INFORMATION TO USERS

An investigation of the effects of selected variables on the Graduate Management Admission Test scores of African-American examinees

Howard, Sandra Anita, Ed.D.

The University of North Carolina at Greensboro, 1993

AN INVESTIGATION OF THE EFFECTS OF SELECTED VARIABLES ON

THE GRADUATE MANAGEMENT ADMISSION TEST SCORES

OF AFRICAN-AMERICAN EXAMINEES

by

Sandra Anita Howard

A Dissertation Submitted to
the Faculty of The Graduate School at
The University of North Carolina at Greensboro
in Partial Fulfillment
of the Requirements for the Degree
Doctor of Education

Greensboro
1993

Approved by

_____
Dissertation Advisor

HOWARD, SANDRA ANITA, Ed.D. An Investigation of the Effects of Selected Variables on the Graduate Management Admission Test Scores of African-American Examinees. (1993)
Directed by Dr. Kieth Wright. 120 pp.

The purposes of this study were to develop a profile of African-American Graduate Management Admission Test (GMAT) examinees and to identify major predictors of GMAT performance for these students.

Multiple regression and t-test analyses were used in this study; GMAT records of 1,500 randomly-selected African-American examinees provided the data. Dependent variables were GMAT verbal (GMATV), GMAT quantitative (GMATQ), and GMAT total (GMATT) scores. Independent variables were age, sex, undergraduate grade point average (GPA), undergraduate major, exam preparation method, and racial composition of the students' undergraduate institutions.

Mean undergraduate GPA was 2.64 (standard deviation = .41); mean age was 28.02 (standard deviation = 5.96). The largest percentage of examinees in each profiled category was as follows: 78% graduated from predominantly white institutions (PWI's), 22% from historically black colleges and universities (HBCU's); 50% had been business majors; 87% were planning to earn MBA's; 27% had worked more than seven years; and 56% were female.

Students with higher GPA's had higher GMAT scores. Males had higher GMATQ and GMATT. Social and physical science majors had higher GMATQ and GMATT scores, humanities majors had higher GMATV scores, and business majors had lower GMATV scores than other majors.

Students from PWI's received higher GMATV, GMATQ, and GMATT scores than students from HBCU's. This finding is probably a result of student differences rather than of institutional differences, as PWI's generally require from applicants evidence of higher levels of academic ability (higher GPA's and admissions test scores) than do HBCU's. Also at PWI's, younger students had higher GMAT scores than older ones.

Students who used a commercial preparation book had higher GMAT scores than other students, but HBCU students who attended a formal coaching course had lower GMATV scores than other students. Determining why specific examinees chose specific preparation methods was impossible, as was controlling for amount or quality of preparation method. Hence, definitive conclusions regarding preparation methods cannot be offered.

HBCU students had higher GPA's and were more likely to have been undergraduate business majors. PWI students were more likely to have enrolled in coaching courses and to have been social science majors.

ACKNOWLEDGMENTS

TABLE OF CONTENTS

CHAPTER I

INTRODUCTION

The end of the 20th century in America has been characterized by changes in the nature of our economy, which has shifted from an industrial era to an information and service era. Moreover, continued technological advances have resulted in an unprecedented focus on economic competitiveness in a global environment (Davis, 1989).

From its very beginning, our country has recognized a direct connection between education and economic advancement. In view of the fast-paced and continuous changes in our highly competitive, global economy, education has been predicted to become an even more important component of American life than ever before. Leading educators and economists contend that an unprecedented proportion of our nation's citizens will need educational preparation beyond the high school diploma in order to prepare for the workplace of the future (Harvey, 1988).

In addition to changes in the nature of the economy, our nation is also experiencing significant changes in its ethnic make-up: the proportion of African-Americans and other minorities is constantly and significantly rising.

Just as America's African-American population is increasing, so is the percentage of African-American students who graduate from high school. However, the percentage of these students who earn college degrees has decreased. Underrepresented at the undergraduate level, African-Americans

constitute an even smaller percentage of students earning degrees at the graduate and professional school levels.

Addressing this underrepresentation, One-Third of a Nation (1988) cautions that a decrease in the level of educational achievement by any substantial population group is something to be particularly concerned about. The authors stress that this concern is even more serious when the decline comes at a time when technological advances and global competition demand a populace with more advanced skills, a higher degree of adaptability, and greater intellectual development than ever before.

Importance of the Graduate Management Admission Test

Graduate schools of business, which offer the highly respected Master of Business Administration (MBA) degree, prepare students to deal directly with the nation's economy through careers in business management. These institutions require that their applicants take the Graduate Management Admission Test (GMAT), an exam sponsored by the Graduate Management Admission Council (GMAC) and developed by Educational Testing Service (ETS). GMAT scores are used to predict performance of students in graduate schools of business (Byrne, 1992; Schrader, 1979).

Each year more than 250,000 students take the grueling, three and one-half hour GMAT in the hope that they will be able to enroll in a highly-respected graduate school of business and earn the MBA degree. Applicants who are accepted often give up lucrative jobs, only to pay out tens of thousands of dollars in tuition and fees for the privilege of earning the MBA. Persons who cannot afford to leave their jobs continue to work while going

to school (Byrne, 1991). But why is the MBA so important? Why are so many students willing to make such sacrifices in order to earn this degree?

One advantage of earning an MBA is that in the process, students often make important contacts that can lead to highly desirable employment upon graduation. However, management students who do not wish to leave the firms where they are employed can still build valuable networks that can lead to lucrative business deals in the future (Byrne, 1990; Byrne, 1991; Hotch, 1992; White, 1992).

Earning power has long been a strong motivator for persons seeking the MBA. New MBA's have reported doubling their salaries after having spent two years in programs at top-ranked business schools. Findings reported in Business Week's 1991 Guide to the Best Business Schools indicate that the average MBA could look forward to $52,000 a year in starting salary and bonus. On the other hand, graduates of top institutions could look forward to an average starting pay and bonus of nearly $78,000. Since the reputation of an MBA institution has a major impact on the income of its graduates, however, MBA's from less renowned institutions generally receive lower earnings (Byrne, 1990).

More than half the respondents in a 1986 survey of senior executives from major corporations stated that when merit and abilities are equal, MBA's get promoted faster than do people without this degree. Moreover, 78% of the executives stated that they would advise a son or daughter planning a career in business to earn an MBA. Only 17% stated that they would not make such a recommendation (Byrne, 1990).

Initially, the MBA degree was particularly important in the fields of banking and consulting. Today's turbulent economic environment, however, has brought a need for MBA's in many other areas. For instance, changing demographics throughout the entire world have brought about the need for MBA's skilled in managing amidst increasingly large amounts of diversity both in the workforce and in the clients served. Moreover, emerging opportunities in areas such as health management, environmental management, manufacturing, and international business bring increasing challenges and benefits for MBA's trained to meet management needs in these fields (Byrne, 1991; Hotch, 1992).

Description of the GMAT

Like the Scholastic Aptitude Test (SAT), the GMAT is a multiple choice exam divided into two categories -- verbal and quantitative. However, the two exams are quite different in terms of the difficulty levels of the questions. Unlike the SAT, which is designed for students who are about to have their first experiences as college students, the GMAT is designed for students about to enter graduate programs. Hence, GMAT questions have a deeper level of difficulty and a broader range of topics than do SAT questions.

The quantitative portion of the GMAT is divided into two problem-solving sections and a data sufficiency section. The verbal portion consists of a reading comprehension section, a critical reasoning section, and a sentence correction section. A seventh section of every GMAT consists of trial questions that are used only for pretesting and equating purposes. Trial questions are not identified as such, and examinees do not know which test

items are the trial questions. Answers to trial questions, of course, are not included in determining an examinee's score (Bulletin, 1992; Katzman, 1992).

A set of sample GMAT questions and their instructions, all taken from the 1992-93 edition of The Bulletin, can be found in Appendix A.

GMAT scores can range from a low of 200 to a high of 800. Examinees are not expected to receive scores of 800, and fewer than 10 of the more than 250,000 persons tested each year actually do; as a matter of fact, fewer than 200 reach the 700 mark. A score in the low 500's would place one in the 60th percentile, while a score of 600 would move a student up to the 89th percentile; a score of 475 is considered to be average. Top business schools generally look for scores around 600 or higher, but sometimes promising applicants with lower scores are accepted.

Purpose of the Study and Sources of Data

GMAT scores play a pivotal role for applicants hoping to earn the MBA; high GMAT scores are especially important for admission at most top-ranked institutions. However, African-American MBA applicants generally make lower scores on this exam than do their white counterparts. Hence, African-Americans are underrepresented in graduate schools of business and as MBA recipients. In view of this situation, the purpose of this investigation is twofold. One objective, which is purely descriptive in nature, is to develop a profile of characteristics common to African-American GMAT examinees. The other objective is an exploratory attempt to identify significant predictors of performance on the Graduate Management Admission Test for African-American examinees. Findings from this study

may serve as a guide for students who wish to pursue careers in business management and for counselors, advisors, and other persons who provide pertinent guidance and support for those students.

Relevant literature regarding the use of standardized admission tests in general as well as the GMAT provides a starting point in this investigation. Data from computer-scannable tapes containing the records of all GMAT test takers for the 1987-88 school year will be used in developing the profile of characteristics common to the African-American examinees in the study. These tapes will also provide data for variables to be used in this investigation.

Organization of the Study

Following a brief overview of the history of the use of standardized college admissions tests, Chapter II presents positions in favor of and against the use of these tests in general, as well as controversies concerning the use of the GMAT. Studies on the predictive validity of standardized college admissions tests in general and of the predictive validity of the GMAT are also highlighted. Finally, issues regarding the effects of coaching to improve standardized test scores are discussed.

Chapter III explains the research design and data analysis techniques used in conducting the investigation. Chapter IV contains the results obtained from the study, including a profile of characteristics common to the African-American GMAT examinee. Finally, Chapter V contains a summary and discussion of the investigation, and recommendations for future research.

CHAPTER II

REVIEW OF RELEVANT LITERATURE

Rationale for the Development of Standardized College Admissions Tests

Prior to 1926 potential college and university students were evaluated for admissions purposes by means of locally developed tests, most of which required students to write responses to essay questions. Students applying to different selective colleges were required to take admissions examinations specific to each institution. With the steady increase in the number of persons seeking a college education, institutions found themselves faced with more applications than they had the ability to accommodate. Therefore, more feasible ways of evaluating and responding to enrollment demands were needed (Whitney, 1989).

Institutional diversity was another source of concern for college admissions officers in the early 1900's. As the college and university movement continued to grow, college officials were faced with increasing diversity in the institutions from which applications were being received. Despite familiarity with major feeder schools for their own institutions and with nationally-recognized schools, persons making admissions decisions found their task becoming more and more difficult because differences in student backgrounds and in the institutions the applicants had attended made it increasingly difficult to compare applicant grades. Widely different academic standards meant that a given GPA from one institution did not necessarily reflect the same degree of academic achievement as the same GPA

from a different institution, or even from a different teacher or class at the same institution. Therefore, officials felt the need for a selection instrument that could be used to indicate on a common scale educational outcomes of applicants from various programs of study (Whitney, 1989).

In 1926 the College Entrance Examination Board (CEEB) introduced the test battery which is now known as the Scholastic Aptitude Test (SAT). The primary objective of the SAT was, and remains, to provide a standard measure of ability for colleges to use in making admissions decisions. Another goal was, and remains, to promote greater efficiency in handling increasingly larger numbers of applications (Braswell, 1992; Donlon, 1984; Haney, 1981). Hence, standardized college admissions tests have come to be known as a way to achieve accurate and equitable appraisal of the academic abilities of applicants from diverse programs and institutions. Accordingly, these instruments are promoted as a means of compensating for the diversity among the institutions by inhibiting grade inflation and by establishing consistency in evaluating students from different schools (Braswell, 1992; Donlon, 1984; Haney, 1981).

Controversies About the Use of Standardized College Admissions Tests

Since the development of the SAT, numerous other standardized selection tests have been developed. Like the SAT, the American College Test (ACT) is widely used for screening prospective undergraduates and for predicting student academic success in undergraduate school (Klitgaard, 1985). On the graduate and professional school levels, applicants must take standardized tests such as the Graduate Record Exam (GRE), the Law School

Admission Test (LSAT), the Graduate Management Admission Test, and the Medical College Admissions Test (Haney, 1981; White, 1985; Whitney 1989). Hence, on a scale admissions officials in the early 1900's might never have dreamed of, standardized tests continue to enable postsecondary officials to make selection decisions regarding increasingly larger numbers of potential students from increasingly varied backgrounds and institutions.

More recently, demands for accountability for tax dollars spent on education have led to a move to improve the quality of college graduates by screening out applicants perceived to be weak in the skills needed for college success. To this end, standardized tests have come to play a major role, especially at public institutions, which receive support from tax dollars. In order to enroll students most likely to maintain high grades and graduate, colleges and universities focus on selecting students who score at or above a designated level on standardized admissions tests (Collison, 1992).

While the practice of using standardized college admissions tests has a great deal of support, there is also quite a bit of opposition to the use of these instruments. Some opponents believe that the aim of education should be to educate all students to their maximum potential. These critics argue that the sorting of students according to test scores makes the use of the tests exclusive rather than inclusive and denies some students the opportunity to pursue maximum talent development through higher education.

Other critics argue that the value of standardized tests is not sufficient to justify their cost, including their trauma to students (Fisher & Resnick, 1990).

Crouse and Trusheim (1987) cite an investigation in which researchers examined the SAT scores of and admissions decisions regarding a cohort of 2,781 participants in a national longitudinal study of the class of 1972 (Crouse & Trusheim, 1987). Although SAT scores had been a factor in the admissions decisions regarding the students in the study, decisions on only 9.2% or 256 of the students would have been reversed if SAT scores had been eliminated from the admissions criteria. On the grounds that a 9.2% change is not enough to alter dramatically the character of a class, Crouse and Trusheim argue against the use of standardized test scores in admissions decisions.

Proposing greater diversity and parity, some critics of standardized admissions tests contend that students should be selected in such a way as to ensure proportionate representation among the various subgroups according to such characteristics as sex and race. Although this practice can be used to include capable students who otherwise might have been rejected, it can also be used to exclude in a manner that might not be anticipated, as illustrated below.

The University of California at Berkeley is one of the few institutions nationwide that spell out their goals for diversity. Emphasizing that general ranges rather than ceilings or floors are being targeted, the university proclaims that in the interest of diversity, the institution intends to enroll a given proportion of capable students such as minorities, athletes, and other individuals from underrepresented groups. In the process of reaching this goal, Berkeley can deny admission to white students or students from some subgroups, even though the denied students might have higher grades or ranking on some other variable. On the other hand, Asian-Americans have

complained about being denied admission at Berkeley despite the fact that they have higher rankings on grades or some other criteria than do many of the white students (or students from other subgroups) admitted (Collison, 1992).

In the former case, a "quota-like" system is used to include students who might otherwise have been rejected based on rankings; in the latter case, the same kind of system is used to reject students who might otherwise have been included based on rankings (Collison, 1992; Times Higher Education Supplement, 1990). Haney (1981) points out, however, that such quota-based approaches have been largely discounted in the professional literature.

Controversy about the use of standardized admissions tests is also present at the graduate school level. The American Assembly of Collegiate Schools of Business (AACSB) is an accreditation organization for schools of business. Former AACSB president Paul Grambsch contends that the use of GMAT scores in making admissions decisions is a factor in producing an unhealthy homogeneity among MBA students (Fisher & Resnick, 1990).

Degrees earned at the graduate and professional school level are required for entry into certain careers such as law or medicine. In other fields such as business management or business teaching, one might be able to get a start with an undergraduate degree, but a graduate degree is generally needed in order for one to attain higher positions and salaries (Byrne, 1991; de Gruyere, 1990). Because of the role admissions test scores play in determining which applicants are accepted for enrollment in graduate and professional schools, critics contend that these tests limit practice opportunities for persons who wish to pursue these careers, even though individuals denied

enrollment because of test scores might perform well in their chosen areas (Kaplan & Saccuzzo, 1989; Whitney, 1989). Hence, standardized admissions tests are criticized as being an unfair obstacle to professional practice (Nairn, 1980).

A major argument against the "gatekeeper" criticism just cited is based on the question of the correlation between admissions test scores and the effectiveness of the persons who practice the professions "guarded" by those scores. Test opponents argue that heavy reliance on cutoff scores could have a detrimental effect on the supply of competent persons available to pursue careers to which access must be gained through standardized test scores (Nairn, 1980). Along these lines, Astin (1971) states that colleges should seek to include rather than exclude. He adds that instead of relying heavily on admissions test scores, officials should base decisions on whether students learn and whether they acquire skills and knowledge that are valuable either to the students themselves or to society (Haney, 1981).

In a survey of more than 4,000 students who had already been accepted for study at graduate and professional schools, 55 percent of the respondents stated that they believed the admissions tests to be primarily an obstacle rather than a help to candidates. This position is similar to findings in Baird's 1977 study in which 96 percent of African-American professional school students expressed the belief that standardized tests are biased against African-Americans and other minorities (Haney, 1981).

