76, in Kaplin & Lee, 1995, p. 403). It was reverse discrimination because minorities were treated differently from whites. For example, only minorities could be considered for admission under the special admissions program, they were not required to meet the 2.5 GPA cutoff point required by the school, and they were to fill a predetermined number of places (438 U.S. at 272-76, in Kaplin & Lee, 1995). As the facts of this case attest, the admissions policies and practices of the medical school were clearly discriminative and not in harmony with the requirements of affirmative action as spelled out by Executive Order 11246 that mandated it.

Unlike the admissions process followed at Bakke’s school, the admissions process at the University of Washington’s medical school as explained in *McDonald v. Hogness* (1979) was an example of how affirmative action could correctly be applied to college admissions. The major distinction between the admission processes of the two schools was that while affirmative action was applied to only a portion of the applicants at the California school, the Washington school applied it to all the applicants (Kaplan & Lee, 1995). The court approved of this policy because it found that under it, all applications were considered on individual basis based on previously published quantitative and qualitative admissions criteria; race was considered as only one of the many possible “extenuating background circumstances” and only applicants who met at least the minimum academic qualifications were allowed to compete for the available places thus further avoiding the potential of the admission process stigmatizing “any discrete group” (Kaplan & Lee, 1995, p. 405; 598 P.2d at 713-14 in Kaplin, 1995, p. 408).

Conclusion

It is suggested in this review of literature that at the heart of the discussions about higher education admissions is the issue of fairness. Fair admissions processes can promote equal opportunity. That is why both minority and majority desire that colleges and universities be fair in their admissions policies and practices. There is disagreement, however, about how admissions procedures can be made fair. Minority ethnic groups believe that because of institutional racism, mandated “action-based” programs such as affirmative action are necessary to ensure that they have their fair share of access. The majority, on the other hand, loathes affirmative action because since it was transformed “to include strategies to increase diversity on campuses,” one of the strategies that were adopted was the incorporation of targeted goals or quotas in the admissions processes. They perceive this strategy to be unfair to them because targeted admissions encourage admission of less qualified minorities at the expense of better qualified majority students. To them, admissions are fair only if they are based on quantitative criteria alone.

Public colleges and universities have, contrary to the mission of their founding which was to “open up higher education to those who previously had been denied it” and thereby promote equity (Tierney, 1996, p.120-130; Veysey, 1965), transformed themselves into selective institutions thereby adopting selective admissions procedures. As a result, Williams, Gooden, Ewers, Daniels, & Brewington (1983) found that although first-time freshman applicants were often asked to present both qualitative and quantitative information that could be used to predict their performance in higher education, quantitative criteria including GPA, test scores, high school rank, high school curriculum, and academic curriculum were, in varying degrees, considered more important than qualitative criteria, which, in the study included motivation, admissions interview, application essay, leadership, and extracurricular activities whose relative importance they found “lagged behind the traditional measures” (p. 30).

It was also found in this review, however, that although institutions prefer quantitative criteria to qualitative criteria, they have, since they began applying affirmative action to minority admissions, considered race, a qualitative criteria, as a factor in their admissions processes. The Supreme Court opinions in *Bakke*, and the Washington Supreme Court opinions in *McDonald* suggest that the practice could both be legal and illegal depending upon how it was applied.

Several lessons may be learned from the facts and the findings in *Bakke* and *McDonald*. First, the application of affirmative action in higher education admissions is both legal and noble because its goal of granting equal opportunity to all regardless of “race, color, religion, sex, or national origin” (Yates, 1993, p. 40) satisfies the requirements of the equal protection clause of the Fourteenth Amendment and Title VI of the Civil Rights Act of 1964 (Kaplin & Lee, 1995). Second, because the goals of affirmative action are inclusive and not exclusive, it should be applied to all applicants and not just a portion of the applicants. Doing so naturally prevents illegal practices and outcomes such as insulating a group of applicants from competition and the consequent stigmatization of the insulated group (Kaplin & Lee, 1995). Third, any institutional policies and practices that can produce results that suggest discrimination against a group of students can be illegal. In Bakke, the policies of the school were found illegal by the Supreme Court because their outcome suggested discrimination against white applicants. Fourth, though there have been no lawsuits filed by rejected minority applicants challenging admissions policies that discriminate against them since the introduction of affirmative action, colleges and universities that pursue strict quantitative admissions criteria only admissions policies or weight quantitative admissions criteria more heavily than qualitative criteria may be acting illegally because such policies, though given the appearance of fairness by being applied to all applicants equally, not only unfairly exclude minorities from participating in higher education against the requirements of affirmative action, but they also result in stigmatization of minority students, an outcome which the Supreme Court found illegal in *Bakke*. As Yates (1993) has argued, institutions can only meet the requirements of affirmative action if they replace policies that discriminate against groups of people with those that are inclusive of people from all recognized groups. (See also 438 U.S. at 306 n.43 in Kaplan & Lee, 1995, p. 415). Fifth, an institution that was discriminative in its policies and practices in the past can legally include race as a factor in its admissions process as a corrective measure of the effects of the past use of such policies and practices. The only restriction is that such an inclusion should not be a proxy for protecting those previously discriminated against from competition. (Kaplan & Lee, 1995; Tyle, 1996; see also Spence, 1993). The fair use of race as a factor in admissions processes and indeed the appropriate use of both quantitative and qualitative admissions criteria in admissions processes were demonstrated in *McDonald.* In the case, race was one of the factors considered in the admissions process but not to the disadvantage of white students.

CHAPTER III

METHOD

In this chapter, the procedures that were followed in sample selection, data collection, and data analysis are described. Where appropriate, the techniques used to analyze data are presented.

The Sample

This study was conducted in three parts with each part dealing with different data but with all the parts seeking to answer the same research question. Sample selection was not necessary for the first and third parts of the study. In the first part, quantitative admissions data that provided information about SAT scores, GPA, High School Rank (HSR), and requested major (RM) for all African American, Hispanic American, Asian American and white American first-time freshman applicants in the years 1994, 1995, 1996, 1997, and 1998, were analyzed. The number of applicants in each of the years was 14,106, 13,993, 15,399, 15,864, and 14,372 consecutively. However, only data submitted by 9,236, 8,982, 11,204, 11,199, and 10,169 in that order were used in the study because the rest of the applicants were "deleted due to missing values for the response or explanatory variables." It was possible to analyze all the data because they are stored in the university's computer database that made them easy to access and analyze.

The third part of the study involved an interview with the director of admissions and the deputy director of admissions for freshman admissions. The information collected was in form of answers to questions that focused on the admissions process at Virginia Tech and some of the findings in the first part of this study.

For the second part of the study, a stratified random sample of 400 rejected applications submitted to the university for fall 1998 admission was selected for the purpose of collecting data that described the reasons given for rejection. The other years of interest were not included in this part of the study because no data were available as the university annually destroys rejected applications with all the data pertaining to rejection reasons. Of the selected sample, 100 were African Americans, 89 were Hispanic Americans, 100 were Asian Americans, and the last 100 were white Americans. Each of the strata was equally composed of males and females except for the Hispanic strata that had only 39 rejected females.

Data Collection

Each part of this study focused on different data. Data used in the first part of the study were readily available in the university’s computer database. Data collection was, therefore, not necessary. The data included SAT scores, GPA, high school rank, requested major, race and gender.

Since the data were confidential information kept by the university, permission was sought from the director of admissions before they could be accessed. The data were then obtained through the office of the director of institutional research.

Data that described the reasons given for rejection of applicants for fall 1998 was collected for the second part of the study from folders kept by the admissions office for each of the applicants. The reasons given were found on the outside cover of the folders. The application folders were kept in alphabetical order. Therefore, a computer printout with names of the applicants that were included in the samples was used to locate the folders. The raw reasons given were then entered against the appropriate names.

Data for the third part of the study were collected through a personal interview with the director of admissions and the deputy director of admissions for undergraduate admissions. The interview lasted about one hour. The officers were asked questions related to issues such as:

1. Whether the admission process at the university was race-blind.
2. The admission process followed by the university

3. How qualitative factors such as motivation, and initiative are factored into the admissions process.
4. Whether affirmative action is applied to undergraduate admissions at the university and how it is applied.
5. The finding in the first part of the study that African American males and females and white American females had significantly higher probabilities of getting accepted given GPA, SAT scores, HSR, and RM than other groups in the last five years.
6. What the university meant by “expanding recruiting and financial aid in order to attract and retain more people of color and women undergraduate and graduate student population (especially in business, engineering, mathematics, and the sciences)…” meant.

Data Analysis

SAS statistical program was used to analyze data used in the first part of the study. The data were analyzed by first developing a probability model that could be used to explain admission decision practices at Virginia Tech in the years 1994-1998. Logistic regression, “a mathematical modeling approach that can be used to describe the relationship of several independent variables to a dichotomous dependent variable," (Kleinbaum, 1994, p. 5) was used to develop the model. The model was "fitted;" that is, it was developed by using existing data sets "to estimate unknown parameters…" as described by Kleinbaum (1994, p. 9). The data sets used were SAT scores, GPA, High School Rank (HSR), RACE, GENDER, and Requested Major (RM) submitted to the university by first-time freshman applicants in the years 1994-1998.

GPA, SAT, and HSR were treated as continuous variables. RM was given the value of 1 for majors in engineering or business and 0 for majors in other colleges in the university. Engineering and business majors were put together under RM because they, together with mathematics and sciences were identified by the university as majors in which minority representation needed to be increased. Race had four categories: African Americans, Asian Americans, Hispanic Americans, and White Americans, while gender had two: male and female. The four categories of race and two of gender produced 8 groups; that is, Black Males (BM), Black Females (BF), Asian Males (AM), Asian Females (AF), Hispanic Males (HM), Hispanic Females (HF), White Males (WM), and White Females (WF). Each of these groups was given the value of 1 if it was the variable of interest while all others were given the value of 0. The equation, also known as the logistic model (Kleinbaum, 1994, p. 31), used to calculate the probability of acceptance was:

$$P(X) = \frac{1}{1 + e^{(\alpha + \sum \beta_i X_i)}}$$

Significance tests for the probabilities of acceptance were carried out using "The Wald Test that is computed by dividing the estimated coefficient of interest by its standard error," (Kleinbaum, 1994, p. 135) as follows:

$$Z = \frac{estimate(row) - estimate(col)}{s.e.(row - col)}$$

where $se(row - column) = \sqrt{\mathrm{var(row) + var(column) - 2cov(row, column)}}$

Rejection criterion was determined by using Bonferroni's correction which is a "test based on the principle of dividing" the one sided level of significance (alpha) "by the number of tests to be carried out" (Howell, 1992, p.351). The Bonferroni test was used to guard against type I error, that is, to minimize the chances of rejecting the null hypotheses when they should not be rejected. Because of this conservative nature of the test, the comparisons were made at overall levels of .05 and .10.

For the four categories of race and two categories of gender, 28 comparisons were carried out. The rejection criteria were, therefore, determined by dividing the two alphas by 28. Dividing .05 by 28 yielded a *p* value of .001786, one tailed, and a *p* value of 000893, two tailed, for each comparison while .10 alpha produced .00178571, two-tailed. The lower critical values for these *p* values were –3.1237 and -2.9137 respectively. The calculations were done as follows for an overall Type I error rate of $\alpha = 0.05$ to find the lower critical value

$$P\left(Z < z_{\frac{\alpha}{2(28)}}\right) = P(Z < z_{0.000893}) \Rightarrow Z = -3.1237$$

and

$$P\left(Z < z_{\frac{\alpha}{2(28)}}\right) = P(Z < z_{0,00178571}) \Rightarrow Z = -2.9137$$

for $\alpha = 0.10$.

Thus, for all comparison test statistics in this study, the following decision rule was followed when group A was compared to group B.

$Z < -3.1237$?	A Significantly preferred to B
$-3.1237 \le Z < -2.9137$?	A Most likely preferred to B
$-2.9137 \le Z < 2.9137$?	No difference in preference between A and B
$2.9137 \le Z < 3.1237$?	B Most likely preferred to B
$Z > 3.1237$?	B Significantly preferred to A

Example of Tests of Significance

A statistical test of significance between the 1994 probabilities of admission for African American males and Asian American males is given below to illustrate how the tests of significance were carried out. From the logistic procedure output (Appendix A), the coefficient for African American males was –0.6556 while the one for Asian males was 0.5030. Their respective variances were 0.27134 and 0.039201 while their covariance was 0.003193. Considering African American males to be row and Asian American males to be column, the calculation was done as follows:

$$Z = \frac{-0.6556-(0.5030)}{\sqrt{0.27134+0.039201-2(0.003193)}} = -4.7320$$

Since $|Z| = 4.7320 > 3.1237 = z_{0.000893}$ (i.e. the critical value for overall $\alpha = 0.05$) the difference was significant. Furthermore, since the sign of the test statistic is negative, the row effect was shown preference over the column effect. In other words, the probability for admission for a Black male was higher than that for an Asian male with the same admissions criteria in 1994. In this case, the null hypothesis that there was no difference between the two groups with regard to probability of admission was rejected.

The 28 comparisons were:

BM – BF	BF – AM	AM – AF	AF – HM	HM – HF
BM – AM	BF – AF	AM – HM	AF – HF	HM – WM
BM – AF	BF – HM	AM – HF	AF – WM	HM – WF
BM – HM	BF – HF	AM – WM	AF – WF	
BM – HF	BF – WM	AM – WF		
BM – WM	BF – WF			
BM – WF				
HF – WM	WM – WF			
HF – WF				

In order to calculate probability of acceptance and to carry out the tests of significance, parameter estimates and variance and covariance estimates were first obtained by running the logistic procedure. Information concerning the importance of the admissions criteria relative to each other and the degree of preference shown to each of the eight-race/gender groups relative to each other were also obtained from the output.

In the development of the model, white males were arbitrarily used as a reference group against which how all other groups fared in the admissions process was compared. Between group comparisons were, however, carried out to find out how all groups fared compared to each other. No interaction variables were included in the final model because they were not significant.

A chi-square test was used to analyze data for the second part of the study. In order to run the test, the data were organized in a table form by category and group to show the observed frequencies as shown in Table 1. The test was carried out as follows.

$$X^2 = \sum_{i=1}^{8}\sum_{j=1}^{3}\frac{(\text{observed} - \text{expected})^2}{\text{expected}} = 20.99838$$

$$p - value = P\left(X^2 > \chi^2_{14} \mid H_0\right) = 01017$$

As shown in Table 1, the raw data describing the reasons that were given for rejection could be grouped in three categories: GPA, test scores, and “other.” The reasons that were grouped together under the category of GPA included reasons such as “weak record,” “low GPA,” “low grades,” “first three years are weak, “D’s in every grade,” “D’s and F’s,” “very weak record,” “D’s in 10th and 11th grades,” “poor record,” “terrible senior year,” “several D’s, C’s, and F’s,” “D in 11th grade” and all other reasons that referred to grades or performance in class. Under Test Scores were reasons such as “low SAT,” “low ACT,” “low scores,” and low verbal.”

There were some reasons that though clearly related to GPA were grouped together under “Other” category because of their relationship with other criteria considered by the admissions office during the admissions process. These were grouped under “Other” because they were cited very few times as reasons for rejection. They included “declining grades,” and “downhill record,” which referred to “trends in academic performance,” and “noncompetitive,” a variable which ostensibly described rejection because of not having high enough grades to go into a competitive major such as architecture. Other reasons that were included under “Other” included reasons such as “Toefel too low,” and “poor grammar.”

Table 1

Observed Frequencies of Reasons that were given for Rejection of Applicants in 1998 by Race/Gender Group and Admission Criteria

	Reasons for Rejection		
Race/Gender Group	GPA	SAT	Other
African Female	45	14	6
African Male	47	8	2
Asian Female	42	12	6
Asian Male	51	8	6
Hispanic Female	42	10	1
Hispanic Male	46	4	5
White Female	40	10	9
White Male	50	3	4

The purpose of the personal interview in the third part of the study was to seek information that would provide some insights into what actually goes on during the admissions process at the university and the reasons thereof. The information was used alongside the information collected from literature to explain the findings in the first and second parts of this study.

CHAPTER IV

RESULTS

In this chapter, the findings of this study are presented. They are presented in three groups according to the three kinds of data that were studied. The presentation begins with the description of the proportion of the populations that were studied by race and gender.

Proportions of the Application Pools by Race and Gender

In order to understand the populations that were examined in this study, the proportions of the application pools that were made up of members of each of the eight/race gender groups are presented in Tables 2 and 3. In Table 2 are presented the proportions of the applications that were submitted to the university. Table 3 contains proportions of the applications that were accepted and those that were rejected. The white male and white female groups submitted the highest number of applications. They also had the highest number of acceptances and rejections. These findings were consistent with the common knowledge that Virginia Tech is a predominantly white university. More white males than females requested admission in each of the five years. Also, the proportion of white males accepted was higher than that of white females. There generally were more white applicants accepted than rejected.

Table 2

Numbers and Percentages of All Applicants by Race/Gender Groups and Year

Race/Gender	Year									
	1994		1995		1996		1997		1998	
	n	%	n	%	n	%	n	%	n	%
BF	979	6.94	644	4.60	792	5.14	771	4.86	629	4.38
BM	843	5.98	653	4.67	757	4.92	806	5.08	717	4.99
AF	446	3.16	473	3.38	427	2.77	450	2.84	428	2.98
AM	654	4.64	616	4.40	615	3.99	715	4.51	632	4.40
HF	145	1.03	148	1.06	175	1.14	167	1.05	161	1.12
HM	170	1.38	192	1.37	257	1.67	273	1.72	201	1.40
WF	4629	32.80	4886	34.92	5106	33.16	5301	33.41	4818	33.52
WM	6215	44.06	6381	45.60	7270	47.21	7381	46.53	6786	47.22

Note

BF = African American Females

BM = African American Males

AF = Asian American Females

AM = Asian American Males

HF = Hispanic American Males

HM = Hispanic American Males

WF = White American Females

WM = White American Males

Table 3

Numbers and Percentages of the Applications that were Accepted and those that were Rejected by Race/Gender Group and Year

R/G	Year																			
	1994				1995				1996				1997				1998			
	Accept		Reject		Accept		Reject		Accept		Reject		Accept		Reject		Accept		Reject	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
BF	725	5.14	254	1.80	435	3.11	209	1.49	556	3.61	236	1.53	482	3.04	289	1.82	435	3.03	194	1.35
BM	520	3.69	323	2.29	381	2.72	272	1.94	450	2.92	307	1.99	443	2.79	363	2.29	419	2.92	298	2.07
AF	363	2.57	83	0.59	388	2.77	85	0.61	358	2.32	69	0.45	366	2.31	84	0.53	356	2.48	72	0.50
AM	493	3.49	161	1.14	455	3.25	161	1.15	494	3.21	121	0.79	500	3.15	215	1.36	461	3.21	171	1.19
HF	100	0.71	45	0.32	106	0.76	42	0.30	133	0.86	42	0.27	126	0.79	41	0.26	122	0.85	39	0.27
HM	125	0.89	70	0.50	138	0.99	54	0.39	192	0.42	65	1.25	168	1.06	105	0.66	139	0.97	62	0.43
WF	4034	28.60	595	4.22	4188	29.93	698	4.99	4503	29.24	603	3.92	4325	27.26	976	6.15	4114	28.63	704	4.90
WM	5031	35.67	1184	8.39	5225	37.34	1156	8.26	6033	39.18	1237	8.03	5631	35.50	1750	11.03	5408	37.63	1378	9.59

Note

R/G = Race/Gender Group

N = Number of Applicants

% = Percentage of all Applicants in a Given Year

BF = African American Females

BM = African American Males

AF = Asian American Females

AM = Asian American Males

WF = White American Females

WM = White American Males

HF = Hispanic American Males

HM = Hispanic American Males

African American Groups together had the second highest proportion of the number of applications submitted to the university in each of the five years between 1994 and 1998. The proportions of the accepted and the rejected from the two groups were also the second highest in each of the five years. The difference between the number of African American male applicants and that of African American female applicants was small throughout the five years. There were, however, more female African Americans accepted than males.

The two Asian American groups represented the third highest proportion of applicants. There were more male applicants than female. Also more male applicants than females were accepted. Hispanic Americans submitted the fewest number of applications to Virginia Tech in the last five years. There was not much difference between the number of female applicants and male applicants. The difference between the accepted and the rejected male and female Hispanic Americans was also small.

Logistic Regression Analysis and Tests of Significance

The outcome of logistic regression analysis suggested that in each of the five years from 1994 to 1998, given the characteristics considered in this study, there were differences in the probability of acceptance for each of the eight groups: African American males (BM), African American females (BF), Asian American males (AM), Asian American females (AF), Hispanic American males (HM), Hispanic American females (HF), White American males (WM), and white American Females (WF). The information in Tables 4 and 5 is presented as an example of how probabilities of admission differed by group given grade point average (GPA) of 2.5, scholastic aptitude test-verbal (SATV) of 550, scholastic aptitude test-math (SATM) of 550, class percentile (PCT) of .1, and requested major (RM) of 0 (colleges other than engineering and business) and 1 (colleges of engineering and business).

The results of all the twenty-eight possible tests of significance that were carried out to determine if the observed differences in probability of admission were significant are presented in Table 6. Table 7 contains their *p* values while the information in Table 8 is a summary of the results that were found significant.

Overall, African American males, African American females, and white American females had the highest probabilities of getting accepted by the university in that order except in 1996. In that year, the white female group had the highest probability of getting accepted followed by the African American male group and the African American female group in that order. The two Asian groups, Asian American males and Asian American females, had the least chances of getting accepted.

The information summarized in table 8 suggests that African American males had significantly higher probabilities of getting accepted than Asian American males throughout the last five years, Asian females and white males throughout the five years except 1996 and Hispanic males in 1994 and 1995. African American females had significantly higher probabilities of getting accepted than the Asian American males and Asian American females throughout the five years, Hispanic males in 1994, 1995, and 1997; Hispanic American females in 1994 and 1995, and white American males in 1994, 1995 and 1998. White American females had significantly higher chances of getting accepted than the Asian American males and white American males throughout the five years, and Asian American females in 1994 and 1996.

Between the three groups that had the highest probabilities of getting accepted and the Asian groups that had the least chances of getting accepted were the Hispanic American males, Hispanic American females, and white American males. The information in Table 8 suggests that Hispanic American females had significantly higher chances of getting accepted than Asian American males in 1995, 1996 and 1997; and white males in 1997. Hispanic American males had significantly higher chances of getting accepted than Asian American males in 1996.