Cameron (1989) suggests that the conflict between merit and democracy, two prevalent but different points of view regarding opportunity in America, is a major reason for the controversy regarding the use of

standardized admissions tests. Supporters of the meritocratic philosophy contend that the "best and brightest" should be selected for admission to college. Convinced that standardized tests correctly differentiate among applicants, proponents of this position believe that it is the examinees with the highest admissions test scores who should be allowed to enroll (Cameron, 1989; Collison, 1988). In contrast, persons who champion the democratic belief in equal opportunity for all assert that educational access should be available for everyone, and not reserved for just the wealthy or the "privileged class". Accordingly, proponents of this position contend that all persons should have an opportunity to make for themselves a better life through higher education (Cameron, 1989).

Counter to America's basic tenet that all persons are created equal and that they are entitled to equal opportunities for advancement, standardized tests are designed to point out differences. Moreover, differences pointed out are measured in such desirable attributes as intelligence and aptitude. These differences are often interpreted to mean that people are not created with the same basic abilities, and this interpretation is made even more controversial and divisive by differences in performance among certain ethnic groups (Kaplan & Saccuzzo, 1989; Times Higher Education Supplement, 1990).

Differences in performance among subgroups is at the heart of a great deal of debate concerning the use of standardized test scores in the college admissions process. Generally, white examinees receive higher scores than African-American examinees. Opponents argue that using these instruments in selection is unfair to minority students and low income

white students because the tests reflect the culture and values of middle class whites (Cameron, 1989).

IQ test results are an example of ethnic differences in scores on standardized tests. Black Americans generally score 15 points, or approximately one standard deviation, lower than white Americans on these instruments. Of course, there are whites whose scores are as low as the lowest scores received by African-Americans, and there are African-Americans whose scores are as high as the highest scores received by whites. However, only 15% to 20% of African-American examinees score above the white mean and only about 15% to 20% of whites score below the African-American mean (Kaplan & Saccuzzo, 1989).

Although the figures on standardized test score differences between African-American examinees and white examinees are indisputable, there is disagreement about reasons for the differences. Some argue that the score differences are a result of biological factors. Shockley and Jensen are widely known for their contention that white students do better on standardized tests because of genetic or biological differences. Supporters of this position state that African-Americans are intellectually inferior to whites and that little can be done to equalize the performance between the two groups (Cole & Moss in Linn, 1989; Jensen in Haney, 1981; Kaplan & Saccuzzo, 1989).

In contrast to the biological and genetic position, Hopkins, Stanley and Hopkins (1990) state that research regarding the relation between genetic factors and intelligence within the Afro-American population is quite limited. Moreover, other theorists state that group differences result not from biological factors, but from differences in the social environment.

Supporters of this point of view contend that greater efforts to wipe out societal inequalities, particularly regarding access to quality education, are needed to improve the performance of African-Americans on standardized tests (Bond, 1982; Kaplan & Saccuzzo, 1989).

Brazziel (1988), Hopkins, Stanley and Hopkins (1990), and Kaplan and Saccuzzo (1989) address this genetic/environmental controversy by citing the compelling 1976 Scarr and Weinberg study on differences in the scores of African-American and white examinees on standardized tests. The purpose of the study was to examine the effects of cross-racial adoption on the IQ scores of African-American children (Brazziel, 1988; Kaplan & Saccuzzo, 1989).

The subjects in the Scarr and Weinberg study were 130 African-American or interracial infants who had been adopted by 101 advantaged white families in Minnesota. The biological mothers of the adopted children had achieved 10.8 years of education, one year less than African-American females in general in their age group (25-44). Otherwise, the biological parents of the children were indistinguishable educationally from their cohorts of the same age in the general population (Brazziel, 1988; Kaplan & Saccuzzo, 1989).

The Weschler Intelligence Scale for Children (WISC) was administered to the adoptees when they ranged in age from four to seven. The mean IQ score for these children was 106. The mean for African-American children raised in the same geographical area was only 90, 16 points lower than the 106 mean. Moreover, the 106 mean was 21 points above the national average of 85 for African-American children and 6 points above the national average of

100 for white children. Similar results were seen on achievement and aptitude tests the adoptees took in school (Brazziel, 1988; Kaplan & Saccuzzo, 1989).

Another interesting and enlightening aspect of the Scarr and Weinberg study is the finding that the children who were adopted at the youngest ages had the highest test scores. Moreover, similar test acumen was found in studies of non-adopted children in African-American middle-class families (Brazziel, 1988).

Obviously, the results of the Scarr and Weinberg study are quite inconsistent with the position of those who contend that differences between IQ scores of African-American and white children are the result of genetic differences between the two races. Accordingly, it is not surprising that the nurture, or social-environment, position appears to have more support than the nature, or genetic, position (Brazziel, 1988; Kaplan & Saccuzzo, 1989).

From a perspective consistent with the Scarr and Weinberg findings, Brazziel (1988) emphasizes the relationship between language development and early development of thinking skills. He points out that the strongest correlation between the development of academic skills and test acumen in children at an early age is early attention from and teaching by educated adults, a factor strongly influenced by environment (Brazziel, 1988).

The high degree of correlation among standardized achievement tests has been cited as another reason for the differences in the scores of African-American and white students on standardized tests. Although IQ tests and college admissions tests such as the SAT and the GRE are classified as aptitude tests designed to measure some inborn trait that is unlikely to

change despite one's environment, experts generally agree that such tests actually measure achievement (Kaplan & Saccuzzo, 1989). In over half the achievement tests on the market, correlation with other achievement tests is identified as the the only method for satisfying the requirements for predictive validity (Brazziel, 1988). Considering this fact, along with family socio-economic status and other factors that impact on standardized test scores, one might expect that students who generally receive the highest scores on IQ tests -- middle class white students -- are also likely to score highest on the SAT and other college admissions tests. Hence, it is not surprising to note that this is the case (Brazziel, 1988; Hopkins, Stanley & Hopkins, 1990).

Even the scoring patterns of African-Americans and whites differ on standardized admissions tests. For instance, white students tend to make similar scores on both the verbal and the quantitative sections of the SAT. On the other hand, African-American students tend to score higher on the verbal section than on the quantitative section of the exam (Brazziel, 1988; Kaplan & Saccuzzo, 1989). Goldman has proposed the differential process theory to explain this difference in scoring patterns (Kaplan & Saccuzzo, 1989).

Goldman's differential process theory maintains that African-American students place greater focus on developing their verbal skills than on developing their quantitative skills. Another aspect of this theory asserts that African-American students have fewer opportunities to learn the quantitative skills that lead to higher quantitative SAT scores. Supporters of this point of view have suggested that students who intend to major in fields

that require strong verbal rather than quantitative skills be given admissions tests that highlight verbal skills while deemphasizing quantitative skills (Kaplan & Saccuzzo, 1989). In fact, this suggestion is somewhat similar to actual practice in some institutions, which do consider individual scores on separate parts of standardized tests as opposed to relying heavily on overall admissions test scores (Byrne, 1991).

Brazziel (1988) and Oakes (1986) contend that unequal educational opportunities, particularly in the form of curriculum differences, are major reasons for the differences in college admissions test scores of African-American and white students. For instance, Brazziel (1988) states that the tracking system has long been a crucial element in the kinds of curriculum presented to students, for it is tracking that determines whether children will be placed in general, vocational, or college preparatory curricula. Moreover, Brazziel and Oakes contend that the policy of tracking African-American students in non-college preparatory classes from elementary school through high school has a crucial effect on the scores African-American students ultimately make on standardized college admissions tests.

Citing the role of early educational experiences in the tracking process, Brazziel (1988) states that on the whole, African-American children do not have the same advantage of early and enriched educational experiences enjoyed by children from middle class white families. This situation, contends Brazziel, is a major reason why African-American children make lower scores on standardized tests given as far down in elementary school as kindergarten. Based on these scores, African-American children are placed, and usually kept, on general or vocational education tracks and away from

college preparatory tracks. Thus steered away from a curriculum that would help prepare them for college, these students do not receive the kinds of instruction and experiences that generally lead to high scores on the SAT and similar tests. Rather, standardized test scores made by such students are lower than those made by students who have gone through school in college preparatory classes -- generally middle class whites (Brazziel, 1988).

To compare curriculum offerings in general classes, college preparatory classes, and vocational classes, Oakes (1986) attended a number of classes in all three categories. She found that in college preparatory classes students spent much of their time reading works from Shakespeare, Keats, and Browning; writing and receiving feedback on weekly theme papers; completing SAT preparation activities on computers; and studying reports and papers from college freshman classes in English. In general English classes, students spent a great deal of their time completing drills and exercises in workbooks, learning how to fill out job applications, discussing such topics as current events and popular teen music, and reading books about adventures and youth life.

These contrasts effectively illustrate reasons why college preparatory students are better prepared to make high scores on standardized admissions tests than are students enrolled in general and vocational curricula. The curriculum gap between college preparatory classes and vocational classes, reports Oakes (1988), was even wider.

Recalling experiences he encountered while masquerading as a high school senior in a large public school in Stratford, Connecticut, Owen (1985) provides further details of the head start college preparation students have

over other students in building a strong foundation for success on standardized tests. At the school in Stratford, SAT preparation courses were a common part of the curriculum. In Owen's English class, the majority of the course work consisted of memorizing lists of vocabulary words. Students also learned how to interpret accurately and answer multiple choice questions similar to those found on the antonyms, analogies, and sentence completion sections of the verbal part of the SAT.

According to Owen (1985), nearly one-third of the high schools in seven northeastern states indicated that they also offer special preparatory programs for the verbal SAT, and that students can earn credit toward high school graduation by taking such classes. Students not enrolled in college preparatory curricula, however, generally have no access to such courses in school (Owen, 1985; White 1985).

Data from High School and Beyond, the U.S. Department of Education's longitudinal study of 1982 high school graduates, also highlight the college preparatory gap between African-American students and white students. Study results indicate that only 36 percent of the African-American high school graduates who had taken the SAT and ACT that year had pursued college preparatory curricula. On the other hand, nearly half the white students who took the ACT and SAT that year had been enrolled in college preparatory courses. According to 1985 CEEB data, African-American students enrolled in college preparatory curricula received combined SAT scores that were 124 points higher than those received by African-American students enrolled in general education curricula. Blacks enrolled in vocational curricula were even farther behind (Oakes, 1986).

The July 7, 1990 edition of the <u>Times Higher Education Supplement</u> clearly illustrates the relation between high school curriculum and a student's ability to meet college admissions standards. According to this publication, since the California school system instituted more demanding course requirements for high school students, the percentage of students meeting the state's college requirements rose from 25.4% in 1984 to 30.6% in 1989. Moreover, in contrast to trends across the country, the percentage of African-American students who meet the requirements in California continues to rise at a rate even faster than the rate for the overall population of California students.

While an understanding of high school curriculum differences provides insight regarding reasons for differences in performance of African-Americans and Caucasians on standardized college admissions tests, questions have arisen regarding differential prediction of test scores according to race (Haney, 1981; Nairn, 1980). Some theorists have suggested that while standardized admissions tests may be accurate in predicting performance for whites, these instruments do not predict accurately for African-Americans. However, regression studies have been conducted to address the issue of differential predictive validity of the SAT but empirical data from these studies have not supported the differential prediction theory. Rather, the SAT has been found to predict equally well for both African-Americans and Caucasians (Bond, 1982; Cole, 1981; Hopkins, Stanley & Hopkins, 1990).

Even on standardized admissions tests for graduate school, African-American students generally make lower scores than do Caucasian students. Heubert (1991) identifies inequities on the college level as major factors in

this situation. Referring to the historic Supreme Court decision which ordered Mississippi's public university system to admit African-American students to formerly all-white institutions, Heubert (1991) has declared that "The fight for desegregation fought by James Meredith in Mississippi is not over."

Heubert (1991) explains that during the segregation era Mississippi instituted American College Test (ACT) score requirements designed to prevent 71 per cent of the state's African-American high school graduates from being eligible for admission at Mississippi's five historically white public colleges and universities. Admissions decisions in the state are still based on those requirements. Moreover, the three state universities once reserved by law for African-American students only remain grossly inferior to the five white institutions.

Comparisons of facilities, per-student expenditures and other appropriations, faculty training, and the number and quality of academic programs reveal continued inequalities in Mississippi's system of public higher education. For instance, in 1986 black colleges in Mississippi operated 31 master's programs and one doctoral program; the five white institutions operated 162 master's programs and 56 doctoral programs. Per-student expenditures were 41 per cent higher at the white institutions than at the black institutions (Heubert, 1991).

Data indicate that during 1987 all 22 senior administrative officers and over 97 per cent of the faculty at Mississippi's five historically white institutions were white. At the three historically black universities nine of ten senior administrators were African-American and fewer than one-third

of the faculty members were white. Over 99 per cent of white undergraduates attended the five institutions once reserved by law for white students only, and at the state's flagship institution, the University of Mississippi, only 5.9 per cent of the students were African-American. Yet, African-Americans constituted nearly 40 per cent of the state's total population and 30 per cent of its college students. The three black institutions still educate 71 percent of the state's African-American undergraduates (Heubert, 1991).

Mississippi's operation of "branch centers" provides additional, and perhaps startling, evidence of the inferior quality of education offered at the state's historically black public colleges and universities. A component of the state system of colleges and universities, branch centers are located near black campuses but run by white institutions so that white students can attend college locally without having to enroll at black institutions (Heubert, 1991).

Ethical Conceptions of Fairness in the Selection of College Applicants

Educational inequities such as those described above, along with the consistent pattern of scoring differences between African-American and white examinees, have led many to denounce standardized admissions tests on the grounds that such instruments are biased against African-Americans. However, Kaplan and Saccuzzo (1989) contend that the consistent pattern of score differences between African-Americans and whites is often the result not of test bias but rather of long-term social and/or educational inequities that need to be corrected. In support of the Kaplan and Sacuzzo position, Cole and Moss (1989) caution that test bias is a complex, technical concept that is tied closely to validity and quite difficult to define. Moreover, Cole and

Moss contend that "...the nature of the public debates about bias and test use also require an understanding of the broader concerns of social justice and the appropriateness of test use for groups affected by testing" (Cole & Moss in Linn, 1989).

Beyond technical definitions and consistent with the social justice position advocated by Cole and Moss, the concept of bias has been defined in terms of moral and ethical points of view. When used in this context, bias refers to a perceived lack of fairness. In light of the major issue at the heart of this investigation -- the small percentage of African-American applicants selected for admission at graduate schools of business -- it is this unfairness concept of bias that will now be addressed.

Ethical models such as quotas, unqualified individualism, and qualified individualism have been proposed as a way of addressing bias in the use of standardized selection tests. Procedures for using quotas in the selection process take into account the proportion of various subgroups within a given population. On the other hand, unqualified individualism focuses on criterion performance, while qualified individualism focuses on accuracy of prediction, particularly in terms of lower scoring groups (Kaplan & Saccuzzo, 1989).

In a selection process based on a quota system, admissions tests play a less prominent role than they do under other systems. A quota system selects individuals from a given subgroup based on the proportion of the total population that subgroup represents (Kaplan & Saccuzzo, 1989; Whitney, 1989).

To promote high performance, a quota system can be based on separate regression equations for each subgroup in order to select from each group the persons making the highest qualifying test scores. Under this type of quota system, if the population of African-Americans in a state were 15%, then 15% of the students selected for enrollment at, perhaps, a graduate school of business would be African-American, particularly if the institution were supported by public funds. The 15% selected would be those African-American students who had made the highest scores among African-American test takers on the selection test. Applicants from other subgroups would also be selected based on the proportion of their subgroup(s) in the state population. Hence, race (or whatever variable is selected) would play a major role in a selection process based on quotas (Kaplan & Saccuzzo, 1989; Thorndike, 1971; Whitney, 1989)).

Opponents criticize the use of quotas because under this system, persons with higher scores from some groups are rejected in favor of lower scoring individuals from groups which need more members selected in order to have adequate proportional representation. Another criticism is that this selection approach results in lower criterion performance and increases the chances that some of those selected will fail on the criterion. Nevertheless, proponents support the system because the practice of selecting members of different subgroups in proportion to their representation in the population results in greater representation from the lower scoring groups. Moreover, a quota system does select persons who would be successful on the criterion; additionally, this approach helps to compensate somewhat for the effects of past discrimination (Kaplan & Saccuzzo, 1989; Whitney, 1989).

Unqualified individualists assert that college admissions tests should be used to select *the most qualified* individuals for enrollment. This approach assumes that the individuals who receive the highest scores on the selection tests are the most qualified and, therefore, should be selected. Hence, unqualified individualism places a great deal of importance on qualifying test scores. "Selective" institutions that wish to keep the admissions scores of their students at a high level and that are not concerned with increasing the level of campus diversity are likely to prefer the unqualified individualism model. Students selected according to this model perform higher on the criterion -- often first year grade point average -- than do other applicants (Peller, 1991; Whitney 1989).