Table 4

Admission Probabilities Given GPA = 2.5, SAT Math = 550, SAT Verbal = 550, Class Percentile = 0.1, Requested Major = 0 by Year and Race/Gender Group

Year	Race/Gender Group							
	BF	BM	AF	AM	HF	HM	WF	WM
1994	.695	.730	.477	.459	.527	.496	.659	.584
1995	.717	.785	.545	.406	.557	.490	.656	.571
1996	.347	.349	.200	.179	.319	.315	.389	.293
1997	.196	.199	.107	.088	.153	.118	.177	.134
1998	.089	.031	.031	.026	.046	.042	.060	.041

Note.

BF = African American Females

BM = African American Males

AF = Asian American Females

AM = Asian American Males

HF = Hispanic American Males

HM = Hispanic American Males

WF = White American Females

WM = White American Males

Table 5

Admission Probabilities Given GPA = 2.5, SAT Math = 550, SAT Verbal = 550, Class Percentile = .1, Requested Major = 1 by Year and Race/Gender Group

Year	Race/Gender Group							
	BF	BM	AF	AM	HF	HM	WF	WM
1994	.456	.499	.252	.238	.292	.266	.416	.341
1995	.587	.672	.403	.278	.414	.351	.518	.428
1996	.380	.382	.224	.201	.423	.323	.351	.346
1997	.204	.208	.113	.092	.160	.123	.185	.140
1998	.097	.106	.034	.029	.050	.047	.066	.045

Note.

BF = African American Females

BM = African American Males

AF = Asian American Females

AM = Asian American Males

HF = Hispanic American Males

HM = Hispanic American Males

WF = White American Females

WM = White American Males

Table 6

Results of significance tests for the Observed Probabilities of Admission by Race/Gender Groups and Year

Year	R/G	Race/Gender						
		bf	am	af	hm	hf	wf	wm
1994	bm	-0.8262	-4.7320	-4.0369	-3.1036	-2.4410	-1.9828	-3.9800
	bf		-4.0053	-6.1108	-5.4926	-4.8626	-1.1459	-2.8971
	am			0.2178	0.7715	1.4268	4.1587	2.5405
	af				0.1992	0.9069	3.4183	1.8597
	hm					0.2899	2.3494	1.2106
	hf						1.6300	0.6836
	wf							-3.1538
1995	bm	-1.6032	-6.4269	-3.9362	-3.4687	-2.4674	-3.6308	-5.6878
	bf		-4.9785	-4.4718	-5.5923	-4.4084	-1.7701	-3.5292
	am			1.4099	1.7068	3.0342	4.9336	3.1935
	af				-0.5331	0.2003	2.0398	0.4307
	hm					0.6059	1.9718	0.9234
	hf						1.0353	0.1415
	wf							-3.6223
1996	bm	-0.0477	-3.4674	-2.4553	-0.4803	-0.3130	1.0016	-1.6042
	bf		-3.3664	-5.0328	-0.9389	-0.8879	1.2381	-1.4848
	am			0.3868	3.4963	3.6275	4.9567	2.9704
	af				1.5347	2.3398	3.4586	1.8061
	hm					0.9740	1.1163	-0.3553
	hf						0.7460	-0.3104
	wf							-4.2486
1997	bm	-0.1065	-4.0332	-2.3919	-2.0062	-0.7966	-0.9070	-3.0831
	bf		-3.8143	-4.7626	-3.8573	-2.1300	-0.8483	-2.7480
	am			0.6752	1.7495	3.3510	4.1600	2.4503
	af				0.2722	1.5309	2.1903	0.9132
	hm					1.0709	1.7176	0.5206
	hf						0.4612	-0.4041
	wf							-3.5555
1998	bm	-0.4033	-4.3219	-3.3685	-2.0284	-1.8143	-2.6139	-4.8032
	bf		-3.8421	-5.8170	-4.0143	-3.8349	-2.2411	-3.8510
	am			0.3554	1.8552	2.1480	3.1373	1.7087
	af				0.6453	1.3146	2.2142	0.9313
	hm					0.9349	0.9177	-0.0666
	hf						0.6844	-0.2647
	wf							-3.3115

Note. These results were tested for significance against the critical values of 3.12, alpha = .0001 (overall alpha = .05) and 2.91, alpha = .0018 (overall alpha = .10).

R/G = Race/Gender Group

BF = African American Females

BM = African American Males

AF = Asian American Females

AM = Asian American Males

HM = Hispanic American Males

WF = White American females

WM = White American Males

HF = Hispanic American Males

Table 7

P-values of Significance Tests Results for the Observed Probabilities of Admission by Race/Gender Groups and Year

Year	R/G	Race/Gender Group						
		bf	am	af	hm	hf	wf	wm
1994	bm	0.4087	0.0000	0.0001	0.0019	0.0146	0.0474	0.0001
	bf		0.0001	0.0000	0.0000	0.0000	0.2518	0.0038
	am			0.8276	0.4404	0.1536	0.0000	0.0111
	af				0.8421	0.3644	0.0006	0.0629
	hm					0.7719	0.0188	0.2260
	hf						0.1031	0.4942
	wf							0.0016
1995	bm	0.1089	0.0000	0.0001	0.0005	0.0136	0.0003	0.0000
	bf		0.0000	0.0000	0.0000	0.0000	0.0767	0.0004
	am			0.1586	0.0879	0.0024	0.0000	0.0014
	af				0.5939	0.8413	0.0414	0.6667
	hm					0.5446	0.0486	0.3558
	hf						0.3006	0.8874
	wf							0.0003
1996	bm	0.9619	0.0005	0.0141	0.6310	0.7543	0.3165	0.1087
	bf		0.0008	0.0000	0.3478	0.3746	0.2157	0.1376
	am			0.6989	0.0005	0.0003	0.0000	0.0030
	af				0.1248	0.0193	0.0005	0.0709
	hm					0.3300	0.2643	0.7224
	hf						0.4557	0.7563
	wf							0.0000
1997	bm	0.9152	0.0001	0.0168	0.0448	0.4257	0.3644	0.0020
	bf		0.0001	0.0000	0.0001	0.0332	0.3963	0.0060
	am			0.4996	0.0802	0.0008	0.0000	0.0143
	af				0.7855	0.1258	0.0285	0.3611
	hm					0.2842	0.0859	0.6027
	hf						0.6447	0.6861
	wf							0.0004
1998	bm	0.6867	0.0000	0.0008	0.0425	0.0696	0.0090	0.0000
	bf		0.0001	0.0000	0.0001	0.0001	0.0250	0.0001
	am			0.7223	0.0636	0.0317	0.0017	0.0875
	af				0.5187	0.1887	0.0268	0.3517
	hm					0.3498	0.3588	0.9469
	hf						0.4937	0.7912
	wf							0.0009

Note. These observed p values were tested for significance at .0001 (Overall alpha = .05) and at .0018 (overall alpha = .10)

BM = African American Females
BM = African American Males
AF = Asian American Females
AM = Asian American Males
HM = Hispanic American Males
WF = White American females
WM = White American Males
HF = Hispanic American Males

Table 8

Significance Test Results for the probabilities of admission that were found significant at .0001 (overall alpha = .05) and .0018 (overall alpha = .10 by Race/Gender Groups and Year

Comparison Groups	Year 1994	1995	1996	1997	1998
BM – BF					
BM – AM	**	**	**	**	**
BM – AF	**	**			**
BM – HM	*	**			
BM – HF					
BM – WF		**			
BM – WM	**	**		*	**
BF – AM	**	**	**	**	**
BF – AF	**	**	**	**	**
BF – HM	**	**		**	**
BF – HF	**	**			**
BF – WM		**			**
BF – WF					
AM – AF					
AM – HM			**		
AM – HF		*	**	**	
AM – WM		**	*		
AM – WF	**	**	**	**	**
AF – HM					
AF – HF					
AF – WM					
AF – WF	**				
HM – HF					
HM – WM					
HM – WF					
HF – WM					
HF – WF					
WM – WF	**	**	**	**	**

Note.

** = Significant at .0001 (overall alpha = .05)

* = Significant at .0018 (overall alpha = .10)

BM = African American Females HM = Hispanic American Males

BM = African American Males WF = White American females

AF = Asian American Females WM = White American Males

AM = Asian American Males HF = Hispanic American Males

Overall rankings of the race/gender groups according to the degree of preference accorded them in each of the five years under study are presented in Table 9. The rankings were determined by the coefficients of each of the race/gender groups found in logistic procedure output in Appendix A and were based on the fact that the more negative the coefficient, the higher the probability of getting accepted.

Other Findings

Other findings that can be deduced from the models relate to the admissions criteria. First, given that the Wald chi-square test tests the significance of a variable given all of the other variables, the larger this measure, the more important the additional contribution of the variable to the contribution of the other variables in the equation. Under the definition of additional contribution, GPA was consistently the most important variable followed by SAT scores. The Wald chi-square measures for each variable by year can be found in appendix A. Second, qualifications for admission to the university rose for all groups as the years went by. The rise in the qualifications is suggested by the changes in probabilities of admission presented in Tables 4 and 5. The probabilities in the Tables suggest that except for 1995 when the chances of getting accepted by the university given the GPA of 2.5, SAT verbal of 550, SAT math of 550, HSR of 0.1, and RM of 0 (if applicants requested majors other than in engineering and business) and 1 (if applicants requested majors in Engineering or business) were higher than those in 1994, the general trend was that the chances of getting accepted reduced in each of the years subsequent to 1994.

Another important finding was that there were no significant interactions between the race/gender variables and the predictor variables in the model. This suggested that all the predictor admissions criteria that were used in the model were equally important in admissions decisions for all applicants regardless of group affiliation.

Comments

Several comments can be made from the findings made in this part of the study.

1. The null hypothesis that there were no differences between African Americans, Asian Americans, Hispanic Americans, and White Americans with regard to probability of freshman acceptance based on the independent variables in this study was rejected.
2. The admission process at Virginia Tech was not race blind in the years under study as there were between group differences in the probabilities of getting accepted.

Table 9

Rankings of Race/Gender Groups by Coefficient and Year (The More negative the Coefficient, the higher the Probability of Acceptance)

R/G	Year									
	1994		1995		1996		1997		1998	
	coef	rank	coef	rank	coef	rank	coef	rank	coef	rank
BF	-.4835	2	-.6438	2	-.2499	3	-.4544	2	-.8128	2
BM	-.6556	1	-1.0086	1	-.2599	2	-.4761	1	-.9152	1
AF	.4281	7	.1028	6	.5045	7	.2508	7	.3021	7
AM	.5030	8	.6638	8	.6420	8	.4751	8	.4735	8
HF	.2294	5	.0574	5	-.1261	4	-.1548	4	-.1101	4
HM	.3560	6	.3241	7	-.1043	5	.1459	6	-.0271	5
WF	-.3204	3	-.3617	3	-.4293	1	-.3315	3	-.3959	3
WM	.0000	4	.0000	4	.0000	6	.0000	5	.0000	6

Note

Rank 1 = had the largest probability of admission, Rank 8 = had the lowest probability of admission

Coef = race/gender group coefficient. (The more negative the coefficient, the higher the probability of the acceptance of the Race/Gender Group)

R/G = Race/Gender Group

BM = African American Females

BM = African American Males

AF = Asian American Females

AM = Asian American Males

HM = Hispanic American Males

WF = White American females

WM = White American Males

HF = Hispanic American Males

3. Gender did not seem to be a factor in the admission process except for white females who were consistently predicted to have a higher probability of acceptance than white males and frequently had a lower probability than African Americans but higher than Hispanic Americans and Asian Americans.
4. The fact that African American groups and the White American female group had higher probability of acceptance based on the measures used in the models suggests the presence of unstated policies and/or university situations that favored these groups.
5. The consistency with which the Asian groups had lower probabilities of acceptance based on the measures in the model suggests the presence of unstated policy and/or university situation that does not favor these groups.
6. The fact that no interactions were included in the final model because none was found significant suggests that the university's policy of selectivity stated in the catalog was applied equally to all applicants regardless of race or gender. This suggests that the differences that

were detected between the groups were the result of cut-off points.

7. The differences in cut-off points by group may have been the natural outcome of the university’s efforts to diversify its student population or an undeclared deliberate application of the quota system in Virginia Tech’s admission process. Either way, the differences in cut-off points suggest that competition for first-time freshman places at the university was first, between groups of applicants and second between individual applicants within their respective groups.
8. Given that the larger the Wald test measure, the more important the parameter, the most important admissions criteria were GPA and SAT scores in that order.
9. Qualifications for admission to the university rose through the years for all groups. This suggests that the university attracted better-qualified students as the years went by. This is suggested by the information in Tables 4 and 5 according to which it was harder to get accepted in each of the years subsequent to 1994, except 1995, given GPA of 2.5, SAT Math of 550, SAT Verbal of 550, class percentile of .1, and

requested major (RM) of 0 (for majors other than those in the colleges of engineering and business) and 1 (for majors in colleges of engineering and business).

Reasons for Rejection

Description of the Sample

The sample of applications that was examined in the second part of the study was made up of eight strata: African American males, African American women, Asian American males, Asian American women, Hispanic American males, Hispanic American women, White American males, and white American females. Each stratum was made up of 50 applications except for the Hispanic female strata, which comprised 39 applications. The differences between the strata with regard to GPA and combined SAT Math and Verbal SAT scores are described below and summarized Tables 10 and 11.

African American Men

GPA in this stratum ranged between 2.04 and 3.20. Five of the GPAs were above 3.0. All the GPAs in this stratum were thus below the average 3.53 presented by the accepted applicants. Combined Verbal and Math SAT scores ranged between 570 and 1250 with eight scoring above 1000. Three of the eight scored above the 1194 average score presented by the applicants who were accepted.

African American Women

The GPAs of African American women rejected in 1998 ranged between 2.06 and 3.40. This means that none of the rejected had 3.53 average GPA presented by those that were accepted. The combined SAT verbal and math score presented by this group ranged between 740 and 1280. Nine scored above 1000. Of these, two scored above the average presented by those who were accepted.

Asian American Men

Rejected Asian Americans presented GPAs ranging between 2.00 and 3.85. Of these, eight had GPAs above 3.0. Three presented GPAs that were above the 3.53 average presented by those that were accepted. Combined verbal and math SAT scores presented by this group ranged between 760 and 1430. Twenty-eight of the scores were above 1000 out of which nine were above the 1194 average presented by those that were accepted.

Asian American Women

GPAs presented by rejected Asian American women ranged between 2.02 and 3.81. Twelve were above 3.0. Three of these were above the 3.53 average presented by those that were accepted. The SAT scores presented by this group ranged between 560 and 1300. Nineteen of the scores were above 1000. One of them was above 1194.

Hispanic American Men

In this stratum, presented GPAs ranged between 2.02 and 3.26 with three of the GPAs above 3.0. Combined SAT verbal and math ranged between 770 and 1440. Thirty-four of the scores were above 1000 with 12 of them scoring above 1194.

Hispanic American Women

Rejected Hispanic American women presented GPAs ranging between 2.0 and 3.52. Eight of them were above 3.0. Combined SAT verbal and math in this stratum ranged between 660 and 1220. Thirteen of the scores were above 1000. Only one was above 1194.

White American Women

White American women that were rejected presented GPAs ranging between 2.05 and 3.47. There were seven GPAs above 3.0. None was above the average GPA of 3.53 presented by those that were accepted. SAT verbal and math combination presented by this group ranged between 750 and 1270. Of these, 20 were above 1000 out of which one was above the 1194 presented by those that were accepted.

White American Men

The range of the GPAs presented by white American men was between 2.04 and 3.42. Six of these were above 3.0. Combined verbal and math SAT scores presented by this group ranged between 790 and 1360. Of these, 37 were above 1000 out of which 10 were above 1194.

Table 10

Description of the Stratified Samples of Applicants Rejected in 1998 by Race/Gender Group and Number of Applicants in Given GPA Ranges

GPA Ranges	Race/Gender Group							
	BF	BM	AF	AM	HF	HM	WF	WM
0.00 – 1.99	6	5	4	4	2	4	2	2
2.00 – 2.49	12	12	6	11	11	15	7	16
2.50 – 2.99	25	27	27	25	18	28	31	26
3.00 – 3.52	7	6	10	7	8	3	10	6
3.53 – 4.00	0	0	3	3	0	0	0	0
Totals	50	50	50	50	39	50	50	50

Note.

BF = African American Females

BM = African American Males

AF = Asian American Females

AM = Asian American Males

HF = Hispanic American Males

HM = Hispanic American Males

WF = White American Females

WM = White American Males

Table 11

Description of the Stratified Samples of Applicants Rejected in 1998 by Race/Gender Group and Number of Applicants in Given Combined SAT Math and SAT Verbal Scores Ranges

Combined SAT Ranges	Race/Gender Group							
	BF	BM	AF	AM	HF	HM	WF	WM
0 - 499	5*	10*	1*	1*	1*	1*	3*	2**
500 - 999	36	32	30	21	24	15	27	11
1000 - 1193	7	5	18	19	12	22	19	27
1194 - 1600	2	3	1	9	1	12	1	10
Totals	50	50	50	50	39	50	50	50

Note.

* = The entries represent missing data
** = One of the two applicants presented a combined score that was within the range. The other applicant’s SAT data were missing
BF = African American Females

BM = African American Males

AF = Asian American Females

AM = Asian American Males

HF = Hispanic American Males

HM = Hispanic American Males

WF = White American Females

WM = White American Males

Rejection Reasons and the Groups

An evaluation of the reasons that were given for rejection found that the most frequently given reasons for rejection were GPA related followed by SAT scores and “other reasons.” When these reasons were totaled for all groups, GPA related reasons were given 77.07% of the time, SAT scores were given as reasons 14.65% of the time, while all other reasons were given only 8.28% of the time.

The Chi-square test of independence that was run to see if there were differences between the eight race/gender groups with regard to reasons given for rejection were statistically significant yielded the observed chi-square value of 20.99 which was not significant at .05 level with 14 degrees of freedom.

Comments

From the findings of this part of the study, the following conclusions were made.

1. The finding that GPA was the most frequently given reason for rejection followed by SAT scores confirmed a similar finding in the first part of this study that GPA was the most important criterion for admission followed by SAT scores.
2. The null hypothesis that there was no difference between African American

applicants, Asian American Applicants, Hispanic American Applicants and white American applicants with regard to reasons given for rejection was true. It could, therefore, not be rejected.

3. The finding that there was no difference between the eight race/gender groups with regard to reasons given for rejection confirmed the finding in the first part of this study that the groups were independent of admissions criteria, that is, all admissions decisions were based on the established admissions criteria regardless of group affiliation.

Results of the Interview

In the personal interview with the director of admissions and the deputy director of admissions for undergraduate admissions, the information provided by the officers may be summarized as follows:

1. Admission to Virginia Tech is not race blind. However, race is only one of the many factors that are considered during the admission process. Others include prior academic preparation, special talent, test scores, geographic location, relationship with alumni,

special interest (for example, personal interest in an applicant by the president), sex, race, socioeconomic status, course offerings at high school, and extenuating circumstances.

2. Admissions decisions are subjectively made by different people who evaluate applications as they are received. These evaluators base their decisions on instructions given to them by the admissions officers. They only make decisions on applications that contain obviously acceptable and those that contain obviously unacceptable grades. Evaluators could, for example, be instructed to automatically reject an application with a GPA of 2.5 because “the applicant would probably not make it.” Applications with grades that are neither clearly acceptable nor clearly unacceptable are examined by the director of admissions and the deputy director of admissions for undergraduate admissions after the last day of accepting applications has passed and after determining the number of places that are still available. There usually are very few places available as most applicants present

grades that are either clearly acceptable or clearly unacceptable.

3. The university does not apply affirmative action to admissions because that may currently mean admitting poor students who cannot make it in college. Instead of applying affirmative action to admissions to increase the number of African Americans in its student population, the university sought to achieve the goal by “expanding” its recruiting programs to include areas of Virginia with heavy African American population and waiving application fee. This strategy was first effected in 1990/1991. Both the number of African American applicants and the number of those accepted tripled. The number of those who actually enrolled remained the same, however.

4. Several reasons may be attributed to the little success that the university has had in its attempts to increase the number of African American students on its campus. One of them is the “whiteness” of the location of the university. Consequently, the admission officers think that the African Americans who

actually enroll probably do so because they come from white communities or because of the reputation of the university's programs that they are interested in.

5. Affirmative action is applied only to African Americans in the state of Virginia because the Supreme Court determined that it was among the states that were in the past involved in *dejure* discriminative practices against the race. It was, as a result, required to take corrective action. Consequently, the state adopted targeted goals in higher education admissions for African Americans according to which all public colleges and universities would accept 12 or 13% (the admissions officers were not sure what the exact percentage was) of all African Americans graduating from high school. Virginia Tech is not close to meeting that requirement as the number of African American applicants it accepts is far less than the ordered percentage.

6. When the admissions officers were contacted later and asked to provide references that could confirm the information that they had

provided during the interview with regard to whether affirmative action in Virginia applied only to African Americans and whether the state adopted targeted goals for African American admissions in the state’s public colleges and universities, they could not provide them. The deputy director of admissions said, however, that targeted goals for African Americans were included in the “Virginia Plan when John Casteen was state secretary of education in the early eighties.”

7. The finding in the first part of this study that African American groups and the white women group had a significantly higher probability of getting accepted than all other groups may be explained by the fact that the groups are accepted with lower test scores because the university considers the tests to be culturally biased against them. Disparity between white women and other groups may also be explained by the pressure exerted upon the university to increase the number of women in the sciences.

8. Qualitative qualities such as motivation and initiative can be detected in the applicant’s

academic record. Students with low qualifications or those that excel in one area such as computers or athletics but perform poorly in other areas of study perform the way they do because of lack of motivation and/or initiative.

<u>Comments</u>

Some of the comments that could be made from this part of the study are as follows:

1. The contention by the admissions officers that admission to the university was based upon the different factors that they cited were not supported by the findings in the first and second parts of this study that GPA and SAT scores were the most important criteria.
2. The data analyzed in the first part of this study do not support the claim that “race is only one of the many factors” considered in the university’s admissions process. Instead, the data suggest that apart from GPA and SAT scores, the only other important factors that the admissions office is concerned about are race, especially the African American race, and gender, as evidenced by the fact that white females consistently had higher

probabilities of acceptance than the white males.

3. The university’s refusal to apply affirmative action to undergraduate admissions for fear of accepting unqualified students is reflected in the findings in the first part of the study that admission was not independent of the admissions criteria considered in this study for any group and that the rise in qualifications affected all groups. The finding in the second part of the study that GPA and SAT related deficiencies were the most cited as reasons for rejection for all groups also reflects the office of admissions’ policy of accepting only qualified applicants based on the same set of criteria.