At first glance, unqualified individualism might appear to be the fairest procedure, since this technique selects only the candidates with the highest test scores. However, critics argue that this approach is unfair in that it eliminates from selection persons, often minorities, who would have been successful on the criterion, but whose qualifying test scores were below a particular cutoff point. Accordingly, such persons are not given the opportunity to be successful (Kaplan & Saccuzzo, 1989).

While unqualified individualism tends to eliminate more minority students from selection than do other approaches, unqualified individualists contend that race or gender should have no role in the selection process unless race or gender is a valid predictor of performance over and above the information in the test. Therefore, supporters of this approach do not see the effect that this system has on the percentage of minorities (or other

subgroups) selected as a deterrent to using the system (Kaplan & Saccuzzo, 1989; Peller, 1991).

Accuracy of prediction is an important concern to persons who oppose unqualified individualism, since unqualified individualism eliminates from selection persons who would be successful on the criterion. The qualified individualism approach to selection attempts to remedy this situation (Kaplan & Saccuzzo, 1989).

Qualified individualists contend that information about race, sex, or other group characteristics should be used in the selection process if the information helps to predict more accurately criterion performance of the lower scoring group. Under qualified individualism, if a member of the higher scoring group and a member of the lower scoring group receive the same score, the member of the lower scoring group would have a slight advantage. In such situations, minority students would have a slight advantage over majority students, since majority students generally score higher than minority students on standardized admissions tests (Kaplan & Saccuzzo, 1989).

Like the two ethical approaches to selection already discussed, qualified individualism has both supporters and critics. Opponents of qualified individualism protest the fact that the system selects some minority students with lower scores over some majority students with higher scores. Additionally, critics contend that under qualified individualism, group performance on the criterion is lower than it is under the system of unqualified individualism. Another complaint is that qualified individualism can lead to underprediction of the performance of the

majority group and overprediction of the performance of the minority group. Acknowledging these points, qualified individualists maintain that their approach still is fair because it better reflects the potential of the lower scoring group; moreover, supporters state that qualified individualism may help to counteract effects of past discrimination, since this approach does lead to some increase in the number of minority group members selected (Kaplan & Saccuzzo, 1989; Peller, 1991).

In accordance with the concept of fairness, Cole and Moss (1989) have proposed that institutions include utilities or values in their selection models in order to promote a quantifiable and agreed upon weight to specific, desired outcomes. This procedure would spell out whether the institution making the selection decision desires to adjust for underrepresentation of certain group members by increasing the percentage of those group members selected. For example, an institution might openly promote its intention to increase the representation of females or minorities by a given number or percentage. With values clearly identified in this manner, these considerations would be as much a part of the selection factors as objectively measured criterion performance (Cole & Moss, 1989). This idea is consistent with the selection procedure at Berkeley, cited earlier in this chapter. At Berkeley, target floors or ceilings are identified to serve as a guide in the institution's efforts to assure a diverse student population. The institution emphasizes that such specifications are actually targets or goals rather than fixed quotas (Collison, 1992).

The Predictive Validity of Standardized Graduate and Professional School College Admissions Tests

Many of the controversial issues on standardized tests cited throughout this chapter can apply to instruments used at both undergraduate and graduate levels; however, a relatively small percentage of the controversy has focused on issues unique to graduate students; nevertheless, concerns have been expressed about the predictive validity of standardized admissions tests used in the selection of applicants to graduate and professional schools. Questioning the ability of these instruments to predict how competent a professional an examinee will ultimately become, critics contend that heavy reliance on standardized graduate school admissions test scores might actually weed out candidates who have the potential to be better, more skilled professionals than those persons who are admitted (Kaplan & Saccuzzo, 1989). This contention is based on the fact that despite a correlation between qualifying test scores and their criterion scores, there is not necessarily a correlation between qualifying test scores and ultimate career success. Controversy about the use of Medical College Admission Test (MCAT) scores can help to illustrate this point.

Traditionally, MCAT scores have played a major role in the selection process for admission to medical school. Research indicates that although the test predicts performance in medical school, it does not predict who will be a successful doctor (Loughmiller et al., 1970 in Kaplan & Saccuzzo, 1989). For example, in a study of 217 physicians practicing in Utah, 76 measures of doctor performance were examined. Over 1000 correlations between grades and doctor performance were studied, but over 97% were nearly 0. The

results of these studies failed to indicate a clear connection between medical school grades or tests and success as a doctor (Kaplan & Saccuzzo, 1989).

Paralleling the MCAT, the Law School Admission Test (LSAT) is required for admission to law school. However, while LSAT scores are used to predict performance in law school, there is little evidence that the LSAT predicts who will become a successful attorney (Kaplan & Saccuzzo, 1989).

Accuracy in predicting professional competence notwithstanding, the use of standardized admissions tests for predicting student performance in graduate school is also a source of concern. In the case of students pursuing the MBA degree, GMAT scores are used for this purpose; accordingly, such scores can have a considerable impact on selection decisions. However, critics have questioned the predictive validity of this exam, and studies have been conducted to address this concern (Fisher & Resnick, 1990).

Baird

In one of the earlier studies on the predictive validity of graduate school admissions tests, Baird (1975) examined the validity of predictors of academic performance in six postgraduate fields, including business. The role of student characteristics such as background, educational history, and self-conception was also included as a part of Baird's study. In all, 31 predictor variables were included in the study; the dependent variable was first year graduate school grades.

Baird's study sample was taken from a pool of 7,734 seniors in 94 colleges across the United States. These students had responded to a College Senior Survey that had been administered during the spring of 1971. The

purpose of the survey was to gather biographical, attitudinal, personal, and educational information about the students.

In the spring of the following year, respondents to the initial survey were asked to provide follow-up information. Only students who had submitted complete data for both the initial survey and the follow-up questions were included in the study. All subjects in the sample had taken standardized graduate school admissions tests, and scores made on those tests were included as independent variables in the study. Minority students were slightly underrepresented in the sample but otherwise the sample was representative of college students throughout the nation.

Stepwise multiple regression analysis was used to identify the factors most strongly correlated with first year graduate school grades. Findings indicated that admissions tests for graduate study in business had higher predictive validity than did admissions tests in other areas, especially medicine. However, undergraduate grades were slightly better predictors than admissions test scores. Moreover, overall undergraduate grade point average (GPA) was a more valid predictor of first year graduate school GPA than were grades in major field courses.

Even though the undergraduate GPA was the best predictor of all, the predictive power of this variable was somewhat limited. The wide variety of institutions involved in the study might have influenced this result. This variety might also have lowered the size of the correlations of other variables with first year graduate grade point average.

Self confidence was also found to be related to student grades. Students with higher levels of self confidence in their own ability to handle

academic demands made higher grades than did students with lower levels of self confidence. There was little relation between sex and grades.

Although the undergraduate GPA and the score on the admission test to the graduate school of business were statistically significant, all of the variables together that entered the equation explained only about 16% of the variance in graduate school of business grades.

Deckro and Woundenberg

In another of the earlier studies on the predictive validity of graduate school of business admissions tests, Deckro and Woundenberg (1977) evaluated the validity of currently-used and proposed admissions criteria as predictors of academic performance among MBA students at Kent State University (KSU). During the period in which this investigation was carried out, minimum admissions criteria required at least a 2.5 GPA (4.0 = A), a minimum GMAT score of 480, and letters of recommendation regarding the applicant's academic and/or professional achievement. The university did allow for exceptions with regard to racial minorities, women, veterans, and applicants with substantial professional experience.

Although program requirements at a given school can change, there were no such changes at KSU for MBA students during the period beginning with the fall quarter of 1973 and ending with the winter quarter of 1975. To ensure that only students with common program requirements were included in the sample, only the 157 students who initially enrolled in the MBA program during this period were subjects in the study.

Of the students in the sample, 11.5% were female and 8.9% were African-American or Spanish-surnamed. 95% of the sample attended school on a part-time basis. By the end of the period of study, 83.4% of the MBA candidates had been successful and 16.6% had been unsuccessful; however, all 157 students in the sample were included in the statistical analysis.

Variables in the study were as follows: Total GMAT score, undergraduate grade point average (UGPA), junior-senior year grade point average (JSGPA), age, minority, sex, part-time/full-time (part-time was defined as enrolled in 6 hours or less per quarter), and hours required in major. Because of the increasing numbers of African-American, Spanish-surname, and women students in the program, the variables minority and sex were included in the investigation as a means of establishing the relevance of those criteria to the success of students who were members of those subgroups.

The first variable entering the regression equation was the total admission exam score. Hence, unlike Baird, Deckro and Woundenberg found that total GMAT score has a greater relation to graduate school grade point average (GGPA) than do any of the other variables. Accordingly, the total GMAT score was identified as the most significant single criterion for admission.

The sex variable also had a positive regression coefficient in this study. This result suggests that females, as a group, do achieve higher graduate grade point averages than males. Deckro and Woundenberg explained this finding by suggesting that since females had not traditionally pursued the field of business administration, the women who did enter this field may

have been extremely highly motivated and may have achieved higher grades as a result of this increased level of motivation. However, because the size of the female grouping was quite small, extreme caution should be observed in interpreting this finding, as further study on this topic is needed.

The highest R-square obtained for any of the variables in the Deckro and Woundenberg study was only .1453; therefore, a large amount of variance remained unexplained. Accordingly, Deckro and Woundenberg asserted that admissions officials should not rely solely on standardized formulas for predicting academic success. Instead, Deckro and Woundenberg recommend individual evaluation of applicants, including personal interviews where possible, especially in the case of marginal applicants.

Paolillo

Paolillo (1982) also studied the relation between admission test scores and graduate school performance. Paolillo's study examined the predictive validity of MBA program admissions criteria, including GMAT scores. He also sought to discuss non-quantitative admissions measures that could predict criterion performance. Paolillo's eleven predictor variables included GMAT total score, whether the student was enrolled on a full-time or part-time basis, and JSGPA. His criterion variable was the first year graduate school grade point average (GGPA).

Paolillo's sample consisted of 220 persons who had earned MBA degrees from a medium-sized university during the 1978-1981 time period. As program applicants, some of the study sample had met the program's

minimum admission requirements, while others had been accepted into the graduate program on a conditional basis.

In his analysis Paolillo also determined the zero-order Pearson product-moment correlation coefficients between each predictor variable and its criterion variable. Additionally, he conducted a stepwise linear regression analysis to determine which predictor variables had the highest degree of association with the criterion variable.

Similar to Baird's (1975) findings and contrary to those of Deckro and Woundenberg (1977), Paolillo (1982) reported that the GMAT score was not the first variable to enter the regression equation. Rather, UGPA was found to have a higher correlation with GGPA than did GMAT score. UGPA accounted for more than half the variance explained by the full regression equation.

GMAT score was the second variable to enter Paolillo's regression equation, while whether the student was full-time or part-time was the third. Hence, all three of these predictor variables showed a significant correlation with GGPA. Together, these three variables accounted for about 19% of the variance in the criterion variable.

In both the Pearson product-moment correlation and the stepwise linear regression analysis, UGPA, GMAT score, and attendance were identified, in that sequence, as the variables with the highest degree of correlation with GGPA. The other variables in the study had no significant level of correlation in either statistical analysis.

The fact that Paolillo's study used UGPA for only the junior and senior years, while similar studies have used overall UGPA has been suggested as a

major reason that Paolillo's study indicated UGPA to be a more effective predictor of GGPA for the MBA students than GMAT score. Institutional diversity could also be a factor, since a given GPA at one institution is not necessarily equivalent to the same GPA at another institution.

Fisher and Resnick

More recently, Fisher and Resnick (1990) investigated the correlation of GMAT scores, along with other variables, with GGPA of MBA students. The subjects in the Fisher and Resnick study were MBA students selected from a large and diverse group of applicants who comprised the Fall 1986 entering cohort of MBA students at Baruch College, a large, urban public college offering degrees in liberal arts, education, and business. The purpose of the study was to determine the degree to which factors used in Baruch College's MBA admissions decisions correlate with GGPA of Baruch's MBA students.

Variables included in the study were as follows:

DOA	(acceptance date)	GMATV	(GMAT verbal percentile)
LAPSE	(amount of time since graduation from college)	GMATQ	(GMAT quantitative percentile)
		GMAT	(GMAT score total)
JSGPA	(junior/senior grade point average)	UGPA	(overall undergraduate grade point average)
		GGPA	(first year graduate grade point average)
SEX		AGE	

The dataset for the Fisher and Resnick study included the 530 students admitted to Baruch's MBA program during the fall of the 1986-87 school year. Multiple regression was used to determine the degree of correlation between these variables and GGPA.

For UGPA, GMAT, GMATV, and GMATQ, there was a significant individual relationship with FYGGPA. GMAT was the best single predictor of all. However, GMATV was a better overall predictor of GGPA than was GMATQ.

When considering the various combinations of all the study variables in the multiple regression, Fisher and Resnick found that the best overall predictor was UGPA plus GMAT, providing a correlation of .2748 with GGPA. This correlation was stronger than that of any of the various other combinations.

Graham

Since the Fisher and Resnick (1990) study, Graham (1991) has also investigated the issue of the predictive validity of standardized admissions tests used by graduate schools of business. The university from which Graham's sample was selected permits applicants to use either the GMAT or the Miller Analogies Test (MAT) for admissions purposes. Therefore, Graham examined both GMAT scores and MAT scores as variables in his study.

Graham's sample consisted of 203 recent graduates from a graduate school of business. There were 165 white students and 38 minorities. 138 of the students were males and 65 were females.

MAT students were an average of two years older than GMAT students -- 32.5 and 30.4 years old, respectively. 82 students had submitted GMAT scores, and 121 had submitted MAT scores. 86% of the students taking the MAT were white, while only 74% taking the GMAT were white. Hence, the GMAT sample contained a higher percentage of minority students than did the MAT sample.

The following student characteristics were included among the ten independent variables in the study: age, ethnic status, sex, GMAT score, MAT score, and type of undergraduate degree (bachelor of science vs. bachelor of arts). The dependent variable was GGPA.

Two random samples, one consisting of 30 MAT students and one consisting of 30 GMAT students, were selected for statistical analysis. For each of the predictor variables a bivariate linear regression model was constructed. Additionally, a stepwise linear regression model was computed for GMAT students and another for MAT students.

Findings from the bivariate linear regression model for GMAT students indicated that the correlation coefficient between GMAT score and GGPA was much higher than the correlation coefficient for any other variable with GGPA. Hence, the GMAT score was found to be the best predictor of GGPA.

Consistent with the results of the bivariate linear regression model, Graham's stepwise linear regression results also indicated that total GMAT score was the best predictor of GGPA. In fact, total GMAT score was the only variable significant at the .05 level (R-square = .1677). This score accounts for

half the variance explained by the regression equation; the R-square for all the variables together was .3055.

In the regression for the MAT students, MAT score was also statistically significant, but the R-square was only .0797. However, UGPA, with an R-square of .1598, was a better predictor of GGPA than the MAT score. Interestingly, race, with an R-square of .1816, was the best predictor of all.

The weak relationship Graham found between MAT score and GGPA suggests that the GMAT is a better predictor of an MBA student's GGPA than is the MAT. However, since all the variables taken together account for a small part of the total variance (30.55% for GMAT students and 49.20% for MAT students), Graham adds that there is a great deal of latitude for considering qualitative assessments of a student's potential through such vehicles as essays, interviews, and work experience.

GMAC Validity Study Service

Like individual researchers, the GMAC has also addressed the issue of the GMAT's predictive validity. Accordingly, the GMAC Validity Study Service (VSS) was developed to enable graduate schools of management to evaluate the adequacy of GMAT scores, as well as other devices and procedures these institutions use for selection purposes. This service was initiated as a pilot study during the 1977-78 academic school year, when 10 graduate management schools participated. Since that time, the VSS has been fully operational, although for the 1978-79 academic year, only GMAC member schools were invited to participate. During the 1979-80 school year,

all graduate management schools that <u>required</u> GMAT scores in the application process were also invited to participate; during the 1980-81 school year, all schools that <u>used</u> GMAT scores in the selection process were invited to participate (Hecht & Powers, 1982).

All VSS participating institutions must send to VSS information on verbal and quantitative GMAT scores and UGPA. This information is used as predictor variables for the studies. Also required is information on student performance on the criterion variable - first year graduate grade point average in management school. Additionally, any institution that wishes can have a separate analysis done on other variables used in its selection process (Hecht & Powers, 1982).

Each participating VSS institution receives an individualized report containing descriptive statistics for each predictor and each criterion for which information was provided. Reports are sent both on the institution as a whole and on each subgroup the institution has specified (Hecht & Powers, 1982).

In the VSS summary covering the school years from 1978-79 through 1980-81, 85 studies were summarized. For each institution involved in the studies, GMAT scores and first year graduate grade point averages were analyzed. Samples for the various institutions ranged in size from 58 to 543. The mean sample size was 175. Mean GMAT-V scores for the various institutions ranged between 14.9 and 38.4, with a GMAT-V standard deviation range from 4.9 to 8.8. Mean GMAT-Q scores ranged from 15.1 to 37.8, with a GMAT-Q standard deviation range of 4.9 to 8.2 (Hecht & Powers, 1982).

For the entire three-year period, the mean GMAT-V for all examinees was 26, with a mean GMAT-V standard deviation of 9. The mean GMAT-Q score was 27, with a mean GMAT-Q standard deviation of 8. Mean first year average for the 78 participating schools using a 0-4 grading system ranged from 2.25 to 3.66; 73 of the 78 means were above 3.00. This lack of variability among the schools is likely to have resulted from some degree of institutional selection or candidate self-selection. The resulting restriction of range probably indicates an underestimation of the predictive validity of the preadmission variables studied (Hecht & Powers, 1982).

Simple correlations between GGPA and each predictor variable were developed for each institution. Multiple correlations between first year average and two combinations of predictors were also developed. Study results from correlational analyses performed for each individual school indicated considerable school-to-school variability. Institutional diversity is likely to account for some of this variability. Accordingly, degree of selectivity, relative weights given to various predictors in making selection decisions, or even the type of curriculum offered could have been contributing factors. The size of the sample on which a given correlation is based should also be considered in interpreting findings, as smaller sample sizes and larger numbers of variables require larger correlation coefficients to obtain statistical significance (Hecht & Powers, 1982).

For the simple correlations of UGPA, GMATV, and GMATQ, the median coefficients with student first year GGPA's were .24, .25, and .30 respectively. The ranges of correlations with GGPA for the three variables were .05 to .45, .04 to .42, and .03 to .53, respectively. For the combination of

GMATV and GMATQ scores with GGPA and the combination of the three predictors with GGPA, the median multiple correlations were .35 and .44, with ranges from .07 to .55 and .21 to .63. The median multiple correlation of .44 for the three predictors in combination was significantly higher than the median correlation for either UGPA alone (.24) or for the combination of GMAT scores.

Based on the study results, researchers have concluded that the GMAT score is statistically one of the most important predictor variables in assessing graduate school success, as measured by graduate grade point average. Although some disagreement remains over whether the best predictor of first year graduate grade point average is GMAT scores or UGPA, GMAT scores have been cited more frequently as the best predictor (Fisher and Resnick, 1990). Even so, UGPA is also considered to be a strong predictor; in fact, of the studies cited above, GMAT scores and UGPA consistently rank as either number one or number two in predictive validity. Moreover, study results indicate that the use of both UGPA and GMAT scores together results in better prediction of the criterion than does either of these variables alone. Even together, however, these variables account for only a small percentage of criterion variance (Hecht & Powers, 1982).

Even though most graduate schools of business, especially top-ranked institutions, place a great deal of value on GMAT scores, Harvard Business School is a notable exception. Based on the school's own investigation, officials at Harvard take issue with the use of the GMAT in the selection process (Byrne, 1991; Fisher & Resnick, 1990; GMAT Princeton, 1989).

During the mid-1980s Harvard Business School spent a great deal of time evaluating its admissions policies. In conjunction with this self-evaluation, the school tried an experiment involving an entire class of students entering its MBA program. All the applicants were subject to the same screening process for admission with one exception: unknown to the students, 20% of the entering class was admitted without regard to their GMAT scores. Hence, there was a group whose GMAT scores had been a factor in their admission to the school and a group whose GMAT scores had not been a factor. After the students had completed their first year, admissions officers compared the performance of the two groups and found the performance to be about the same for both (Fisher & Resnick, 1990; Maeroff, 1985; McGrath, 1985).

In a position strengthened as a result of this experiment, Harvard officials state that undue emphasis on GMAT scores can actually detract from the school's purpose. Asserting that their focus goes beyond merely enrolling strong academic performers and that their major goal is to select individuals with the potential to become outstanding general managers, officials contend that a candidate's undergraduate record and personal traits are better predictors of success than a score on a single test. In conjunction with this position, applicants must complete an eight-page application requiring eleven separate essays, all of which are read and discussed by a faculty committee. Officials indicate that these essays are more useful than GMAT scores in evaluating work experience and individual management attributes such as problem-solving skills and the capacity to organize and motivate subordinates (Maeroff, 1985; McGrath, 1985).

In light of the results of their mid-eighties experiment, along with the variety of other options, Harvard officials have concluded that the predictive validity of GMAT scores is not sufficient to justify the school's continued use of the exam. Hence, beginning with the fall 1986 class, Harvard has no longer required or even considered GMAT scores in making admissions decisions (Fisher & Resnick, 1990; GMAT Princeton, 1989; Maeroff, 1985; McGrath, 1985).

Using Special Preparation Methods to Boost Test Scores

As illustrated throughout this chapter, controversies continue regarding the use of standardized college admissions tests on both the undergraduate and graduate levels. Some critics argue that such tests are unfair to African-Americans because social and educational inequities have denied these individuals opportunities and experiences middle class Caucasians have enjoyed, and that this denial systematically results in lower test scores for African-Americans, thus putting this population subgroup at a disadvantage in the selection process. Other critics contend that such tests predict very little of the variance in criterion performance and that these instruments have not been shown to predict professional competence in their corresponding areas. Accordingly, Harvard's business school no longer even considers GMAT scores in its selection process.

Despite the controversies just mentioned, and despite the various statistical and ethical models recommending less emphasis on standardized college admissions test scores, such scores remain a very real part of the

selection process at most graduate schools of management. Accordingly, many students look to coaching as a means of improving their test scores.

The Graduate Management Admission Council reports that 25% of GMAT examinees rely on coaching as a means of receiving high test scores. In view of this situation, the focus of this paper will now be directed toward the effects of using special preparation methods, or coaching, to increase scores on standardized graduate school admissions tests. This chapter will conclude with a look at Leary and Wightman's study of the effects of special preparation methods on the scores of African-American GMAT examinees.

Coaching is regarded as a common test preparation method, although perceptions of what coaching actually is can vary tremendously. Some individuals use this term to refer simply to instruction in test wiseness, while others use the term in reference to highly specific teachings based on the kinds of knowledge and skill needed to answer questions correctly on a specific test. Hence, instruction can take many forms -- from a single session designed to teach geometry or vocabulary building to a series of lessons held over a period of several weeks or more (Bond, 1982)

Addressing the difference between instruction and coaching, Bond (1989) asserts that the length of instruction time -- short term vs. long term -- is not the key factor in making the distinction. Rather, he identifies purpose as the distinguishing feature. According to this point of view, coaching takes place when instruction is provided specifically to increase scores on a particular examination rather than mainly to increase the general academic skills that the test is designed to predict. On the other hand, the primary purpose of instruction may be simply to provide sustained teaching in broad

academic skills of the type generally encountered in high school English and mathematics courses. In such cases, performance on standardized admission tests is merely incidental (Bond, 1989). As used in this investigation, the term coaching refers to any instructional program designed specifically to increase scores on the GMAT or some other standardized test used for admissions or for otherwise differentiating among examinees.

The issue of coaching in preparation for standardized admissions tests is accompanied by a great deal of controversy. In the past ETS has held that coaching is likely to bring about only negligible gains in scores beyond what normally would be expected from growth and instruction in school. From a somewhat modified position, ETS now recognizes a little more value in coaching but still maintains that gains from coaching are always small, regardless of the coaching method used or the differences among the students being coached (Katzman, 1992).

Stating that standardized college admissions tests measure skills that can not be significantly improved through studying, coaching critics maintain that coaching in preparation for such tests is not beneficial. However, counterclaims from coaching advocates present a different point of view. For instance, Slack and Porter (1980) and Powell and Steele (1983) agree that coaching can be an effective way for students to raise standardized test scores (White, 1985). Moreover, schools such as those run by Stanley Kaplan and the Princeton Review contend that coaching can lead to significant score increases on standardized admissions exams (Katzman, 1992; Owen, 1985).

Downplaying the role and effects of coaching schools, Klitgaard (1985) asserts that gains from coaching courses can possibly raise the SAT verbal-

math composite score by a total of 40 points, but that specialized coaching does not affect SAT results. Disputing this position, however, White (1985) contends that Klitgaard's conclusions are based on a composite derived by combining results from earlier SAT studies with later studies reporting less dramatic coaching effects. Owen (1985) also questions these composite findings on the grounds that no distinction had been made regarding the quality of the coaching materials about which the conclusions had been drawn. Moreover, White (1985) also cites Slack and Porter's (1980) assertion that coaching is associated with increased scores on standardized admissions tests.

Cost is at the heart of some criticisms against coaching. Some coaching schools charge hundreds of dollars for tuition and cater to the economically well off. Accordingly, critics contend that if coaching schools do make a difference, persons who have no access to such methods are at a disadvantage (White, 1985). Because of limited financial resources, minorities often fall into this category (Bond, 1982).

Other coaching critics argue that standardized admissions examinations are intended to measure specific abilities such as reading comprehension or vocabulary, and that such assessments should not be confounded with unrelated and unwanted variables such as differences in guessing strategies, degree of test wiseness, or extent of prior practice with tests. While this point might have some ethical merit, competition based on admissions test scores makes it highly likely that this argument will not end the practice of coaching as a preparation for such tests.

Messick considers possible effects of coaching under three different sets of circumstances. In each situation, a borderline candidate who might have been rejected participates in coaching sessions and is selected for admission to college. Bond (1989) summarizes these scenarios.

One scenario presented by Messick describes a situation in which coaching can help a student not only improve abilities the test is intended to measure, but also strengthen cognitive abilities the student will need for success in college. This outcome can be achieved when coaching helps a student who is weak in specific quantitative skills overcome his/her weaknesses and master the skills. In learning to strengthen quantitative skills, the individual being coached can also strengthen analytical skills needed for success in college. Hence, a student who had been on the borderline prior to the coaching could achieve both stronger cognitive abilities and acceptable performance on the admissions test. As a result, the student who otherwise would have been rejected would be selected for admission to college. Thus, this student would be moved from the "valid rejection" category to the "valid acceptance" category. Under such circumstances, arguments against coaching might not receive a great deal of support (Bond, 1989).

A different situation focuses on the kind of student who already has strong cognitive abilities in general and strong abilities in the areas measured on the admissions test. However, this student does not do well on standardized tests because of a combination of very poor test taking skills and a great deal of anxiety about taking standardized tests. Coaching can help this student become more comfortable with test taking procedures and skills, and

become more relaxed and confident about taking the test. These benefits can enable the student to perform well on the admissions test, receive a test score that more accurately reflects his/her abilities, and be selected for admission to college. As a result, the student can be moved from the "false rejection" category to the "valid acceptance" category. In this situation, arguments against coaching are again likely to lack widespread support (Bond, 1989).

Messick's third scenario features a student who is weak in both the abilities the test is designed to measure and the cognitive abilities needed for success in college. Through coaching, the student can achieve enough facility in one area of the test to receive an acceptable score and be selected for college admission. However, the item type in which the student achieves the added facility might be in verbal analogies or some other area that is rarely, if ever, encountered in college. Moreover, the cognitive abilities the student needs for success in college could remain weak. However, because of the score increase brought about through coaching, the student is moved from the category of "valid rejection" to the category of "false acceptance." This situation is sometimes referred to as "faking high aptitude (Bond, 1989)."

Opponents of coaching place the concept of faking high aptitude into a negative category, along with the practice of "teaching to the test." While there might be some merit to criticisms regarding faking high aptitude, the concept of teaching to the test has been described as a gross misnomer. Without prior knowledge of the specific questions on the test, coaching, at best, is limited to familiarizing students with item formats and other characteristics of the test. Otherwise, it is possible for the instructor to teach

to the domain, but after all, is not that task the main focus of education, anyway (Bond, 1989)?

Amidst the controversial opinions on coaching, a number of studies have been conducted to assess the effect of preparatory measures on test scores. The interaction of race with practice and coaching has been addressed in some of those investigations. Studies of general group mental tests have indicated that special practice for African-American students is no more effective than for white students. In analyzing Federal Trade Commission data, however, Messick found that African-American students who had been coached had achieved substantially and significantly higher gains than had white students who had been coached (Bond, 1989).

In a separate investigation of his own, Messick again found coaching to be significantly more beneficial to African-American students than to white students. According to Messick's analysis, the average SAT verbal score gain for the 132 coached white participants was -.25. In other words, there was no overall benefit from the coaching. On the other hand, the average verbal score gain for the 13 coached African-American students was 46.5. Although the size of the sample was small, this substantial difference in gain indicates that further study on this topic could shed more light on the issue (Bond, 1982).

Past coaching studies have shared a major common problem in that they had no carefully-chosen control groups of students who did not participate in the coaching sessions. Hence, gains experienced by coached students could not be compared with results of students who had not been coached. Another complicating factor is the inability to compare the

instructional quality and content of the various coaching sessions (Bond, 1989).

To address inconsistencies in findings on coaching, Messick has critically reviewed what is considered to be the methodologically sound literature on the issue. His results indicate that beyond gains that students would normally be expected to achieve from their classes in school, the average total SAT score increase from coaching ranges from 10 to 15 points. These figures are more in line with Klitgaard's claims rather than those made by coaching schools. The great disparity in the results of studies on the effects of coaching indicates that definite conclusions regarding this issue are premature, and that more carefully-controlled studies are needed (White, 1985).

In view of controversies mentioned above, it is not surprising to note that ETS has been involved in quite a bit of controversy about the coachability of its standardized exams. While ETS assertions have maintained that coaching is not an effective strategy for increasing SAT scores, critics such as Owen (1985) and Katzman (1992) have proclaimed notable score increases attained by students who had been coached. In fact, Katzman (1991) has stated that "serious" coaching students have gained more than 185 points as a result of enrollment in coaching school. Although ETS has modified its position somewhat and is not quite as negative regarding the effectiveness of coaching in the case of the SAT, disagreement remains over the coachability of the GMAT (The Bulletin, 92-93; Katzman, 1992).

In the 1992-93 issue of The Bulletin, a booklet published by ETS for students who are planning to take the GMAT, ETS suggests that coaching in

general will not be useful as a preparation method for taking the GMAT. In the portion of The Bulletin that directly addresses what students should do in order to score well on the GMAT, the coaching question is avoided; rather, the focus is on becoming familiar with the kinds of questions asked on the exam and with the instructions for the various types of exam questions. Consistent with this focus, Maeroff (1985) cautions that GMAT questions and instructions can be quite lengthy and complex, especially in the Data Sufficiency section. To assist potential GMAT examinees, ETS includes in The Bulletin sample GMAT questions of every type, along with the corresponding instructions for each type of question.

For persons who wish to do further studying beyond the sample questions in The Bulletin, the publication contains information about how one can obtain official GMAC study materials such as The Official Software for GMAT Review and The Official Guide for GMAT Review. The Bulletin also mentions attending test review courses. However, no claims of major score gains through the use of any of these materials and strategies are made in The Bulletin. Instead, the publication states that GMAC is unaware of any evidence "that these methods are superior to a review of the sample questions included in this Bulletin for enhancing familiarity with the GMAT" (The Bulletin, 92-93).

In contrast, Martz, Katzman, and Robinson (1992) contend that coaching can be quite beneficial for prospective GMAT examinees. They quote a popular coaching school as stating that its students who complete all assigned homework and attend all scheduled classes, workshops, and tests, will achieve GMAT score increases of at least 50 points; the average GMAT

score gain reported for students attending the coaching school is 80 points (Katzman, 1992).

Because of the integral role GMAT scores play in the admissions process to graduate schools of business, persons planning to take this test sometimes use special preparation methods in order to gain a competitive edge (The Bulletin, 92-93; Katzman, 1992; Leary & Wightman, 1983). To find out what kinds of preparation methods are used and how many examinees undergo such preparations, ETS has included on the GMAT answer sheet a multiple choice question requesting that examinees identify preparation methods they have used. It should be noted that respondents answer this question on a voluntary basis, and that there is no way to compare or control for the quality of the test preparation methods reported by examinees (Leary & Wightman, 1983). The question and its answer choices are as follows:

In preparing for this test, did you:

1. Study the sample questions in the GMAT registration bulletin?

2. Work through an actual GMAT published by ETS?

3. Use a preparation book not published by ETS on how to prepare for the GMAT?

4. Attend a test preparation or coaching course for the GMAT?

5. Undertake on your own any review of mathematics?

Leary and Wightman investigated the relationship between these five methods of test preparation and performance on the GMAT, as measured by GMAT verbal, GMAT math, and GMAT total score. Evaluations were made for first time examinees and second time examinees. Mean scores of students using each type of preparation method were calculated. Also, regression analysis was used to estimate the effects of each method of preparation.

In the case of first time examinees, overall mean GMAT scores for persons who used each method of preparation did not differ greatly from corresponding scores for examinees who reported that they did not use the method. However, examinees reporting that they had pursued their own study of mathematics averaged lower scores on all three measures -- GMAT verbal, quantitative, and total scores -- than test takers who had not studied math on their own. Examinees who reported using each of the other four methods tended to attain higher mean verbal and total scores than examinees who did not. Mean quantitative scores differed slightly and inconsistently for examinees responding "yes" and "no" to the use of each of the other four methods.