4. From the first part of this study, the finding that the two African American groups had significantly higher probabilities of getting accepted compared to other minority groups suggests that the university paid special attention to the two groups while it showed little or no interest in the other minority groups. This finding may be explained by the finding in this part about the perceived

existence of targeted goals for African Americans in the state of Virginia according to which all freshman classes in public colleges and universities in the state would be made up of a given percentage of African Americans.

CHAPTER V

DISCUSSIONS, CONCLUSIONS, IMPLICATIONS AND RECOMMENDATIONS

The findings of this study support some of the concerns that led to it; that is, that admissions practices in public universities and colleges are not totally consistent with the stated institutional admissions policies. This study’s findings suggest, for example, that while admissions policies stated in Virginia Tech’s *Undergraduate Course Catalog and Academic Policies* suggest that the university is committed to fairness in admissions, its admissions practices in the last five years suggest that race and gender are part of its considerations. The findings also suggest that even though only a limited number of quantitative admissions criteria and no qualitative admissions criteria other than race and gender were included in the logistic model in the first part of the study, GPA and SAT scores were the most important criteria for admission to the university. This conclusion is supported by the finding that GPA followed by SAT scores were the most important criteria in the first part of the study, only GPA and SAT related reasons were given for the rejection of applications in the second part of the study, and the evaluators of applications were instructed to automatically reject applicants presenting a given GPA such as 2.5 because “the applicant would probably not make it.” The finding was consistent with findings in previous studies that colleges and universities consider quantitative admissions criteria to be more important than qualitative criteria. The fears of those opposed to affirmative action that qualitative criteria could be used to advance the interests of minority students were supported by the finding that perceived or real external pressure may have been the cause of the high probabilities of acceptance of African Americans. What this suggests is that the use of quantitative criteria does not guarantee equal opportunity as their use is subject to other institutional interests such as the quest for the attainment of diversity of student populations.

Policies versus Practices

Admission policy statements found in public university and college catalogs suggest that public universities and colleges base their selection of first-time freshmen on previous academic preparation alone. This is especially the case when they use terms that suggest merit such as “competitive” or “selective” to describe their admissions processes. Virginia Tech, for example, states in its *1997-1998 Undergraduate Course Catalog And Academic Policies* that admission to the university is “competitive” and that applicants had better chances of getting accepted if they averaged B or B+ (White, 1997, p. 13). Indeed, in the letter that the university sent out to the applicants it rejected in 1998, “keen competition among the many applicants for limited spaces” was cited as the reason for rejection. This suggests that the university accepted only the best from the application pool of 1998. It was however found in this study that “the best” in the admissions processes at Virginia Tech in the last five years were not determined based upon individual competition regardless of background characteristics. They were determined based upon group affiliation meaning that competition was between groups with the best within groups accepted to fill places that may or may not have been previously set aside for them.

The underlying reason for the adoption of policies that base admission on merit is the issue of fairness. Although minorities, backed by some studies, have argued that meritorious admissions are unfair to students from minority ethnic groups because of their background characteristics, colleges and universities and members of the majority group largely consider basing admission on merit to be the only fair method of selection when there are more applicants than available spaces. The reason that is often given in support of meritorious admissions is that because they are based on quantifiable criteria such as GPA, test scores, and high school rank, they are transparent and, therefore, more prone to being fair.

In the first part of this study, some of the quantifiable admissions criteria used to select students in selective and competitive admission processes, namely GPA, SAT, and high school rank (HSR) were used together with race, gender, and requested major (RM) variables to develop a probability of admission model for Virginia Tech for the years 1994-1998. Eight race/gender groups were used as follows: African American males (BM), African American females (BF), Asian American males (AM), Asian American females (AF), Hispanic American males (HM), Hispanic American females (HF), white American males (WM), and white American females (WF). The model determined that probabilities of getting accepted differed by race. Differences by gender were also found but with regard to white females only. The subsequent Bonferroni and Wald tests that were carried out to test significance suggested that some of the differences were significant.

The finding that significant differences existed between groups with regard to chances of getting accepted was interpreted to mean that Virginia Tech's admission practices contained biases and, therefore, were not consistent with the university's stated admission policies, which presuppose fairness. Racially, the two African American groups were found to have significantly higher probabilities of getting accepted than other groups while the Asian groups had the least chances of getting accepted. This suggests that the former two were shown the greatest preference while the latter two were shown the least preference.

Perceived outside pressure from the state government may be one of the explanations for the observed African American groups’ higher probabilities of acceptance. This interpretation is strengthened by the finding that the other minority groups in the study, the Asian American groups and the Hispanic groups, that were perceived to be excluded from the perceived state targeted goals in higher education admissions did not fare well in the university’s admission process. This suggests that without the external pressure to increase their numbers, the African Americans too would have had low probabilities of getting accepted.

This association of ethnic minority students’ chances of getting accepted by a public higher education institution and the presence of external pressure is reminiscent of the 1960s when similar external pressures forced colleges and universities to accept them. One possible explanation for the results is the allegation in the literature that the majority of institutions have never committed themselves to the education of minority students. Only after pressure is applied does the institution make an effort to provide minority students an equal right (Wilson, 1991). The finding also supports the argument in literature that the opportunities for African Americans exist only because of the application of external pressure. The future access of African Americans and other minority groups to resources such as higher education depends very much on both “the law … and … on the willingness of the government to protect them in the exercise of these rights…” (Berry, 1994, in Hudson, 1994, p. 223).

Governmental intervention to protect minority rights has historically been the result of agitation by civil rights activists and civil rights movements as was the case in the 1960s. Another outcome of the actions of the civil rights activists and civil rights movements that may also help explain the appearance of differential probabilities of minority ethnic groups such as was found in this study is whether or not a disadvantaged group has been able to mobilize itself politically. Groups that have succeeded to mobilize politically get official social categorization that forces higher education institutions “to attend to the group” and “also continuously implores group members to define themselves as a group and to maintain a presence on campuses (sic)” (Karen, 1991, p. 224).

Karen (1991) says that blacks and women were able to mobilize themselves and, therefore, achieved recognition as official social categories. This may explain why Virginia

Tech and other higher education institutions bend to external pressure to “attend to” the members of these groups. The Director of Admissions and the Deputy Director of Admissions did indeed suggest, during the interview, that pressure to increase the numbers of members of these groups –- on campus, for the African Americans, and in sciences, for women –- could be an explanation for the significant differential probabilities that was detected in the first part of this study. Likewise, the observed lower probability of acceptance for Hispanics and the least probability of acceptance for Asians, may be explained by the fact that the two groups were not politically mobilized and, therefore, not recognized as social categories. This may have led to their not being “attended to.”

Even the low probabilities of getting accepted that were observed for white males may have been the result of having two groups in one: one of middle- to upper-socioeconomic status and the other of low-socioeconomic status. Although those from the low socioeconomic status have traditionally been a deprived group, they have not politically mobilized themselves and therefore, are not a socially recognized category (Karen, 1991). As a result, higher education institutions are not obligated to “attend to them.” This may explain why the white male category had lower probabilities of acceptance compared to the African

American groups and the white female group. The low socioeconomic status group may have “pulled down” the most likely high probabilities of acceptance for white middle to upper class status applicants.

It can be argued, therefore, that fairness in admissions does not reside in the policies or the process followed. Rather, whether or not admissions decisions can be made fairly depends upon whether or not institutions of higher education are committed to educating students from all backgrounds. As found in this study, even selective or competitive admissions can be manipulated to suit institutional interests, fairly or unfairly to the applicants.

Admissions Criteria

The findings in this study that GPA and SAT scores were the most important criteria from among those that were considered upon which admissions decisions were made is consistent with previous findings that despite denials by higher education institutions, first-time freshman admissions are largely based on evidence of previous academic preparation regardless of background characteristics of the applicants. A study by Williams, Gooden, Ewers, Daniels, and Brewington (1983) found that although colleges and universities requested varied information from applicants purportedly to help them determine which applicants to accept, the information that was most important to them was that which could objectively tell them about the applicants' previous academic preparation. They found that such information in varying degrees included GPA, class rank, high school curriculum, test scores, and academic curriculum.

At Virginia Tech, it was found that GPA and SAT related deficiencies were virtually the only reasons cited for rejection in 1998. Even in the letters that were sent out to applicants, the only information that was specific enough to help them understand why they may have been rejected related to GPA and SAT scores. It stated among other things that "Applicants offered admission presented an average GPA of 3.53 and average SAT of 1194." In fact, during the interview session, the admissions officers suggested that applicants' previous academic record provides sufficient information upon which admissions decisions could be made when they stated that the presence or absence of qualitative indicators such as motivation and initiative in an applicant could be detected from the applicant's academic record.

Conclusion

Virginia Tech's admissions processes in the last five years do not seem to have been race blind. Although findings such as in this study may suggest that minority applicants were shown preference, there is evidence also that the probability of the acceptance of minority applicants may have been related to external pressure exerted upon the university to increase their number on campus. In this study, for example, perceived state requirement that 12% or 13% of all freshman classes be made up of African Americans was a possible reason for their higher probabilities of getting accepted. The Asian Americans who were not covered by the perceived mandate had lower probabilities of getting accepted while the Hispanics did not fair as well as the African Americans.

Implications

The findings of this study have several implications. First, although Virginia Tech is evidently making an effort to increase the diversity of its student population, it is yet to demonstrate a breadth of commitment to the education of minority students. Between 1994 and 1998, the chances of the university's acceptance of students from minority ethnic groups were dependent upon external pressure exerted upon it by external forces. For African Americans, there was sufficient pressure, perceived or real, to make the university "attend to" the students from the community. As a result, they had high probabilities of getting accepted. The university experienced little or no pressure to "attend to" students from the Asian groups and the Hispanic groups. Consequently, higher qualifications were expected of students from the two groups compared to the two African American groups as manifested in their lower probabilities of getting accepted.

The possibility that Virginia Tech may be accepting minority students to satisfy external requirements and not because of commitment to their education may be the reason behind the difficulty the university is experiencing in its efforts to increase diversity of its student population. It may also be the reason why the university is having to pay special attention to the retention of the few African American students that it happens to enroll as demonstrated by the many retention programs initiated for them both at the university level and college level in the university’s constituent colleges. Examination of why the university is not able to increase the enrollment of African Americans and other minorities and why the university has to work hard to retain minority students that it happens to enroll is, however, beyond the scope of this study.

Second, the use of quantitative criteria is not immune from being unfair. They too can be manipulated to suit institutional interests. The findings in the first part of this study suggest, for example, that although admission to Virginia Tech was largely based on GPA and SAT scores regardless of race or gender, the between group differences in the probability of admission suggest that competition for first-time freshman places was largely within groups. The findings of all parts of the study suggest that this confinement of competition within groups may have been the result of the university’s interest in diversifying its student population while at the same time pursuing its goal of selectivity.

Third, the majority perception reported in literature that the use of qualitative criteria is often intended to benefit students from minority groups to their disadvantage is not unfounded. Their position is supported in this study by the finding that consideration of race, a qualitative criterion, in Virginia Tech’s admission process was intended to increase the number of African American students. The finding in the first part of this study that the two African American groups had higher probabilities of admission also suggests that indeed, when colleges and universities consider qualitative criteria such as race for purposes of increasing diversity, applicants from the majority group are disadvantaged. In this study, the higher probabilities for the African American groups suggest that admission to the university was made harder for applicants from the majority group and that, therefore, “lesser qualified” minority applicants were accepted to the disadvantage of “better qualified” majority applicants.