Leary and Wightman point out a very important caution that must be observed in interpreting these results. The reason for an examinee's decision to use a particular preparation method is not known. Extremely well-prepared, high scoring students may choose certain methods, or they may feel no need to use any method. On the other hand, poorly-prepared, low scoring students may choose certain methods of test preparation over others, or they may be more likely than well-prepared students to use at least one test

preparation method. Thus, a positive relationship between GMAT score and a particular test preparation method does not necessarily mean that the method helped produce that score. Thus, the fact that students who reported that they had pursued their own study of mathematics averaged lower scores on the GMAT does not mean that studying math produces lower GMAT scores; most likely, poorly prepared students did some studying of math on their own.

Independent variables in the Leary and Wightman regression analysis were undergraduate GPA, race, sex, and test preparation method. Separate regressions were computed with GMAT verbal score, GMAT quantitative score, and GMAT total score as the dependent variable. In none of the regressions was the R-square greater than 17%; thus, the major portion of the variance in GMAT score was unrelated to undergraduate GPA, race, sex, or test preparation method. Of the variance that was accounted for in the regression, undergraduate GPA was the variable that had the largest effect.

For all GMAT scores, the only test preparation variables that were statistically significant were "undertake on your own any review of mathematics," "study the sample questions in the GMAT registration bulletin," and "use a book not published by ETS on how to prepare for the GMAT." The coefficient of "undertake on your own any review of mathematics" was negative; students who had used this preparation method received lower scores than did students who did not report using the method. The coefficients of "study the sample questions in the GMAT registration bulletin" and "use a book not published by ETS on how to

prepare for the GMAT" were positive; students using these methods received higher scores than did students who did not report using the methods.

For examinees who reported using more than one method of preparation, interactions between all possible pairs of test preparation methods were entered into the multiple regression equation. A number of the interactions were significant and negative, but only the interaction of using a test preparation book and doing a review of mathematics was significant ($p<.05$) and positive. Thus, even though some students used two preparation methods to improve their scores, it cannot be concluded from this study that such students obtained higher GMAT scores than students who did not.

Results for Second-time Examinees

All students taking the GMAT for a second time had higher average scores than on their first time, regardless to whether or not the examinees had obtained some type of test preparation before their second test. For second-time examinees, certain results were the same as those for first-time test takers: second-time examinees who had studied math on their own averaged lower quantitative and total scores than those who had not used this method, and mean GMAT scores for second-time examinees who used or did not use methods of preparation other than studying math on their own did not differ greatly.

Most of the variance in second scores was accounted for by the variance in the first scores. Hence, the sizes of the effects associated with each method of preparation for second-time examinees were considerably less

than those obtained using data from the first-time examinees. When differences in ability were held constant statistically for second-time examinees, only the effects of using a test preparation book not prepared by ETS or attending a test preparation course were significantly different from zero; the other test preparation methods did not significantly affect GMAT scores.

Results for African-American Students

The relationship between the use of test preparation methods and GMAT scores for African-American students varied greatly. On the quantitative section, students who used a preparation book not published by ETS averaged HIGHER quantitative scores than students who did not use that method.

For both the verbal section of the GMAT and the total GMAT score, results were the same. African-Americans students who studied the sample questions in the GMAT registration bulletin, used a preparation book not published by ETS, or attended a test preparation course for the GMAT averaged HIGHER scores than those who did not use these methods. Students who worked through an actual GMAT published by ETS or pursued their own study of mathematics averaged lower verbal and lower total GMAT scores than examinees who did not use those preparation methods. Mean quantitative scores differed slightly and inconsistently for examinees responding "yes" and "no" to the use of each of the other four methods.

Again, Leary and Wightman caution that the reason for an examinee's decision to use or not use a particular preparation method is not

known; therefore, a positive relationship between GMAT score and a particular test preparation method does not necessarily mean that the method helped produce the score. Thus, we can not conclude that studying math on one's own produces lower GMAT scores than not studying math on one's own.

Regression analysis indicated that the only two variables that were statistically significant were the independent review of mathematics and using a book not published by ETS. For quantitative GMAT scores, the regression coefficient associated with the independent review of mathematics was negative. This variable was also negative for total GMAT scores. Hence, students using this preparation method had lower quantitative and total GMAT scores. Using a book not published by ETS was a positive variable for verbal, quantitative, and total GMAT scores. Students using this preparation method received higher scores on all three dependent variables.

For examinees who reported using more than one method of preparation, interactions between all possible pairs of the methods of test preparation were entered into the multiple regression equation. Only the interaction effect of using a test preparation book and doing a review of mathematics was significant and positive. Most of the other interaction coefficients were negative; a possible explanation of the negative coefficients is that lower ability examinees felt the need to employ two methods of preparation (Leary & Wightman, 1983). The coefficients that were positive were not statistically significant.

Results of the regression analysis indicated that the major portion of the variance in GMAT score for African-American students was unrelated to

undergraduate GPA, sex, and test preparation method. In none of the regressions was the R-square greater than 7.3%. However, for the small amount of variance that was accounted for in the regression, undergraduate GPA was the variable that had the largest effect.

Based on their findings Leary and Wightman (1983) have concluded that there do appear to be relationships between test preparation methods and GMAT scores. However, Leary and Wightman (1983) caution that it does not necessarily follow that using any of the methods of preparation causes an increase in scores. Rather, the researchers emphasize that any effect on test performance that resulted from using a particular method of preparation could not be separated from the effect of the individual characteristics of the examinees who selected the method. Hence, while this study is not conclusive, neither do Leary and Wightman's (1983) findings preclude the possibility that students who are coached may achieve higher test scores than do students who are not coached.

Implications and Questions from Past Literature for the Present Study

Although this investigation is essentially exploratory, the diverse literature just reviewed on the relationship between standardized test performance and a host of experiential and demographic variables suggests several specific research questions. Most of the studies reviewed contained predominantly white student samples. It is therefore of interest to ascertain whether the trends and relationships previously noted obtain as well for African-American students. In particular, prior findings for majority students regarding the relationship between course of study and test scores,

the relationship between age and test performance, the relationship between
sex and standardized test performance, and finally, the effects of various
forms of coaching on standardized admissions tests will be investigated for
African-American candidates applying to schools of business and
management.

Research Question One: Curriculum and Test Performance

Research on curriculum indicates a relationship between performance
on standardized tests and specific courses taken. In a study by Oakes
(1990), it was found that African-Americans have fewer opportunities to
take courses that prepare them for higher level study in mathematics
and science than do Caucasians. Tobias (1992) argues that the performance of
these students on standardized math tests would, therefore, be affected.
Accordingly, the first research question to be investigated in this study seeks to
determine whether specific courses of study in undergraduate school are
systematically related to GMAT performance. That is, do students who major
in science, mathematics, and other quantitatively-oriented courses of study
perform better on the quantitative section of the GMAT than other students?
More generally, are specific undergraduate majors associated with higher
performance on the quantitative and verbal sections of the GMAT?

Research Question Two: Age and Test Performance

Older students wishing to enroll in college are particularly concerned
about taking standardized admissions tests long after having graduated from
high school. Moreover, older persons who have earned undergraduate

degrees but concentrated their talents and energies on the world of work rather than on the college campus face with apprehension the prospect of taking the GMAT in order to prepare for careers in management (McGrath, 1985). An important research question concerning this issue is whether older students score significantly different from younger students on the GMAT.

Research Question Three: The Effects of Sex

A well-established finding is that males (who it should be noted generally take more courses related to the development of analytical and quantitative skills such as science and mathematics than do females) tend to make higher math scores on these tests than do females (Shea, 1992; Smith, 1992). Hence, the third research question in this investigation is whether this finding is also true for African-American students.

Research Question Four: Coaching

Research on the use of coaching or other special preparation methods for taking standardized tests has not yielded conclusive results. Klitgaard (1985) maintains that specialized coaching does not affect SAT results; several other authors report that, with respect to African-American students, the evidence for the effects of coaching is mixed (Bond, 1989; Messick 1980); and still others report that coaching in general does improve test performance (Katzman, 1992; Owen, 1985; White, 1985). As noted earlier, the effects of coaching depend in large part upon the amount and quality of "student contact time" (Messick, 1980). Unfortunately, experimental control over this variable was not possible in this investigation. Nevertheless, the data base used in this study does contain self-reported information on the type of

special preparation sought by students. Thus, the final specific research question to be investigated in this study seeks to determine which of the special test preparation methods available to African-American students taking the Graduate Management Admission Test appears to be most effective in raising test scores.

CHAPTER III

METHODOLOGY

This study is primarily an exploratory investigation of factors which predict performance of African-American students on the Graduate Management Admission Test. The data source, variables that will be investigated, and statistical procedures to be used will be discussed.

Data Source and Sample Size

The investigator has available on computer-scannable tape, the records of all GMAT test takers during the 1987-88 academic year. For each candidate, the record includes, among other information: undergraduate school attended, undergraduate major, undergraduate grade point average, candidate age, number of years since graduation from undergraduate school, gender, ethnicity, graduate degree objective, extent of preparation for taking the examination, and performance on each item of the GMAT.

The data tape contains records for 268,702 candidates, of whom 13,447 indicated that they are African-American. Very precise estimates of all statistical parameters of interest in this study (e.g., means, standard deviations, partial regression coefficients, multiple correlation coefficients) can thus be obtained. However, since extremely large sample sizes can result in statistically significant findings that are of little practical value, some balance between stability of parameter estimates on the one hand, and practical significance on the other, is desirable. For multivariate prediction

analyses, a general rule of thumb is to have at least 100 cases per predictor variable in the model (Cronbach & Snow, 1978). Toward this end, a sample of approximately 1,500 candidates will be drawn randomly from the 13,447 available records.

Objectives of the Study

This investigation has two major purposes. One objective is purely descriptive and involves the construction of a profile of characteristics common to African-American GMAT examinees. The other major purpose is an exploratory attempt to identify significant predictors of performance on the GMAT for African-American students. These will be discussed in turn.

Profile of African-American Students Taking the GMAT

Which African-American students are likely to pursue graduate degrees in management? Do they, in general, obtain employment for a number of years before seeking graduate education? What is their typical undergraduate major? The first part of this investigation will involve the construction of a comprehensive profile of the African-American student who wishes to pursue graduate education in business and management. The profile will provide basic demographic information (means and where appropriate, standard deviations) on the applicant pool for the following categories: age, gender, grade point average, type of undergraduate institution attended (i.e., historically black vs. predominantly white), undergraduate major, type of graduate degree sought, and work experience.

Variables Affecting GMAT Performance

Which variables are significantly related to performance on the GMAT for African-American students? The potential predictors available to the investigator include the following: (1) Age at time of test administration, (2) undergraduate grade point average, (3) gender, (4) racial composition of undergraduate institution (i.e., historically black vs. predominantly white), (5) undergraduate major (science, business and commerce, humanities, social science, or other), and (6) extent of preparation for taking the examination. The latter predictor, test preparation, includes the following:

(a) Studying the sample questions in the Bulletin, the GMAT registration bulletin

(b) Working through an actual GMAT published by ETS

(c) Using a book on how to prepare for the GMAT but not published by ETS

(d) Attending a test preparation or coaching course for the GMAT

(e) Undertaking on one's own a review of mathematics

In the analysis, it will be important to distinguish among three kinds of factors affecting test performance: stable and unchangeable characteristics of students (i.e., gender), factors over which students have at least partial control (i.e., undergraduate grade point average, age at time of test administration, and type of undergraduate institution attended), and finally factors that are under the explicit control of students (undergraduate major

and extent of preparation for taking the test). While characteristics associated with test performance over which students have no control may be important for theoretical reasons, these factors are of only marginal interest to students and to institutions interested in increasing minority access to higher education in management. In contrast, variables affecting test performance over which students have partial or complete control are important, since those factors have direct implications for student choices (e.g., which school they will attend) and student actions (e.g., how much and what type of test preparation might result in significant test score gains).

Statistical Procedures

In the initial part of the study, three forward selection multiple regression analyses will be performed to determine the degree to which performance on the GMAT-verbal, GMAT-quantitative, and GMAT-total is predictable from the predictors listed above and the relative contribution of each predictor while holding all others constant. For example, to investigate whether students who attended historically black undergraduate institutions performed differently on the GMAT than those who attended predominantly white institutions, the partial regression weight of this dichotomous variable will be examined. If this regression coefficient is significant, then it can be concluded that, holding all other predictors constant, students who attend predominantly white institutions score better (or worse) on the GMAT depending upon initial coding of the variable.

Second, two planned comparisons will be made to examine the performance of African-American GMAT examinees who attended

historically black colleges and universities (HBCU's) against the performance of African-American GMAT examinees who attended predominantly white institutions (PWI's). Two procedures will be used to perform this analysis.

For the first procedure, separate regressions will be computed for African-American GMAT examinees who attended HBCU's and those who attended PWI's. In each case, three regression analyses will be performed, with the GMAT-verbal score, the GMAT-quantitative score, and the GMAT-total score as the dependent variables, respectively; the independent variables will be: (1) Age at time of test administration, (2) undergraduate grade point average, (3) gender, (4) undergraduate major (science, business and commerce, humanities, social science, or other), and (5) extent of preparation for taking the examination. Results from these two regression analyses will also show how the predictor variables for African-American students at HBCU's and for African-American students at PWI's compare with the overall predictor variables identified in the first regression analysis.

In the second procedure for comparing the performance of African-American GMAT examinees who attended HBCU's with the performance of African-American GMAT examinees who attended PWI's, the students will be divided into pairs of subgroups, based on variables identified as significant in the regression analyses comparing HBCU students with PWI students. Means and standard deviations will be calculated for each subgroup and a t-test will be used to determine whether there is a statistically significant difference between the means of the pairs. Possible pairs are listed below:

A. Sex of African-Americans at HBCU's and sex of African-Americans at PWI's

B. Age of African-Americans at HBCU's and age of African-Americans at PWI's

C. GPA of African-Americans at HBCU's and GPA of African-Americans at PWI's

D. GMATV of African-Americans at HBCU's and GMATV of African-Americans at PWI's

E. GMATQ of African-Americans at HBCU's and GMATQ of African-Americans at PWI's

F. GMATT of African-Americans at HBCU's and GMATT of African-Americans at PWI's

G. Preparation method of African-Americans at HBCU's and preparation method of African-Americans at PWI's

H. Major of African-Americans at HBCU's and major of African-Americans at PWI's

The results of these comparisons will be presented in a table, and means that are significantly different will be identified.

CHAPTER IV

RESULTS

One objective of this twofold investigation is to construct a profile of characteristics common to African-American examinees who took the Graduate Management Admission Test during the 1987-88 school year. The second purpose is to identify significant predictors of performance on the GMAT for African-American students, based on data from the 1987-88 administration of this examination.

Primary data sources for the study were computer scannable magnetic tapes containing ETS data on the entire population of 268,702 students who took the GMAT during the 1987-88 school year, including the 13,447 examinees who identified themselves as African-Americans. Additionally, The Statistical Record of Black America (1990) provided pertinent information about the racial makeup of the undergraduate institutions attended by the examinees. This chapter presents findings from the investigation.

The first part of this chapter presents the profile of characteristics common to the African-American examinees in the study. Next, results of a series of the forward selection regression analyses for GMAT verbal, quantitative, and total scores are presented and discussed. Finally, results from comparisons of students from HBCU's and students from PWI's are discussed.

Characteristics Common to African-American GMAT Examinees

Data gathered on a random sample of 1,500 of the 13,447 African-American examinees who took the GMAT during the 1987-88 school year provided information on the following student characteristics: age, sex, undergraduate grade point average (GPA), dominant racial makeup of the institutions where the examinees earned their undergraduate degrees (HBCU's or PWI's), undergraduate major, type of graduate degree sought, and work experience. Table 4-1 below, developed from this information, provides selected demographic and descriptive data on the sample of 1987-88 African-American GMAT examinees.

At the beginning of the 1950's, over 90 percent of African-American college students attended HBCU's. Following the enactment of civil rights legislation during the 1960's and the increased minority access to higher education that resulted, more and more African-Americans began to enroll at predominantly white colleges and universities. Fleming (1984) states that by the late 1980's, about two thirds to three fourths of African-American college students were attending PWI's, while the remainder were enrolled at HBCU's. Fairly consistent with Fleming's (1984) finding, approximately 78 percent of the African-Americans in this study were graduates of PWI's, while about 22 percent were HBCU graduates. The mean undergraduate GPA was 2.84, with a range of 2.0 to 4.0 and a standard deviation of 0.41.

African-American GMAT examinees ranged in age from 20 to 61. The mean age was 28.02 and the standard deviation was 5.96. Slightly over two-thirds (67.1%) of the examinees were under 30 years of age. Somewhat surprisingly, fifty-six percent of the candidates were female.