Fourth, as suggested in the literature review of this study, efforts by higher education institutions to be seen to be fair in their admissions processes by seeking to achieve diversity and at the same time remain selective have not been successful. Consequently, unless colleges and universities adopt alternative admission strategies, their image as far as the issue of desegregation is concerned will remain tainted. They will continue to be perceived to be unfair in their admissions practices. This negative perception will remain for as long as they continue to consider the achievement of diversity to be synonymous with the achievement of equal opportunity in their admission processes. This is because while the goal of diversity in admissions is built on a bad premise which is to have student populations reflect society for the sake of it (Hoffman, 1993; Spence, 1993), that of equal opportunity is built upon a good premise which calls for the erasure of difference by removing obstacles that unfairly prevent a group of students from accessing higher education (See Yates, 1993).

In this study, like in previous higher education literature, it was found that considering quantitative criteria such as GPA and SAT scores which are known to favor the majority to be more important than qualitative criteria and then using qualitative criteria such as race and gender to admit or increase the number of students belonging to a group that has otherwise been judged to be “unqualified” for admission enhanced difference in admission qualifications. This policy is, therefore, an obstacle to the achievement of equal opportunity. It should be reexamined.

To enhance equal opportunity and be seen to be fair to all applicants, Virginia Tech and other public higher education institutions need to base their admission of first-time freshman students on a set of predetermined equally-weighted quantitative and qualitative criteria. This could be done by department or college. The admission strategy described in *McDonald v. Hogness* (Kaplin & Lee, 1995) in which admission criteria, both qualitative and quantitative, were predetermined and then assigned points is recommended. The strategy could reduce the between group differences such as those detected in this study because it would encourage competition for first-time freshman places based not on quantitative criteria alone as is the current practice but on a well thought out combination of both quantitative and qualitative criteria necessary for one to succeed in a given area of study. Higher education would then be not for the best academically but for those with a given combination of qualities both academic and qualitative.

Fifth, although the admissions process is considered to be a “complex exercise” by admissions officers at Virginia Tech and in higher education literature, the admission process at Virginia Tech is a simplified one that emphasizes admission based largely on GPA and SAT scores. The admissions officers blamed this simplification of the university’s admission process on the large number of applications that the university received each year that made it impossible for them to go through the complex exercise of evaluating both the qualitative and quantitative criteria. This simplification of the admission process is, therefore, largely to blame for the apparent unfair outcomes of the admissions processes in the last five years.

Sixth, the model used in the first part of this study suggested rather strongly, with a concordant of about 95% and a discordant of only about 5%, that admission to the university is largely based on quantitative criteria namely GPA and SAT scores. Data analyzed in the second and third parts of the study also support this finding. This finding supports previous findings that college and university first-time freshman admissions are largely based on quantitative criteria and that qualitative criteria are of little importance.

Seventh, since GPA and SAT scores were the most important criteria for admission to Virginia Tech, admission policy statements by Virginia Tech suggesting that admission to the university is selective are not completely misleading. This was especially true based on the fact that even though there were between group differences in probabilities of admission, previous academic preparation was important albeit within groups. High school seniors aspiring to seek admission to the university are, therefore, well advised to score high in tests and achieve above average grades especially that admissions qualifications seem to depend upon the quality of the application pool of any given year.

Eighth, since affirmative action, as stated in the executive order that mandated it was never intended to replace qualification criteria (Spence, 1993), basing first-time freshman admissions on affirmative action should not lower academic standards of higher education institutions. A good example of how affirmative action could appropriately be applied in admissions processes was found in the admission process followed at the Washington medical school as discussed in *McDonald v Hogness* (Kaplin & Lee, 1995). Unlike the prevalent practice in higher education of admitting the best applicants academically, the school admitted the best applicants based upon a predetermined set of both academic and qualitative criteria that applicants had to present as evidence of their ability to benefit from the programs of the school. The qualifications were assigned points and were required of all applicants. The applicants who scored the highest points were accepted regardless of whether they scored highest quantitatively or qualitatively.

Apart from enhancing equal opportunity in admissions by removing obstacles that come into play when admissions decisions are based on only one type of criteria, the admission process that is equally based upon both academic and qualitative qualifications could have a positive long term effect of producing better prepared professionals who are able to deal with the ever increasing complex challenges that professionals face in their selected areas of specialization. Admission officers should, therefore, bear in mind not only the ability of an applicant to succeed as a student but also as a professional. Since the findings of this study suggest that admission at Virginia Tech is not strictly selective, the university is well advised to adopt the admission process described here. This admission procedure could help it achieve diversity of its student population fairly because it does not have built-in preferential tendencies that stigmatize minorities and discriminate against majority applicants.

Ninth, Virginia Tech’s goal of increasing diversity of its student population by “expanding recruiting” does not seem to have been successful if the strategy was meant to increase the chances of recruiting “promising” African American students who could effectively compete for first-time freshman places based upon traditional admission measures. There is a need, therefore, to find a more effective strategy that could increase the number of minority students, especially African Americans without lowering the chances of the acceptance of applicants from the majority group. As already suggested in this study, a potentially successful strategy could be one that replaces the current policies and practices of basing first-time freshman admission largely on traditional measures that are known to unfairly hinder minority access to higher education with a set of predetermined criteria, both quantitative and qualitative, that could be used to predict the success of all applicants in their chosen majors.

Recommendations for Further Study

Based upon the findings of this study, several recommendations for further study are made. First, only three of the many admission criteria that higher education institutions and Virginia Tech say they use in their admission processes were included in the logistic model that was fitted in the first part of this study. Further investigations of admission practices that would include the traditional measures included in this study, that is, GPA, SAT or other standardized test scores and high school rank and others not included such as the rigor of high school curriculum and properly coded qualitative criteria such as motivation, initiative, geographic location, persistence, previous experience with discrimination, letters of recommendation and socioeconomic status in their analyses are recommended.

Second, this study focused on one institution only. In order to gain a better understanding of admission practices in higher education in general, further studies should include more institutions that are randomly selected from institutions in a state, region or the whole nation depending upon the goals of the studies.

Third, the probability that an applicant will succeed, that is, the probability that an applicant will graduate if admitted is a factor that should be considered in an admission process. It is recommended, therefore, that further studies consider the relationship between the differences in admission qualifications such as those detected in this study and student performance and retention.

Fourth, the analysis made in the first part of this study was based on information that was presented to the university by the entire populations of interest. Future studies of admission practices could use information from random samples instead.

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Appendix A

Admissions Data 1994

The LOGISTIC Procedure

Data Set: WORK.Y94
Response Variable: ADMIT
Response Levels: 2
Number of Observations: 9236
Link Function: Logit

Response Profile

Ordered Value	ADMIT	Count
1	0	1909
2	1	7327

WARNING: 4870 observation(s) were deleted due to missing values for the response or explanatory variables.

Model Fitting Information and Testing Global Null Hypothesis BETA=0

Criterion	Intercept Only	Intercept and Covariates	Chi-Square for Covariates
AIC	9414.216	4260.692	.
SC	9421.347	4353.393	.
-2 LOG L	9412.216	4234.692	5177.524 with 12 DF (p=0.0001)
Score	.	.	4232.304 with 12 DF (p=0.0001)

The LOGISTIC Procedure

Analysis of Maximum Likelihood Estimates

Variable	DF	Parameter Estimate	Standard Error	Wald Chi-Square	Pr > Chi-Square	Standardized Estimate	Odds Ratio
INTERCPT	1	18.8757	0.6533	834.9114	0.0001	.	.
PCT	1	1.6877	0.3240	27.1254	0.0001	0.166063	5.407
GPA	1	-4.7632	0.1722	765.4785	0.0001	-1.231146	0.009
SATVERB	1	-0.00907	0.000601	228.1937	0.0001	-0.444322	0.991
SATMATH	1	-0.00452	0.000562	64.7331	0.0001	-0.242297	0.995
COL	1	0.9966	0.0952	109.5267	0.0001	0.248556	2.709
BM	1	-0.6556	0.1647	15.8394	0.0001	-0.083242	0.519
BF	1	-0.4835	0.1669	8.3916	0.0038	-0.066854	0.617
AM	1	0.5030	0.1980	6.4530	0.0111	0.054662	1.654
AF	1	0.4281	0.2302	3.4590	0.0629	0.038899	1.534
HM	1	0.3560	0.2941	1.4657	0.2260	0.021953	1.428
HF	1	0.2294	0.3356	0.4674	0.4942	0.012561	1.258
WF	1	-0.3204	0.1016	9.9452	0.0016	-0.083578	0.726

Association of Predicted Probabilities and Observed Responses

Concordant	= 94.4%	Somers' D	= 0.890
Discordant	= 5.4%	Gamma	= 0.891
Tied	= 0.2%	Tau-a	= 0.292
(13987243 pairs)		c	= 0.945

Estimated Covariance Matrix

Variable	INTERCPT	PCT	GPA	SATVERB	SATMATH	COL	BM
INTERCPT	0.426745	-0.12364	-0.09705	-0.00012	-0.00008	0.008313	-0.02711
PCT	-0.12364	0.105001	0.032342	-9.19E-6	-8.02E-6	0.00048	0.004999
GPA	-0.09705	0.032342	0.029639	0.000011	-9.05E-6	-0.00237	0.003697
SATVERB	-0.00012	-9.19E-6	0.000011	3.607E-7	-1.35E-7	9.474E-7	5.586E-6
SATMATH	-0.00008	-8.02E-6	-9.05E-6	-1.35E-7	3.157E-7	-8.66E-6	0.000016
COL	0.008313	0.00048	-0.00237	9.474E-7	-8.66E-6	0.009069	-0.00075
BM	-0.02711	0.004999	0.003697	5.586E-6	0.000016	-0.00075	0.027134
BF	-0.02676	0.007396	0.001609	3.047E-7	0.000029	-0.00044	0.0058
AM	0.000608	-0.00151	-0.00263	0.00002	-9.04E-6	0.000306	0.003193
AF	-0.0017	-0.00108	-0.00403	0.00001	9.953E-6	0.000996	0.004032
HM	0.001228	-0.00625	-0.00305	2.83E-6	9.495E-6	-0.00006	0.003686
HF	-0.00423	-0.00249	-0.00236	5.06E-7	0.000015	0.000766	0.00414
WF	-0.00862	0.000137	-0.00136	-2.8E-6	0.000018	0.000873	0.004438

The LOGISTIC Procedure

Estimated Covariance Matrix

Variable	BF	AM	AF	HM	HF	WF
INTERCPT	-0.02676	0.000608	-0.0017	0.001228	-0.00423	-0.00862
PCT	0.007396	-0.00151	-0.00108	-0.00625	-0.00249	0.000137
GPA	0.001609	-0.00263	-0.00403	-0.00305	-0.00236	-0.00136
SATVERB	3.047E-7	0.00002	0.00001	2.83E-6	5.06E-7	-2.8E-6
SATMATH	0.000029	-9.04E-6	9.953E-6	9.495E-6	0.000015	0.000018
COL	-0.00044	0.000306	0.000996	-0.00006	0.000766	0.000873
BM	0.0058	0.003193	0.004032	0.003686	0.00414	0.004438
BF	0.027852	0.003195	0.005017	0.004092	0.004946	0.005425
AM	0.003195	0.039201	0.004436	0.003693	0.003534	0.003256
AF	0.005017	0.004436	0.052994	0.00426	0.004583	0.004563
HM	0.004092	0.003693	0.00426	0.086475	0.004173	0.00408
HF	0.004946	0.003534	0.004583	0.004173	0.112598	0.004574
WF	0.005425	0.003256	0.004563	0.00408	0.004574	0.010321

The LOGISTIC Procedure

Data Set: WORK.Y95
Response Variable: ADMIT
Response Levels: 2
Number of Observations: 8982
Link Function: Logit

Response Profile

Ordered Value	ADMIT	Count
1	0	1772
2	1	7210

WARNING: 5011 observation(s) were deleted due to missing values for the response or explanatory variables.

Model Fitting Information and Testing Global Null Hypothesis BETA=0

Criterion	Intercept Only	Intercept and Covariates	Chi-Square for Covariates
AIC	8923.162	4015.371	.
SC	8930.265	4107.709	.
-2 LOG L	8921.162	3989.371	4931.792 with 12 DF (p=0.0001)
Score	.	.	3913.647 with 12 DF (p=0.0001)

The LOGISTIC Procedure

Analysis of Maximum Likelihood Estimates

Variable	DF	Parameter Estimate	Standard Error	Wald Chi-Square	Pr > Chi-Square	Standardized Estimate	Odds Ratio
INTERCPT	1	20.8640	0.7327	810.9565	0.0001	.	.
PCT	1	1.1374	0.3629	9.8251	0.0017	0.108594	3.119
GPA	1	-4.6222	0.1840	631.1906	0.0001	-1.212454	0.010
SATVERB	1	-0.0102	0.000647	246.3101	0.0001	-0.508141	0.990
SATMATH	1	-0.00745	0.000576	167.2687	0.0001	-0.421157	0.993
COL	1	0.5760	0.1043	30.4827	0.0001	0.141098	1.779
BM	1	-1.0086	0.1773	32.3536	0.0001	-0.115262	0.365
BF	1	-0.6438	0.1824	12.4562	0.0004	-0.074690	0.525
AM	1	0.6638	0.2079	10.1986	0.0014	0.068550	1.942
AF	1	0.1028	0.2387	0.1854	0.6668	0.009709	1.108
HM	1	0.3241	0.3510	0.8526	0.3558	0.018750	1.383
HF	1	0.0574	0.4055	0.0200	0.8875	0.003008	1.059
WF	1	-0.3617	0.0999	13.1236	0.0003	-0.095899	0.696

Association of Predicted Probabilities and Observed Responses

Concordant = 94.7%	Somers' D = 0.895
Discordant = 5.2%	Gamma = 0.897
Tied = 0.2%	Tau-a = 0.284

(12776120 pairs) c = 0.948

Estimated Covariance Matrix

Variable	INTERCPT	PCT	GPA	SATVERB	SATMATH	COL	BM
INTERCPT	0.53678	-0.16103	-0.11913	-0.00017	-0.0001	0.003956	-0.03447
PCT	-0.16103	0.131668	0.042368	-4.02E-6	-0.00001	-3.25E-6	0.006124
GPA	-0.11913	0.042368	0.033848	0.000018	-4.38E-6	-0.00141	0.004854
SATVERB	-0.00017	-4.02E-6	0.000018	4.187E-7	-1.31E-7	4.192E-6	9.566E-6
SATMATH	-0.0001	-0.00001	-4.38E-6	-1.31E-7	3.316E-7	-7.82E-6	0.000019
COL	0.003956	-3.25E-6	-0.00141	4.192E-6	-7.82E-6	0.010884	-0.0008
BM	-0.03447	0.006124	0.004854	9.566E-6	0.000019	-0.0008	0.031445
BF	-0.02864	0.00643	0.001703	4.52E-6	0.000029	-0.00032	0.006473
AM	0.002059	-0.00105	-0.00322	0.00002	-9.18E-6	0.00036	0.003469
AF	-0.00501	0.002099	-0.00258	0.000012	4.717E-6	0.000788	0.004339
HM	0.003901	-0.00527	-0.00261	2.839E-6	1.229E-6	-0.00017	0.003514
HF	0.000422	-0.00289	-0.00419	-6.69E-6	0.000022	0.000561	0.004624
WF	-0.00937	0.001076	-0.00092	-4.98E-6	0.000019	0.000648	0.004836

The LOGISTIC Procedure

Estimated Covariance Matrix

Variable	BF	AM	AF	HM	HF	WF
INTERCPT	-0.02864	0.002059	-0.00501	0.003901	0.000422	-0.00937
PCT	0.00643	-0.00105	0.002099	-0.00527	-0.00289	0.001076
GPA	0.001703	-0.00322	-0.00258	-0.00261	-0.00419	-0.00092
SATVERB	4.52E-6	0.00002	0.000012	2.839E-6	-6.69E-6	-4.98E-6
SATMATH	0.000029	-9.18E-6	4.717E-6	1.229E-6	0.000022	0.000019
COL	-0.00032	0.00036	0.000788	-0.00017	0.000561	0.000648
BM	0.006473	0.003469	0.004339	0.003514	0.004624	0.004836
BF	0.033277	0.003749	0.005148	0.003681	0.005893	0.005693
AM	0.003749	0.043206	0.004894	0.004041	0.003809	0.003508
AF	0.005148	0.004894	0.056958	0.003926	0.004792	0.004427
HM	0.003681	0.004041	0.003926	0.123197	0.004025	0.003751
HF	0.005893	0.003809	0.004792	0.004025	0.164451	0.005268
WF	0.005693	0.003508	0.004427	0.003751	0.005268	0.009971

The LOGISTIC Procedure

Data Set: WORK.Y96
Response Variable: ADMIT
Response Levels: 2
Number of Observations: 11204
Link Function: Logit

Response Profile

Ordered Value	ADMIT	Count
1	0	1917
2	1	9287

WARNING: 4195 observation(s) were deleted due to missing values for the response or explanatory variables.

Model Fitting Information and Testing Global Null Hypothesis BETA=0

Criterion	Intercept Only	Intercept and Covariates	Chi-Square for Covariates
AIC	10256.472	4245.768	.
SC	10263.796	4340.981	.
-2 LOG L	10254.472	4219.768	6034.704 with 12 DF (p=0.0001)
Score	.	.	4830.650 with 12 DF (p=0.0001)

The LOGISTIC Procedure

Analysis of Maximum Likelihood Estimates

Variable	DF	Parameter Estimate	Standard Error	Wald Chi-Square	Pr > Chi-Square	Standardized Estimate	Odds Ratio
INTERCPT	1	21.8555	0.7475	854.9752	0.0001	.	.
PCT	1	1.5203	0.3326	20.8967	0.0001	0.152136	4.574
GPA	1	-5.6626	0.1920	870.1002	0.0001	-1.506810	0.003
SATVERB	1	-0.00685	0.000641	114.2454	0.0001	-0.316487	0.993
SATMATH	1	-0.00582	0.000645	81.4019	0.0001	-0.294083	0.994
COL	1	-0.1418	0.0917	2.3901	0.1221	-0.037445	0.868
BM	1	-0.2599	0.1620	2.5736	0.1087	-0.030747	0.771
BF	1	-0.2499	0.1683	2.2042	0.1376	-0.030722	0.779
AM	1	0.6420	0.2161	8.8233	0.0030	0.063418	1.900
AF	1	0.5045	0.2793	3.2619	0.0709	0.041323	1.656
HM	1	-0.1043	0.2936	0.1262	0.7224	-0.006739	0.901
HF	1	-0.1261	0.4063	0.0964	0.7562	-0.006476	0.881
WF	1	-0.4293	0.1010	18.0545	0.0001	-0.112245	0.651

Association of Predicted Probabilities and Observed Responses

Concordant	= 95.6%	Somers' D	= 0.914
Discordant	= 4.2%	Gamma	= 0.916
Tied	= 0.3%	Tau-a	= 0.259

(17803179 pairs)   c   = 0.957

Estimated Covariance Matrix

Variable	INTERCPT	PCT	GPA	SATVERB	SATMATH	COL	BM
INTERCPT	0.558689	-0.14273	-0.12469	-0.00015	-0.00011	0.001708	-0.02611
PCT	-0.14273	0.110605	0.036056	-9.05E-7	-6.69E-6	-0.00081	0.005264
GPA	-0.12469	0.036056	0.036852	0.000013	-3.53E-6	-0.00051	0.003031
SATVERB	-0.00015	-9.05E-7	0.000013	4.112E-7	-1.9E-7	5.355E-6	6.339E-6
SATMATH	-0.00011	-6.69E-6	-3.53E-6	-1.9E-7	4.164E-7	-0.00001	0.000017
COL	0.001708	-0.00081	-0.00051	5.355E-6	-0.00001	0.008414	-0.0016
BM	-0.02611	0.005264	0.003031	6.339E-6	0.000017	-0.0016	0.026249
BF	-0.02782	0.007529	0.001477	3.911E-6	0.000028	-0.00023	0.00534
AM	0.00532	-0.00109	-0.00239	0.000015	-0.00002	0.000326	0.002653
AF	-0.00006	0.001476	-0.00441	9.755E-6	6.146E-6	0.00127	0.003674
HM	-0.00929	0.001766	0.000512	5.82E-6	2.121E-6	-0.00082	0.003731
HF	-0.01293	-0.00165	-0.00102	-4.88E-6	0.000028	0.001255	0.004307
WF	-0.01004	0.000017	-0.00087	-3.07E-6	0.000019	0.001301	0.003927

The LOGISTIC Procedure

Estimated Covariance Matrix

Variable	BF	AM	AF	HM	HF	WF
INTERCPT	-0.02782	0.00532	-0.00006	-0.00929	-0.01293	-0.01004
PCT	0.007529	-0.00109	0.001476	0.001766	-0.00165	0.000017
GPA	0.001477	-0.00239	-0.00441	0.000512	-0.00102	-0.00087
SATVERB	3.911E-6	0.000015	9.755E-6	5.82E-6	-4.88E-6	-3.07E-6
SATMATH	0.000028	-0.00002	6.146E-6	2.121E-6	0.000028	0.000019
COL	-0.00023	0.000326	0.00127	-0.00082	0.001255	0.001301
BM	0.00534	0.002653	0.003674	0.003731	0.004307	0.003927
BF	0.028327	0.002422	0.004761	0.003763	0.00555	0.004942
AM	0.002422	0.046713	0.003664	0.003248	0.002213	0.002552
AF	0.004761	0.003664	0.078023	0.003422	0.004331	0.004177
HM	0.003763	0.003248	0.003422	0.086177	0.003276	0.003227
HF	0.00555	0.002213	0.004331	0.003276	0.165058	0.005033
WF	0.004942	0.002552	0.004177	0.003227	0.005033	0.01021

The LOGISTIC Procedure

Data Set: WORK.Y97
Response Variable: ADMIT
Response Levels: 2
Number of Observations: 11199
Link Function: Logit

Response Profile

Ordered Value	ADMIT	Count
1	0	2618
2	1	8581

WARNING: 4665 observation(s) were deleted due to missing values for the response or explanatory variables.