Table 4-1

AFRICAN-AMERICAN GMAT EXAMINEE PROFILE SUMMARY			
1987-88 GMAT ADMINISTRATION			
Charac-teristic	Category or Range	Most Frequent Characteris-tic/Percent	Mean/SD
AGE	20 - 61	23/10.4%	28.0/5.96
SEX	Male or Female	Female/55.7%	--
GPA	2.0 - 4.0	3.0/12.5%	2.84/.41
Type	HBCU	331/22.1	
	PWI	1169/77.9%	--
Major	Science	320/21.3%	--
	Business (Bus.)	764/49.7	
	Humanities	63/4.2	
	Social Science	268/17.9	
	Other	103/6.9	
Graduate Degree Sought	MBA (Bus. Admin.)/MS (Indus. Mgt.)	1307/87%	
	MHA/Health Admin.	24/1.6	
	MPA/Public Admin.	17/1.1	
	Phd/Doctorate in Bus.	41/2.7	
	Joint MBA/Engineering	13/0.9	
	Joint MBA/Law	49/3.3	
	Other	46/3.1	
	Missing	3/0.2	
Work Ex-perience	Summer/Part time only	205/13.7%	--
	< 1 year (yr.)	88/5.9	
	1 - 3 yrs	341/22.7	
	3 - 5 yrs	250/16.7	
	5-7 yrs	165/11.0	
	7+ yrs	400/26.7	
	Missing	51/3.4	

The modal GPA was 3.0; 12.5% of the examinees reported their undergraduate GPA's to be 3.0. Moreover, the percentage of African-Americans enrolled at PWI's was larger than the percentage enrolled at HBCU's. About 78% of the students had attended PWI's, while about 22% had attended HBCU's.

The most popular undergraduate major was business; 49.7% of GMAT examinees had earned undergraduate degrees in business. Humanities majors comprised the smallest group of test takers; only 4.2% of the examinees had earned undergraduate degrees in humanities. Most of the examinees (87%) were planning to earn the MBA degree. The degree sought by the smallest percentage of examinees (3.3%) was the joint MBA/law degree.

Work experience was grouped in categories based on the amount of time examinees had worked. These categories ranged from summer or part-time work only to more than seven years of work experience. The largest percentage of examinees, 26.7%, had attained more than seven years of work experience. The smallest percentage, 5.97%, had worked for less than one year.

Regression Analyses Results

To determine the degree to which verbal, quantitative, and total GMAT scores are predictable from student characteristics used in this investigation, three series of forward selection regression analyses were performed. In each series of analyses, three regressions were performed, using GMAT verbal scores, GMAT quantitative scores, and GMAT total

scores as dependent measures, and the list of predictors described below as independent variables. The first set of analyses was performed on the entire set of 1,500 candidates. The second set of analyses was performed on those candidates who had attended HBCU's, and the third set was performed on candidates who had attended PWI's. For all regressions, the independent variables were as follows:

1. AGE (examinee age when GMAT was taken)

2. GPA (undergraduate grade point average)

3. SEX

4. ETHNIC (racial composition of undergraduate institution (HBCU = predominantly black; PWI = predominantly white). [ETHNIC was an independent variable in the full sample regression only.]

5. Undergraduate major (See Appendix B)

    A. SCIENCE

    B. BUSEC (Business and commerce)

    C. HUM (Humanities)

    D. SOCSC (Social science)

    E. OTHER (Any other major not mentioned above)

6. Extent of preparation for taking the GMAT, as determined by participation in or the lack of participation in the following preparatory methods:

    A. BULL (Studying the sample questions in the Bulletin, the GMAT registration booklet)

B. ETSG (Working through an actual GMAT published by ETS)

C. PREPB (Using a preparation book not published by ETS on how to prepare for the GMAT)

D. COAC (Attending a test preparation or coaching course for the GMAT)

E. OWNM (Undertaking on one's own a review of mathematics)

GMATV Forward Selection Multiple Regression. Six variables (in order, BUSEC, GPA, ETHNIC, AGE, OTHER, PREPB) were significantly predictive of performance on the GMATV scores for the entire sample of candidates. Together they accounted for approximately 10% of the GMAT verbal score variance. The first variable to enter the equation was BUSEC, accounting for approximately three percent of the variance. The coefficient of BUSEC was negative, indicating that students majoring in business and commerce had lower GMAT verbal scores than other students. This result might seem odd, since most people would expect students majoring in business to perform well on a "business test". But it should be remembered that the focus of the GMAT is on quantitative and verbal skills rather than on principles of business, per se. Undergraduate business majors apparently gain no special advantage from their courses over other students.

GPA was the second variable to enter the regression equation, raising the R-Square to .053. Thus, BUSEC and GPA accounted for approximately 5.3% of GMATV score variance among the African-American GMAT examinees. The other variables found to be significant in the GMATV forward selection regression were ETHNIC, AGE, OTHER, and PREPB.

ETHNIC and AGE coefficients were significant and negative; that is, African-American examinees from PWI's received higher GMATV scores than those from HBCU's, and older African-American GMAT examinees received lower GMATV scores than younger ones. Also significant and negative, the regression coefficient for OTHER indicates that students who did not major in either of the four named areas -- BUSEC, HUM, SOCSC, or SCIENCE -- received lower GMATV scores than students who majored in one of these areas. PREPB was significant and positive: students who prepared for the GMAT by using a test preparation book not published by ETS obtained higher GMATV scores than students who did not use this preparation method.

Variables found to be not significant in the GMATV forward selection regression analysis were SEX, BULL, ETSG, COAC, OWNM, SCIENCE, HUM, and SOCSC. Table 4-2 presents a summary of the findings from the forward selection regression for GMATV.

Table 4-2

FORWARD SELECTION REGRESSION STATISTICS FOR GMATV SCORES (R-Square = 0.099)					
Variable Name	Step Entered	Percent Variance	Unstandardized Coefficient	Standardized Coefficient	Level of Significance
BUSEC	1	3%	-2.63	-.189	.001
GPA	2	5%	0.32	.192	.001
ETHNIC	3	7%	-2.28	-.142	.001
AGE	4	8%	-0.13	-.102	.001
OTHER	5	9%	-3.00	-.105	.01
PREPB	6	10%	1.24	.087	.01

GMATQ Forward Selection Multiple Regression. Of the variables identified in the GMATQ regression, the one which accounted for the greatest amount of the variance in GMATQ scores was SCIENCE, with an R-Square of .096. ETHNIC, which increased the R-Square to .12, was the second variable to enter the GMATQ forward selection regression equation. The third variable to enter the equation, GPA, increased the R-Square to .14, while AGE increased the R-Square to .16. SEX, PREPB and SOCSC increased the overall R-Square to .19. Accordingly, these seven variables together accounted for approximately 19% of the variance in GMATQ scores, almost twice as much variance as was accounted for by the significant variables in

the forward selection model for GMATV. Table 4-3 presents a summary of the findings from the forward selection regression for GMATQ.

Table 4-3

FORWARD SELECTION REGRESSION STATISTICS FOR GMATQ SCORES (R-Square = 0.191)					
Variable Name	Step Entered	Percent Variance	Unstandardized Coefficient	Standardized Coefficient	Level of Significance
SCIENCE	1	10%	5.68	.315	.001
ETHNIC	2	12%	-2.90	-.173	.001
GPA	3	14%	0.26	.151	.001
AGE	4	16%	-0.19	-.145	.001
SEX	5	17%	-1.94	-.133	.001
PREPB	6	19%	1.62	.108	.001
SOCSC	7	19%	1.50	.077	.05

GMATT Forward Selection Multiple Regression. Predictably, many of the variables found to be significant in the GMATT forward selection regression analysis were the same as those found to be significant in the GMATV and GMATQ forward selection regression analyses. However, BUSEC and OTHER, significant in the GMATV forward selection regression analysis, were found not to be significant. On the other hand, HUM, significant in neither the GMATV or GMATQ forward selection regression, was found to be significant for GMATT. Examinees who were humanities

majors received higher GMATT scores than students who were not humanities majors.

The first variable to enter the GMATT forward selection regression equation was SCIENCE, which accounted for approximately 4.6% of GMATT score variance. ETHNIC and GPA increased the R-Square to approximately 10.2. AGE, SOCSC, PREPB, and HUM raised the overall R-Square to 16.1%.

Table 4-4 presents a summary of the findings from the forward selection regression for GMATT.

Table 4-4

FORWARD SELECTION REGRESSION STATISTICS FOR GMATT SCORES (R-Square = 0.161)					
Variable Name	Step Entered	Percent Variance	Unstandardized Coefficient	Standardized Coefficient	Level of Significance
SCIENCE	1	5%	55.45	.247	.001
ETHNIC	2	7%	-36.47	-.175	.001
GPA	3	10%	4.17	.192	.001
AGE	4	12%	-2.16	-.135	.001
SOCSC	5	13%	32.40	.133	.001
PREPB	6	15%	20.83	.112	.001
SEX	7	15%	-17.62	-.097	.01
HUM	8	16%	41.26	.084	.01

Regression Analyses Results: HBCU Students. Tables 4-5 through 4-7

present results of the forward selection regression analysis for students who

attend historically black undergraduate institutions. GPA and COAC were

both significant in predicting verbal scores. In addition, students who

majored in one of the social sciences (SOCSC) tended to score higher on the

verbal section than other students. Together these three variables accounted

for slightly less than 13% of the verbal score variance (see Table 4-5 below).

Table 4-5

FORWARD SELECTION REGRESSION STATISTICS FOR GMATV SCORES: HBCU STUDENTS (R-Square = 0.127)					
Variable Name	Step Entered	Percent Variance	Unstandardized Coefficient	Standardized Coefficient	Level of Significance
GPA	1	9%	0.47	.283	.001
SOCSC	2	11%	3.06	.150	.05
COAC	3	13%	-3.35	-.140	.05

The forward selection regression for quantitative scores of students

who attend historically black colleges and universities indicated that GPA

was significant and positive, just as it had been for GMATV. SEX, PREPB,

and SCIENCE were also significant and positive for GMATQ. Males received

higher quantitative scores than did females, and students who used a

preparation book not published by ETS received higher GMATQ scores than

students who did not use such a book. Additionally, SCIENCE majors received higher GMATQ scores than students who did not major in science.

GPA, with an R-Square of .058, accounted for approximately one-third of all the GMATQ score variance explained in the HBCU regression. The combination of GPA and SEX accounted for 12% of the variance in GMATQ scores. The addition of PREPB and SCIENCE increased the R-Square value to .16 (see Table 4-6 below).

Table 4-6

FORWARD SELECTION REGRESSION STATISTICS FOR GMATQ SCORES: HBCU STUDENTS (R-Square = 0.165)					
Variable Name	Step Entered	Percent Variance	Unstandardized Coefficient	Standardized Coefficient	Level of Significance
GPA	1	6%	0.39	.247	.001
SEX	2	12%	-3.19	-.244	.001
PREPB	3	14%	2.19	.165	.01
SCIENCE	4	16%	2.65	.158	.01

The forward selection regression analysis for GMATT scores of students attending HBCU's included all of the significant predictors obtained for the verbal and quantitative scores, except SCIENCE and SOCSC (see Table 4-7). The four significant predictors (GPA, SEX, PREPB, and COAC) accounted for approximately 16% of the variance in GMAT total scores.

It will be recalled that SCIENCE was a significant predictor for quantitative scores, but not for verbal scores, and that SOCSC was a significant predictor for verbal scores, but not for quantitative scores. Apparently, the inclusion of the verbal scores in the total score tends to negate the predictor effects of SCIENCE, and the inclusion of the math score in the total score tends to negate the predictor effects of SOCSC. As will be shown below, this pattern did not occur for PWI students.

Table 4-7

FORWARD SELECTION REGRESSION STATISTICS FOR GMATT SCORES: HBCU STUDENTS (R-Square = 0.158)					
Variable Name	Step Entered	Percent Variance	Unstandardized Coefficient	Standardized Coefficient	Level of Significance
GPA	1	10%	5.88	.292	.001
SEX	2	12%	-27.42	-.163	.01
PREPB	3	14%	26.18	.153	.05
COAC	4	16%	-35.71	-.123	.05

Regression Analyses Results: PWI Students. In the PWI forward selection regression for GMATV, BUSEC, with an R-Square of .034, entered the equation first. Hence, this regression analysis identified BUSEC as the strongest predictor of GMATV for African-American PWI examinees. GPA, the second variable to enter the equation, and AGE, the third variable to

enter, each added about .02 to the R-Square, together raising the R-Square value to .081. The last predictor to be selected, PREPB brought the R-Square value up to .088. Accordingly, the significant variables together accounted for approximately 8.8% of GMATV score variance for African-American examinees at PWI's.

Table 4-8 presents a summary of the findings from the PWI model multiple regression for GMATV.

Table 4-8

FORWARD SELECTION REGRESSION STATISTICS FOR GMATV SCORES: PWI STUDENTS (R-Square = 0.088)					
Variable Name	Step Entered	Percent Variance	Unstandardized Coefficient	Standardized Coefficient	Level of Significance
BUSEC	1	3%	-2.98	-.215	.001
GPA	2	6%	0.27	.161	.001
AGE	3	7%	-0.16	-.126	.001
OTHER	4	8%	-2.98	-.107	.01
PREPB	5	9%	1.14	.080	.05

With an R-square of .124, SCIENCE, the first variable to enter the PWI GMATQ equation, accounted for approximately 12.4% of the variance among GMATQ scores for African-American PWI examinees. Accordingly, as illustrated in Table 4-9, SCIENCE alone accounted for more GMATQ score

variance than the total amount accounted for by all the other significant

GMATQ variables together.

The next two variables to enter the equation were AGE and GPA. AGE

increased the portion of variance explained to .148, while GPA brought the

figure up to .162. SEX increased the variance by just over .01 (to .173), while

PREPB increased the variance by just under .01 (to .183). Accounting for the

least amount of variance were SOCSC, which increased the R-Square value to

.18998, and HUM, which increased the value to .195.

No other variables were found to be significant. Table 4-9 presents a

summary of the findings from the PWI analysis for GMATQ.

Table 4-9

FORWARD SELECTION REGRESSION STATISTICS GMATQ SCORES: PWI STUDENTS (R-Square = 0.195)					
Variable Name	Step Entered	Percent Variance	Unstandardized Coefficient	Standardized Coefficient	Level of Significance
SCIENCE	1	12%	6.76	.374	.001
AGE	2	15%	-0.22	-.170	.001
GPA	3	16%	0.22	.125	.001
SEX	4	17%	-1.59	-.107	.01
PREPB	5	18%	1.44	.095	.01
SOCSC	6	19%	1.87	.097	.01
HUM	7	19%	2.72	.070	.05

Variables identified as significant and positive in the GMATT PWI multiple regression analysis were exactly the same as those identified as significant in the GMATQ PWI analysis. However, R-Square values were different. For instance, while the R-Square value for SCIENCE, the first variable to enter the equation for both GMATQ and GMATT, was .124 for GMATQ, the SCIENCE value for GMATT was only .06427. Moreover, the sequence in which the variables entered the equation for GMATT was different from the GMATQ sequence. Table 4-10 presents a summary of the findings from the PWI forward selection regression for GMATT.

Table 4-10

FORWARD SELECTION REGRESSION STATISTICS FOR GMATT SCORES: PWI STUDENTS (R-Square = 0.153)					
Variable Name	Step Entered	Percent Variance	Unstandardized Coefficient	Standardized Coefficient	Level of Significance
SCIENCE	1	6%	65.83	.295	.001
GPA	2	8%	3.54	.159	.001
AGE	3	11%	-2.56	-.160	.001
SOCSC	4	13%	33.38	.140	.001
HUM	5	14%	53.70	.113	.01
PREPB	6	15%	18.81	.101	.01
SEX	7	15%	-14.31	-.078	.05

Table 4-11 contains a summary of the significant variables for GMATV, GMATQ, and GMATT for HBCU and PWI examinees. The summary tables in Appendices C1 through C3 present these data in graphic form, broken down by preparation method, undergraduate major, and selected demographic characteristics.

Table 4-11

A Comparison of Significant HBCU and PWI Predictor Variables Based on Forward Selection Multiple Regression Findings

* = Positive Coefficient

SIGNIFICANT GMATV PREDICTORS

HBCU Predictors		PWI Predictors	
Variable	Cumulative R-Square	Variable	Cumulative R-Square
*GPA	.086	BUSEC	.034
*SOCSC	.108	*GPA	.056
COAC	.127	AGE	.071
		OTHER	.081
		*PREPB	.088

SIGNIFICANT GMATQ PREDICTORS

HBCU Predictors		PWI Predictors	
Variable	Cumulative R-Square	Variable	Cumulative R-Square
*GPA	.058	*SCIENCE	.124
SEX	.116	AGE	.148
*PREPB	.140	*GPA	.162
*SCIENCE	.165	SEX	.173
		*PREPB	.183
		*SOCSC	.190
		*HUM	.195

SIGNIFICANT GMATT PREDICTORS

HBCU Predictors		PWI Predictors	
Variable	Cumulative R-Square	Variable	Cumulative R-Square
*GPA	.097	SCIENCE	.064
SEX	.122	*GPA	.085
*PREPB	.143	AGE	.109
COAC	.158	SOCSC	.126
		HUM	.137
		PREPB	.147
		SEX	.152

Summary Statistics for HBCU and PWI Students

It is conceivable that variables found to be predictive of GMAT performance in one type of undergraduate institution but not in another differed in their means across type of institution, and that this is the reason for their differential predictive value. For example, the regression coefficients for AGE were found to be significant (and negative) in some of the analyses of test performance for students who attended predominantly white undergraduate institutions, but was not significantly related to test performance for students attending historically black institutions. Is this finding, and similar findings for other predictors, a result of the fact that mean ages of students attending the two type of schools differ, with more older students attending predominantly white institutions? To facilitate interpretation and discussion of the regression analyses by type of undergraduate school attended, means and standard deviations of all variables found to be significant in any of the within-school type analyses were computed, and a series of t-tests was conducted. Table 4-12 presents these results.