Model Fitting Information and Testing Global Null Hypothesis BETA=0

Criterion	Intercept Only	Intercept and Covariates	Chi-Square for Covariates
AIC	12181.870	4760.431	.
SC	12189.193	4855.637	.
-2 LOG L	12179.870	4734.431	7445.439 with 12 DF (p=0.0001)
Score	.	.	5714.755 with 12 DF (p=0.0001)

The LOGISTIC Procedure

Analysis of Maximum Likelihood Estimates

Variable	DF	Parameter Estimate	Standard Error	Wald Chi-Square	Pr > Chi-Square	Standardized Estimate	Odds Ratio
INTERCPT	1	24.1092	0.7328	1082.4280	0.0001	.	.
PCT	1	2.0430	0.3199	40.7960	0.0001	0.205450	7.714
GPA	1	-5.6439	0.1801	982.3331	0.0001	-1.484107	0.004
SATVERB	1	-0.00749	0.000591	160.6573	0.0001	-0.350007	0.993
SATMATH	1	-0.00767	0.000615	155.4530	0.0001	-0.379885	0.992
COL	1	-0.0514	0.0852	0.3634	0.5466	-0.013583	0.950
BM	1	-0.4761	0.1544	9.5059	0.0020	-0.057982	0.621
BF	1	-0.4544	0.1654	7.5506	0.0060	-0.055380	0.635
AM	1	0.4751	0.1939	6.0046	0.0143	0.048558	1.608
AF	1	0.2508	0.2746	0.8342	0.3611	0.020904	1.285
HM	1	0.1459	0.2803	0.2709	0.6027	0.009426	1.157
HF	1	-0.1548	0.3831	0.1632	0.6862	-0.007947	0.857
WF	1	-0.3315	0.0932	12.6392	0.0004	-0.087052	0.718

Association of Predicted Probabilities and Observed Responses

Concordant = 95.9%   Somers' D = 0.919
Discordant = 4.0%   Gamma   = 0.921

Tied	= 0.1%	Tau-a	= 0.329
(22465058 pairs)		c	= 0.960

Estimated Covariance Matrix

Variable	INTERCPT	PCT	GPA	SATVERB	SATMATH	COL	BM
INTERCPT	0.536992	-0.12506	-0.11483	-0.00014	-0.00013	0.002007	-0.0259
PCT	-0.12506	0.102308	0.031304	1.77E-8	-9.63E-6	-0.00049	0.004867
GPA	-0.11483	0.031304	0.032426	0.000011	3.556E-7	-0.00076	0.003313
SATVERB	-0.00014	1.77E-8	0.000011	3.495E-7	-1.52E-7	4.633E-6	5.855E-6
SATMATH	-0.00013	-9.63E-6	3.556E-7	-1.52E-7	3.787E-7	-8.27E-6	0.000015
COL	0.002007	-0.00049	-0.00076	4.633E-6	-8.27E-6	0.007261	-0.00086
BM	-0.0259	0.004867	0.003313	5.855E-6	0.000015	-0.00086	0.023847
BF	-0.02765	0.006115	0.001824	4.892E-6	0.000026	0.000124	0.004826
AM	-0.00249	0.001553	-0.00066	0.000012	-9.87E-6	-0.0004	0.00291
AF	-0.00354	0.001719	-0.0028	8.02E-6	6.81E-6	0.000934	0.003455
HM	-0.00741	-0.00005	0.001105	7.528E-7	1.845E-6	-0.00067	0.003135
HF	-0.01114	0.00074	-0.00114	-2.79E-6	0.000023	0.000742	0.003951
WF	-0.00845	0.00019	-0.00088	-2.58E-6	0.000016	0.001249	0.003562

The LOGISTIC Procedure

Estimated Covariance Matrix

Variable	BF	AM	AF	HM	HF	WF
INTERCPT	-0.02765	-0.00249	-0.00354	-0.00741	-0.01114	-0.00845
PCT	0.006115	0.001553	0.001719	-0.00005	0.00074	0.00019
GPA	0.001824	-0.00066	-0.0028	0.001105	-0.00114	-0.00088
SATVERB	4.892E-6	0.000012	8.02E-6	7.528E-7	-2.79E-6	-2.58E-6
SATMATH	0.000026	-9.87E-6	6.81E-6	1.845E-6	0.000023	0.000016
COL	0.000124	-0.0004	0.000934	-0.00067	0.000742	0.001249
BM	0.004826	0.00291	0.003455	0.003135	0.003951	0.003562
BF	0.027343	0.002777	0.004321	0.003006	0.005041	0.004443
AM	0.002777	0.037595	0.003224	0.002889	0.002523	0.002534
AF	0.004321	0.003224	0.075421	0.002728	0.004043	0.003776
HM	0.003006	0.002889	0.002728	0.078549	0.002857	0.002807
HF	0.005041	0.002523	0.004043	0.002857	0.146738	0.004318
WF	0.004443	0.002534	0.003776	0.002807	0.004318	0.008693

The LOGISTIC Procedure

Data Set: WORK.Y98
Response Variable: ADMIT
Response Levels: 2
Number of Observations: 10169
Link Function: Logit

Response Profile

Ordered Value	ADMIT	Count
1	0	1994
2	1	8175

WARNING: 4203 observation(s) were deleted due to missing values for the response or explanatory variables.

Model Fitting Information and Testing Global Null Hypothesis BETA=0

Criterion	Intercept Only	Intercept and Covariates	chi-square for Covariates
AIC	10067.857	3014.644	.
SC	10075.084	3108.596	.
-2 LOG L	10065.857	2988.644	7077.213 with 12 DF (p=0.0001)
Score	.	.	5444.533 with 12 DF (p=0.0001)

The LOGISTIC Procedure

Analysis of Maximum Likelihood Estimates

Variable	DF	Parameter Estimate	Standard Error	Wald Chi-Square	Pr > Chi-Square	Standardized Estimate	Odds Ratio
INTERCPT	1	31.4882	1.0330	929.2312	0.0001	.	.
PCT	1	1.2657	0.3944	10.2994	0.0013	0.127305	3.546
GPA	1	-7.9235	0.2586	938.9883	0.0001	-2.036448	0.000
SATVERB	1	-0.00776	0.000791	96.2750	0.0001	-0.349688	0.992
SATMATH	1	-0.00799	0.000805	98.6656	0.0001	-0.383109	0.992
COL	1	-0.0984	0.1071	0.8436	0.3584	-0.026314	0.906
BM	1	-0.9152	0.1905	23.0729	0.0001	-0.108696	0.400
BF	1	-0.8128	0.2111	14.8295	0.0001	-0.091080	0.444
AM	1	0.4735	0.2771	2.9193	0.0875	0.046997	1.606
AF	1	0.3021	0.3244	0.8674	0.3517	0.025745	1.353
HM	1	-0.0271	0.4066	0.0045	0.9468	-0.001616	0.973
HF	1	-0.1101	0.4159	0.0700	0.7913	-0.005838	0.896
WF	1	-0.3959	0.1196	10.9671	0.0009	-0.104151	0.673

Association of Predicted Probabilities and Observed Responses

Concordant = 97.4%   Somers' D = 0.951

Discordant =	2.3%	Gamma	= 0.954
Tied =	0.2%	Tau-a	= 0.300
(16300950 pairs)		c	= 0.976

Estimated Covariance Matrix

Variable	INTERCPT	PCT	GPA	SATVERB	SATMATH	COL	BM
INTERCPT	1.067022	-0.20558	-0.23568	-0.00029	-0.00022	0.001408	-0.05561
PCT	-0.20558	0.155546	0.051187	0.00001	-0.00002	0.001109	0.008871
GPA	-0.23568	0.051187	0.06686	0.000029	2.844E-6	-0.00076	0.008523
SATVERB	-0.00029	0.00001	0.000029	6.253E-7	-2.59E-7	7.837E-6	0.000017
SATMATH	-0.00022	-0.00002	2.844E-6	-2.59E-7	6.478E-7	-0.00001	0.000024
COL	0.001408	0.001109	-0.00076	7.837E-6	-0.00001	0.011469	-0.00168
BM	-0.05561	0.008871	0.008523	0.000017	0.000024	-0.00168	0.036305
BF	-0.05338	0.009363	0.004445	0.000015	0.000042	0.000392	0.008194
AM	-0.00183	-0.00137	-0.00248	0.000023	-0.00001	-0.00164	0.004926
AF	-0.00565	0.003319	-0.00452	0.000017	7.147E-6	0.000398	0.005474
HM	-0.00909	-0.00232	-0.00093	0.00001	3.956E-6	0.001063	0.004988
HF	-0.01666	-0.00263	-0.00296	8.333E-6	0.00003	0.000902	0.00618
WF	-0.01547	0.00055	-0.00096	-1.91E-6	0.000024	0.001912	0.005564

The LOGISTIC Procedure

Estimated Covariance Matrix

Variable	BF	AM	AF	HM	HF	WF
INTERCPT	-0.05338	-0.00183	-0.00565	-0.00909	-0.01666	-0.01547
PCT	0.009363	-0.00137	0.003319	-0.00232	-0.00263	0.00055
GPA	0.004445	-0.00248	-0.00452	-0.00093	-0.00296	-0.00096
SATVERB	0.000015	0.000023	0.000017	0.00001	8.333E-6	-1.91E-6
SATMATH	0.000042	-0.00001	7.147E-6	3.956E-6	0.00003	0.000024
COL	0.000392	-0.00164	0.000398	0.001063	0.000902	0.001912
BM	0.008194	0.004926	0.005474	0.004988	0.00618	0.005564
BF	0.044548	0.004629	0.006625	0.005514	0.007842	0.007004
AM	0.004629	0.076794	0.005436	0.004789	0.004713	0.004065
AF	0.006625	0.005436	0.105237	0.005162	0.00618	0.005505
HM	0.005514	0.004789	0.005162	0.16536	0.005444	0.005151
HF	0.007842	0.004713	0.00618	0.005444	0.172968	0.006443
WF	0.007004	0.004065	0.005505	0.005151	0.006443	0.014293

Resume

Sylvanus Amkaya Nacheri

Education

Master of Arts in Education – December, 1999
College Student Affairs Administration
Virginia Polytechnic Institute & State University
Blacksburg, Virginia 24061

Bachelor of Arts – June, 1992
Major: History
Minors: Religion & Home Economics
University of Eastern Africa
Baraton, Kenya

Training

P2 Teachers Education Certificate – April, 1977
Kamagambo Teachers Training College
Kisii, Kenya

Professional Experiences (Teaching)

Primary School Teacher: May 1977 – December, 1978
Namatotoa Primary School
Bungoma District, Kenya

Primary School Teacher: January, 1979 – December 1982
Commonwealth Primary School
Bungoma District, Kenya

Primary School Teacher: January 1983 – December, 1983
Malaha Primary School
Bungoma District, Kenya

Primary School Teacher: January, 1984 – August, 1986
Webuye DEB Primary School
Bungoma District, Kenya

Primary School Teaching: September, 1988 – January, 1994
Tilalwa Primary School
Nandi District, Kenya.

Professional Experiences (Administrative)

Deputy Headmaster: September, 1986 – December, 1986
Sinoko Primary School
Bungoma District, Kenya

Deputy Headmaster: January 1987 – April, 1987
Ngwelo Primary School
Bungoma District, Kenya

Headmaster: May, 1987 – August, 1988
Ngwelo Primary School
Bungoma District, Kenya

Awards

Promotion to P1 Teacher Grade, 1986
Director of Education, Kenya.