In the regression analyses discussed above, nine (9) variables were found to exhibit differential predictive significance depending upon undergraduate school type. Of these, GPA, COAC, BUSEC, and SOCSC differed significantly by school type. Specifically, students attending historically black undergraduate schools had higher GPA's and were more likely to have been undergraduate business majors. Students attending

predominantly white undergraduate institutions were more likely to enroll
in coaching courses or use coaching materials other than those provided by
ETS, and were more likely to have majored in one of the social sciences.
No significant differences were found among HBCU and PWI students for
SEX, AGE, PREPB, SCIENCE, and OTHER.

Table 4-12

FREQUENCIES, MEANS, AND STANDARD DEVIATIONS OF SIGNIFICANT HBCU/PWI VARIABLES IN T-TEST ANALYSIS					
Variable	Group	Number of Cases	Mean	Standard Deviation	Level of Significance
COAC	PWI	1169	0.1112	0.315	.05
	HBCU	331	0.0725	0.260	
BUSEC	PWI	1169	0.4705	0.499	.001
	HBCU	331	0.5921	0.492	
SOSC	PWI	1169	0.1933	0.395	.01
	HBCU	331	0.1269	0.333	
GPA	PWI	948	2.8037	0.410	.001
	HBCU	286	2.9773	0.399	

CHAPTER V

SUMMARY AND DISCUSSION

The purposes of this investigation were to develop a demographic profile of African-American GMAT examinees and to identify major predictors of performance on the GMAT for African-American examinees, with particular attention to those predictors over which students have some measure of control. Data on computer scannable tape of the 1987-88 administration of the GMAT provided the major source of information for this investigation. Forward selection multiple regression analyses were used to identify significant predictors of GMAT verbal (GMATV), quantitative (GMATQ), and total (GMATT) scores for the 1,500 randomly selected African-American examinees in this study. Following regression analyses on the full sample, the sample was divided into two groups, based on whether the examinees had graduated from HBCU's or PWI's. The two types of regression analyses were applied separately for HBCU and PWI students. T-tests were conducted to examine possible reasons for the HBCU/PWI differences identified through regression analysis.

Dependent variables in this investigation were GMATV, GMATQ, and GMATT. Independent variables consisted of method of preparation for the GMAT, undergraduate major, AGE, GPA, SEX, and for the total sample regressions, racial composition of undergraduate institution attended (ETHNIC).

Appendices C1 through C3 contain a tabular summary of the major findings of this investigation organized by undergraduate major, GMAT preparation method, and selected demographic variables. A brief narrative summary follows. Answers to research questions presented in Chapter II of this dissertation are included in this summary.

The Role of Undergraduate GPA

Before discussing each research question in turn, a brief word about the role of the undergraduate GPA in predicting GMAT scores is in order. An enormous body of literature points to the importance of high school GPA in predicting college performance, and of undergraduate GPA in predicting graduate and professional school performance. This investigation indicates that undergraduate GPA is also predictive of scores on the graduate management admissions test, at least for African-American students. All regression analyses found GPA to be significantly related to GMATV, GMATQ, and GMATT.

The Role of the Undergraduate Major

Research Question One addressed the issue of whether certain undergraduate majors are associated with higher performance on the quantitative and verbal sections of the GMAT than other majors. Several general conclusions regarding data used in this study shed light on this question. First, when all variables are included in the various regression analyses (see Appendix C1), the only undergraduate majors that significantly contribute to the prediction of GMAT scores are SCIENCE and the humanities. For the total sample, and for students at predominantly white

undergraduate institutions, majoring in science is predictive of scores on the GMATQ. Humanities majors tend to score higher on the GMATV than other students. Also, students who major in one of the physical or social sciences, business, or one of the humanities tend to do better on the GMATQ than other students.

Second, the pattern of significant undergraduate majors in the forward selection regression analyses suggests that students majoring in the social or physical sciences or the humanities tend to receive higher GMAT total and quantitative scores. Also, students majoring in business and those with undergraduate majors other than the sciences and humanities tend to score lower on the GMATV.

Research Question Two sought to determine whether older students score significantly different from younger students on the GMAT. Results of this investigation indicate that of those students who attended predominantly white schools, younger students tended to perform better on the GMAT than did older students. However, this was not the case for students attending historically black institutions; age was not a significant variable in the GMAT performance of African-American examinees who had graduated from HBCU's.

Research Question Three addressed the issue of whether African-American males tend to make higher GMATQ scores than do African-American females. Consistent with innumerable other findings regarding other standardized tests, male students tended to perform better on the GMATQ than did female students. This difference was apparently large enough to result in a significant effect for sex on GMAT total score as well.

The final conclusion regarding demographic variables in this investigation relates to the type of undergraduate institution attended by the examinees. According to results from this study, students attending predominantly white institutions tended to perform better on the GMAT than did students who attended historically black colleges and universities.

The Role of Preparation Method

Research Question Four sought to determine which of the available methods of special preparation for taking the GMAT appeared to be most effective in raising test scores. Easily the most notable result with respect to method of preparation for taking the GMAT is the pervasive and consistently positive effect on GMAT scores of studying one of the commercially available preparation books (e.g., Barrons) other than the review materials made available by the Educational Testing Service. Regardless of the dependent variable (Total, Verbal, or Quantitative scores) or the type of undergraduate school attended, students who indicated that they had studied a commercial preparation book did better on the GMAT than other students.

A rather disturbing finding (to which I will return in the discussion section) is that attending a formal coaching course (COAC) was associated with lower GMAT Verbal scores.

Limitations

It is perhaps useful to first state the limitations of this study before discussing the practical and theoretical implications of the results obtained. The first point to note is the obvious one: students cannot be randomly assigned to schools, majors within schools, grade point averages, and so on.

The non-experimental nature of the analyses undertaken in this study militates against strong, prescriptive conclusions and recommendations. The use of statistical control in place of experimental control is necessarily a compromise. In some cases (see below), specific recommendations for experimental confirmation of the results are possible. In others, ethical and practical considerations make such experimental confirmation impossible.

A second limitation has to do with the absence of an adequate covariate in the set of predictors to control for initial differences in student scholastic ability. It could be argued that undergraduate GPA is quite appropriate for this purpose, but since the GMAT, a standardized aptitude measure, was the dependent variable, an even more appropriate covariate would have been the SAT, ACT, or some other pre-undergraduate school proxy for scholastic ability. It is possible that the inclusion of a standardized scholastic ability proxy would have altered some of the results obtained in this study, especially those effects on the GMAT associated with the type of undergraduate school attended.

While the non-experimental nature of this study is an important limitation, it should be noted that this investigation enjoys a distinct advantage over other correlational studies, namely, a large sample. The availability of an unusually large sample size of minority business school candidates insures that the various regression estimates are quite stable. The results reported are almost assured of holding up under replication.

Discussion

Before discussing the practical and theoretical implications of the results of this study, the relative advantages of the present analysis and the areas of similarity and dissimilarity of the present findings with prior studies involving majority students should be briefly noted. While the educational, cultural, and economic backgrounds of many African-American students differ from those of majority students, it would appear that many well-established predictive patterns found for majority students hold with equal force for African-American students. For example, the correlation between GPA and standardized test performance (regardless of which is the "predictor" and which the "criterion") is a well established fact (Powers, 1983) that was fully supported in this study. Similarly, the superior performance of males on standardized quantitative measures is as evident in African-American students as in majority students. A reasonable speculation is that the tendency for male students to take more math courses, and the tendency for teachers and counselors to encourage male students toward math and science courses and female students toward courses in the arts (Angoff & Johnson, 1990) are as applicable to African-American students and their teachers and to majority students and teachers.

Results from this investigation also support the nearly universal finding that younger examinees score higher on admissions measures of aptitude than older examinees. A most reasonable and generally accepted reason for this finding is that younger examinees, having earned their undergraduate degrees more recently than older examinees, are more facile in using the set of academic skills tested by the GMAT than older students.

The candidate, of course, must weigh the advantages accruing from this "recency" effect against the fact that many graduate schools of business value "on-the-job" experience highly. Thus, other things being equal, candidates with several years of practical experience are generally preferred over students fresh out of undergraduate school. As a practical matter, students who decide to obtain a business degree after several years of work should be mindful of the relative weights that different schools accord to GMAT scores vs. on-the-job experience.

The variance in GMAT scores accounted for by age, holding other variables constant, was significant at PWI schools but not at HBCU's. The question arises whether this is a result of older students returning to schools at predominantly white schools rather than historically black colleges and universities. This turns out not to be the case [$t(1494) = 1.00$, ns]. The reasons for these differential effects of age as a function of racial composition of the school obviously requires further study. I will return to this point later.

GPA was consistently a stronger predictor of GMAT scores for students who attended historically black colleges and universities than this variable was for students who attended predominantly white schools. In every instance, GPA's of HBCU students explained more score variance than did GPA's of PWI students. One plausible hypothesis is that the GPA variance for African-American students is higher in historically black institutions than in predominantly white universities, thus allowing at least the possibility of more explanatory power. This turned out, however, not to be the case. The two variances ($\sigma^2_{hbcu} = 15.88$; $\sigma^2_{pwi} = 16.83$) do not differ

significantly. Nor can these results be explained by extreme differences in mean GPA, or ceiling/floor effects, since the mean GPA's of the two groups of students (2.98 and 2.80) are not very different, nor are they at the extremes of the GPA scale. Reasons for this finding do not appear to be traceable to statistical artifacts. This area obviously should be studied further to ascertain possible substantive explanations for this finding, as well as to determine whether investigations with other samples will yield similar results.

It is perhaps useful to revisit the finding regarding the higher performance of students who attend PWI's. As noted earlier, however, this finding is not necessarily a result of differences between HBCU's and PWI's. Rather, it is more likely a result of differences among HBCU and PWI students themselves, PWI's generally requiring from applicants evidence of higher levels of academic ability, as demonstrated through GPA and admissions test scores, than do HBCU's.

Studies similar to this investigation but which also examine high school GPA's, SAT scores, and student first year GPA's in MBA programs would provide more information regarding student academic achievements along a continuum beginning before undergraduate enrollment and continuing beyond GMAT scores. Such studies could provide information concerning academic differences among HBCU and PWI students. This information could show whether differences in performance between HBCU and PWI students are more likely a result of student differences as opposed to differences between HBCU and PWI institutions. Moreover, follow-up studies focusing on educational and career accomplishments would provide

further information for comparing ultimate success of HBCU and PWI GMAT examinees.

Because there was no way to determine why specific examinees chose specific preparation methods, and because it was not possible to control for amount or quality regarding the various GMAT preparation methods, definitive answers regarding the use of various GMAT preparation methods can not be offered. Nevertheless, certain general conclusions were suggested. A consistent and pervasive finding was that studying preparation materials other than those made available by ETS (PREPB) significantly increases the performance of African-American students on the GMAT. The present investigation also indicated that for HBCU students, attending a coaching course tended to have negative effects on GMAT performance. This seemingly contradictory finding was also noted by Bond (1989) and Messick (1980) who both concluded that the evidence for coaching and special preparation methods is rather ambiguous for African-American students. While more evidence is needed, this investigation suggests a fruitful line of investigation would involve comparing the relative effects of formal coaching courses, on the one hand, and private study of various preparation materials, on the other. In the few cases where taking a formal coaching course or class had any effect at all, it was negative (see Appendix C2), whereas the opposite was true for private study of preparation books and materials.

The absence of significant effects for all other preparation methods (studying the sample GMAT questions, working through an actual published GMAT, undertaking own independent review of mathematics) suggests that

any substantial improvements in performance on the GMAT (and very probably other standardized admissions tests as well) must involve sustained effort and not brief reviews or "cram" sessions. The conclusion is consistent with considerable research on coaching and special preparation (Alderman & Powers, 1979; Bond, 1989).

Generally, one might expect business majors to score higher than other students on the GMAT, an exam designed to be used by graduate schools of business. However, as indicated in the summary above, this investigation did not confirm this expectation. Rather, regression findings indicated that in the two instances when BUSEC was significant (GMATV total and GMATV PWI sample), non-business majors obtained higher GMATV scores than business majors. In none of the analyses was the BUSEC variable significant and positive. As discussed in Chapter 2 of this study, the GMAT is designed to measure complex verbal, analytical, quantitative, and problem-solving skills. Viewing GMAT content from this perspective, one can more readily understand why undergraduate business majors may not necessarily have an advantage over other GMAT examinees.

A fairly consistent finding was that Science and Social Science majors, as a group, tend to perform better on the GMATQ than other students. The specific majors subsumed under these broad science rubrics include, among others, mathematics, engineering, physics, computer science, psychology, and economics. These majors typically draw students with strong quantitative skills. The actual undergraduate work in these disciplines no doubt sharpens even further the quantitative skills that the GMATQ taps.

A Practical Recommendation for Students

Students who intend to pursue post-graduate degrees (whether in business or other professions) are likely to be required to take standardized admissions tests, most of which stress verbal and mathematical reasoning skills. Even if they major in subjects that do not include such mathematical courses such as College Algebra, a wise course of action would be to take such courses as electives. Students in general, and African-American students in particular, should be disabused early of the misguided notion that majoring in a discipline that is logically related to later graduate school success (e.g., majoring in political science as preparation for law school, or Business Administration as preparation for the MBA) is sufficient preparation for adequate performance on tests that are important in gaining admission to graduate school.

Recommendations for Future Research

Three major lines of research are suggested by the major results of this investigation. First, where practical and ethical, the major conclusions should be investigated experimentally. For example, the present results indicate that, even when all other factors influencing GMAT performance are held constant, African-American students who study commercially available preparation materials do better on the GMAT than other students. This finding would gain added credibility if students could be <u>randomly</u> assigned to various preparation conditions (e.g., commercial coaching courses, reviewing ETS materials, studying commercial books, etc.). In this

way, one of the major deficiencies of correlational investigations (the absence of <u>experimental</u> control) would be eliminated.

Second, in those instances where random assignment is not practically possible or ethically permissible, good measures of initial academic aptitude (e.g., the Scholastic Aptitude Test) and perhaps motivation would be highly desirable as statistical controls. For example, the present results indicated that students who attend PWI's and students majoring in the physical and social sciences perform better on the GMAT than students who attend HBCU's and students who major in non-science disciplines, and that no special advantage accrued to undergraduate business majors. An important question is whether all of these differences derive from initial ability. Since students cannot be randomly assigned to undergraduate majors or to the schools they attend, a study where initial ability measures are available would go far in disentangling the effects of curriculum and initial ability.

Third, the interaction of age with type of undergraduate institution attended requires further study, perhaps including case studies of individual institutions and intensive interviews with older students at predominantly white schools and historically black institutions. It is certainly conceivable that social variables (availability of family support systems, faculty "mentors," etc.) vary as a function of institution. These and more strictly academic factors cannot be ruled out.

BIBLIOGRAPHY

Adams, K. (1992, October 6). In the black. <u>News and Record</u>, p. D1.

Ahearn, L. (1992, September 6). Play it smart and diversify, author suggests. <u>News and Record</u>, p. E2.

Alali, A. O., Ross, J. L., & Calhoun, G. (1990). Black professors in higher education: a vanishing breed? <u>College Student Journal</u>, 23, 323-331.

All campuses of University of North Carolina must obey anti-bias laws, U.S. court rules. (1990, November 7). <u>Chronicle of Higher Education</u>, p. A28.

<u>The almanac of higher education</u>. (1992). Chicago: Editors of the <u>Chronicle of Higher Education</u>; Univ. of Chicago Press.

<u>American universities and colleges</u> (13th Ed.). (1987). New York: Walter de Gruyter, Inc.

Angoff, W. H. (1981). Equating and equity. In W. B. Schrader (Ed.), <u>Admissions Testing and the Public Interest</u> (pp. 15-20). San Francisco: Jossey-Bass, Publishers.

Angoff, W. H. & Johnson, E.G. (1990). The differential impact of curriculum on aptitude test scores. <u>Journal of Educational Measurement</u>, 27(4), 291-304.

Atwell calls for commitment to minority participation. (1988, February 1). <u>Newsletter of the American Council on Education</u>, pp. 1, 10.

Baird, L. L. (1975). Comparative prediction of first year graduate and professional school grades in six fields. <u>Educational and Psychological Measurement</u>, 35, 941-946.

Ballesteros, E. J. & Center, T. R. (1988). Whatever happened to access? <u>College and University</u>, 64 (1), 91 - 121.

Bass De Martinez, B. (1988). Political and reform agendas' impact on the supply of black teachers. <u>Journal of Teacher Education</u>, 39, 10-13.

Bean, A. (1975). The prediction of performance in an educational psychology master degree program. Educational and Psychological Measurement, 35, 963-967.

Beckham, B. (1987). Strangers in a strange land: the experience of blacks on white campuses. Educational Record, 74-78.

Black students in 90's still fight civil rights battle. (1992, October 12). News and Record, p. B2.

Blue-ribbon panel on minority participation appointed. (1988, February 1). Newsletter of the American Council on Education, p. 2.

Bond, L. (1981). Before the test: coaching, equity, and admissions. In W. B. Schrader (Ed.), Admissions Testing and the Public Interest (pp. 53-59). San Francisco: Jossey-Bass, Publishers.

Bond, L. (1989). The effects of special preparation on measures of scholastic ability. In R. L. Linn (Ed.), Educational Measurement (3rd ed.), (pp. 429-444). New York: Macmillan Publishing Company.

Brazziel, W. F. (1988). Improving SAT scores: pros, cons, methods. Journal of Negro Education, 57 (1), 81-93.

Broaddus, D. L. (1987). Crisis of minorities in American secondary and post secondary education. Contemporary Education, 59 (1), 30-33.

Byrne, J. A. (1990, December 10). Yessiree, real live MBA's! Get 'em while they last. Business Week, p. 36.

Byrne, J. A. (1991). Business Week's guide to the best business schools, (2nd Ed.). New York: McGraw-Hill.

Byrne, J. A. (1992). The best B schools: Business Week's new ranking is the most comprehensive yet. Business Week, pp. 60-70.

Cameron, R. G. (1989). Issues in testing bias. College and University, 64 (3), 269-277.

Campuses' role in leadership examined. (1988, February 1). Newsletter of the American Council on Education, p. 9.

Cargile, S. D., & Woods, J. E. (1988). Strengthening black students' academic preparedness for higher education. Journal of Black Studies, 2, 150-162.

Chase, C. I. & Jacobs, L. C. (1989). Predicting college success: the utility of high school achievement averages based on only "academic" course. College and University, 64(3), 403-408.

Cole, N. S. (1981). Bias in testing. American Psychologist, 36 (10), 1067-1077.

Cole, N. S. and Moss, P. A. (1989). Bias in test use. In R. L. Linn (Ed.), Educational Measurement (3rd ed.), (pp. 201-219). New York: Macmillan Publishing Company.

Collison, M. N. (1988, February 17). Fascination with business and the Orient fuels enrollment in Asian languages. Chronicle of Higher Education, p. A35.

Collison, M. N. (1992, February 5). Colleges have done a bad job of explaining affirmative action to students, critics say. Chronicle of Higher Education, pp. A37-A38.

Covert, R. W., & Chansky, N. M. (1975). The moderator effect of undergraduate grade point average on the prediction of success in graduate education. Educational and Psychological Measurement, 35, 947-950.

Crouse, J. (1985). Does the SAT help colleges make better decisions? Harvard Education Review, 55 (2), 195-219.

Crouse, J. (1985). This time the college board is wrong. Harvard Education Review, 55 (4), 478-486.

Crouse, J., & Trusheim, D. (1988). The case against the SAT. Chicago: The University of Chicago Press.

Davis, B. E. (1989). International awareness in American management education. Liberal Education, 75 (3), 28-31.

Dawes, R. M. (1971). A case study of graduate admissions: application of three principles of human decision making. American Psychologist, 26, 180-188.

Deckro, R. F. & Woundenberg, H. W. (1977). M.B.A. admission criteria and academic success. Decision Sciences, 8 (4), 765-769.

The declining-score mystery solved? (1986). Journal of Developmental Education, 10 (1), 28-29.

DeSousa, D. J. and King, P. M. (1992). Are white students really more involved in collegiate experiences than black students? Journal of College Student Development, 33, 363-369.

Donlon, T. F. (1984). The college board technical handbook or the scholastic aptitude test and achievement tests. New York: College Entrance Examination Board.

Downie, N. M. & Heath, R. W. (1983). Basic statistical methods. New York: Harper & Row, Publishers.

Ebel, R. L. (1975). Educational tests: valid? biased? useful? Phi Delta Kappan, 83-88.

Ebel, R. L. (1981). The social consequences of not testing. In W. B. Schrader Ed.), Admissions Testing and the Public Interest (pp. 31-37). San Francisco: Jossey- Bass, Publishers.

Ed issues civil rights findings. (1989). Higher Education & National Affairs, 38 (6), 6.

Evangelauf, J. (1990, January 31). Business-school accrediting group eyes changes to satisfy critics' complaints it is too exclusive. Chronicle of Higher Education, pp. A15, A17.

Fisher, J. B. & Resnick, D. A. (1990). Standardized testing and graduate business school admission: a review of issues and an analysis of a Baruch College MBA cohort. College and University, 65 (2), 137-147.

Fleming, J. (1984). Blacks in college. New York: Jossey-Bass Publishers.

Fowler, E. M. (1992, April 7). Revamping the training of M.B.A.'s. The New York Times, p. D21.

Freedle, R. and Kostin, I. (1990). Item difficulty of four verbal item types and an index of differential item functioning for black and white examinees. Journal of Educational Measurement, 27 (4), 329-343.

Fuller, B. (1981). Improving the use of admissions tests: learning from the national debates. In W. B. Schrader (Ed.), Admissions Testing and the Public Interest (pp. 71-79). San Francisco: Jossey-Bass, Publishers.

Gayle, J. B. & Jones, T. H. (1973). Admission standards for graduate study in management. Decision Sciences, 4 (1), 421 - 425.

Glaser, R. and Bond, L. (1981). Testing: concepts, policy, practice, and research. American Psychologist, 36 (10), 997-1000.

Glazer, N. (1990, July 20). Frustrated blacks and weary whites. The Times Higher Education Supplement, p. 15.

Golias, D. (1990). Minority teacher recruitment. The Journal of College Admissions, 21-23.

Goodchild, L. F. & Wechsler, H. S. (Eds.). (1989). ASHE reader on the history of higher education. Needham Heights, MA.: Ginn Press

Graduate management admission test 92-93 bulletin of information and registration form (1992). Princeton: Graduate Management Admission Council.

Graham, L. D. (1991). Predicting academic success of students in a Master of Business Administration program. Educational and Psychological Measurement, 51 (3), 721-727.

Green, B. F. (1981). A primer of testing. American Psychologist, 36 (10), 1001-1011.

Green, M. F. (Ed.) (1989). Minoritries on campus: A handbook for enhancing diversity. Washington, D. C.: American Council on Education.

Green, R. L. (1975). Tips on educational testing: what teachers & parents should know. Phi Delta Kappan, 89-92.

Greenlees, J. (1991, January 2) Japan fears loss from stifling exams. The Times Higher Education Supplement, p. 9.

Haney, W. (1981). Validity, vaudeville, and values. American Psychologist, 36 (10), 1021-1034.

Hanford, G. H. (1985). Yes, the SAT does help colleges. Harvard Education Review, 55 (3), 324-331.

Hartnett, R. T. & Willingham, W. W. (1980). The criterion problem: what measure of success in graduate education? Applied Psychological Measurement, 4 (3), 281-291.

Hecht, L. W. & Powers, D. E. (1982). GMAC research report 82-1, The predictive validity of preadmission measures in graduate management education: three years of the GMAC validity study service. Princeton: Graduate Management Admission Council.

Henry, W. A. (1990, April 9). Beyond the melting pot. Time, pp. 28-31.

Heubert, J. (1991, November 6). For the Supreme Court, a stark choice on civil rights. The Chronicle of Higher Education, pp. B1-B2.

Higgerson, M. L. and Higgerson, R. G. (1991). Affirmative action guidelines: do they impede progress? CUPA Journal, 11-14.

Hodges, L. (1991, December 20). New rules on race cash. The Times Higher Education Supplement, p. 1.

Hopkins, K. D., Stanley, J. C. & Hopkins, B. R. (1990). Educational and psychological measurement and evaluation. Englewood Cliffs: Prentice-Hall, Inc.

Horton, C. P. & Smith, J. C. (1990). Statistical record of black America. Detroit: Gale Research, Inc.

Hotch, R. (1992). This is not your father's MBA. Nation's Business, 80, 51-52.

How the President's '92 budget proposals would affect higher education and science. (1991, February 13). Chronicle of Higher Education, pp. A1, A20-A21.

Jaschik, S. (1991, January 9). Colleges fear debate on minority scholarships may fuel racial tension. Chronicle of Higher Education, pp. A1, A32.

Jaschik, S. (1991, January 9). Department's new stance on minority scholarships is so muddled it's useless, many legal experts say. Chronicle of Higher Education, p. A33.

Jaschik, S. (1991, February 15). Education nominee says he would revoke policies barring minority scholarships. Chronicle of Higher Education, pp. A1, A28.

Jaschik, S. (1992, January 8). U. S. may bar solicitation of gifts for minority scholarships. Chronicle of Higher Education, p. A24, A36.

Jaschik, S. (1992, January 8). U. S. judge orders steps to end segregation of Alabama state colleges; appeal expected. Chronicle of Higher Education, pp. A24, A35.

Kaplan, R. M. (1982). Nader's raid on the testing industry: is it in the best interest of the consumer? American Psychologist, 37 (1), 15-23.

Kaplan, R. M. & Saccuzzo, D. P. (1989). Psychological testing-principles, applications, and issues, (2nd ed.). Pacific Grove, California: Brooks/Cole Publishing Co.

Keeter, L. (1987). Minority students at risk: an interview with Professor Shirley Chisholm. Journal of Developmental Education, 10 (3), 18-21.

King's dream: 'alive, but still denied' (1988, February 1). Newsletter of the American Council on Education, pp. 1, 10.

Kubota, M. and Connell, A. (1991-92). On diversity and the SAT. The College Board Review, 162, 6-17.

Leary, L. F. & Wightman, L. E. (1983). Estimating the relationship between use of test-preparation methods andscores on the Graduate Management Admission Test. Princeton: Graduate Management Admission Council.

Lee, W. S. (1988, August 29). Education influences economic development. Triad Business Weekly, News and Record, p. 4.

Lewis, L. S. and Altbach, P. G. (1992). The new civil rights law and doctoral education. Academe, 12-16.

Maeroff, G. I. (1985, August 11). Harvard to drop an admission test. New York Times, p. 125.

Magner, D. K. (1990, January 10). Panel Calls for radical changes in schools to improve education for minority groups. The Chronicle of Higher Education, pp. A1, A35.

Marquand, R. (1988, June 16). Racism on campus. Christian Science Monitor, pp. 1, 16.

Martz, G. & Katzman, J. (1991). The Princeton review - cracking the system, the GMAT. New York: Villard Books.

McGrath, A. (1985, September 23). GMAT flunks out at Harvard. Forbes, pp. 199-200.

McKenna, B. (1987-88). Ringing an alarm for higher education. Educational Record, 5.

McKenna, J. F. (1991). Management in the 21st century: a modest proposal. SAM Advanced Management Journal, 4 - 8.

Messick, S. (1980). The effectiveness of coaching for the SAT: review and reanalysis of research from the fifties to the FTC (ETS Research Report No. 80-8). Princeton, NJ: Educational Testing Service.

Messmer, D. J. & Solomon, R. L. (1979). Differential predictability in a selection model for graduatestudents: implications for validity testing. Educational and Psychological Measurement, 39 (4), 859 - 866.

Miller, S. and Cunningham, B. (1992). A guided workexperience program for minority students. Journal of College Student Development, 33, 373-374.

Mintz, F. (1986). Retraining: the graying of the training room. Personnel, 63 (10), 69 - 71.

Morgan, G. (1989). Drastic changes for management. Business Month, 67 - 70.

Morgan, J. (1990). Those highly desirable selective black colleges: appplication overflow creates an embarassment of riches. Black-Issues in Higher Education, 6 (23), 1, 13-15.

Mutter, P. (1992). Tinto's theory of departure and community college student persistence. Journal of College Student Development, 33 (4), 310-318.

Nairn, A. & Associates (1980). The reign of ETS. Washington, D.C.: Ralph Nader.

Nash, B. J. (1992, December. Center words for diversity. News and Record, p. E1.

Oakes, J. (1990). Multiplying inequalities: the effectsof race, social class, and tracking on opportunities to learn mathematics and science. Santa Monica, CA: Rand Corporation.

O'Brien, E. M. (1990). AAU exhorts federal government to support minority Ph.D. students. Black-Issues in Higher Education, 6 (23), 1, 4.

One-third of a Nation. (1988). Washington, D.C.: American Council on Education.

Ogbu, J. U. (1990). Understanding diversity. Education and Urban Society, 22 (4), 425-429.

Olivas, M. (1990, December 19). The federal attack on minority scholarships is mean-spirited and legally unwarranted. Chronicle of Higher Education, pp. B1-B3.

Orfield, G. & Paul, F. (1987-88). Declines in minority access: a tale of five cities. Educational Record. 57 - 62.

Owen, D. (1985). None of the above: behind the myth of scholastic aptitude. Boston: Houghton Mifflin.

Panel calls for renewed commitment to minorities. (1988). Higher Education & National Affairs, 37 (10), 1, 7.

Paolillo, J. G. (1982). The predictive validity of selected admissions variables relative to grade point average earned in a Master of Business Administration program. Educational and Psychological Measurement, 42 (4), 1163 - 1167.

Pass rates prompt admissions rethink. (1990, July 7). The Times Education Supplement, p. 11.

Payne, N. J. (1987-88). The role of black colleges in an expanding economy. Educational Record, 104-107.

Peller, G. (1991, December 18). Espousing a positive vision of affirmative-action policies. Chronicle of Higher Education, pp. B1-B2.

Regur, N. M. (1991, January 16). Japanese colleges urged to curb reliance on entrance exams. Chronicle of Higher Education, p. A43.

Report signals push for minority paricipation. (1988). Newsletter of the American Council on Education, 37 (10), 1, 6.

School colors: uneasy gray between black and white (1988, June 14). The Christian Science Monitor, pp. 1, 16, 17.

Schrader, W. B. (1979). The Graduate Management Admissions Test: technical report on test development and score interpretation for GMAT users. Princeton: Educational Testing Service.

Senator says colleges hold key to future challenges. (1988, February 1). Newsletter of the American Council on Education, p. 9.

Shom, C. L. & Spooner, S. (1991). Minorities and the egalitarian-meritocratic values conflict in American higher education: new answers for an old problem. Journal of Multicultural Counselling and Development, 19(4), 182-190.

Smith, J. H., Simpson-Kirkland, D., Zimmern, J. C., Goldstein, E., and Prichard, K. (1986). The five most important problems confronting black students today. The Negro Educational Review, 37 (2), 53-61.

Snyder, T. D. & Hoffman, C. M. (1990). Digest of Education Statistics 1990. Washington, D.C.: Department of Health, Education, and Welfare; Education Division; National Center for Education Statistics.

Thorndike, R. L. (1971). Concepts of culture-fairness. Journal of Educational Measurement, 8(2), 63-82.

Tumin, M. M. (1981). The functions of testing. In W. B. Schrader (Ed.), Admissions Testing and the Public Interest (pp. 21-29). San Francisco: Jossey-Bass, Publishers.

Two cheers for affirmative action. (1992). The College Board Review, 163, 40.

UCLA in dock over quotas. (1990, October 12). The Times Higher Education Supplement, p. 10.

Vaz, K. (1987). Building retention systems for talented minority students a ttending white universities. The Negro Educational Review, 38 (1), 23-29.

Wallace, P. (1990, December 19). Colleges should develop new ways to meet the training needs of business. Chronicle of Higher Education, p. A36.

Watson, B. C. (1981). The social consequences of testing: another view. In W. B. Schrader (Ed.), Admissions Testing and the Public Interest (pp. 39-51). San Francisco: Jossey-Bass, Publishers.

White, B. J. (1992, May 3). M.B.A. in reality. New York Times, p. III8.

White, D. M. (1985). Two views of standardized testing. Harvard Educational Review, 55 (3), 332-341.

Whitney, D. N. (1989). Educational admissions and placement. In R. L. Linn (Ed.), Educational Measurement (3rd ed.), (pp. 515-525). New York: Macmillan Publishing Company.

Wiley, E. (1991). Teacher exams still wreaking havoc on minority teachers. Black-Issues in Higher Education, 6 (23), 1, 12-14.

Williams, T. M. and Leonard, M. M. (1988). Graduating black undergraduates: the step beyond retention. Journal of College Student Development, 69-75.

Wilson, R. (1989). Affirmative action: yesterday, today, & tomorrow. CUPA Journal, 1-6.

Wisconsin to re-tool recruitment plans as minority enrollment dips 17%. (1991, October 23). The Chronicle of Higher Education, A37.

Wolfman, B. R. (1990, September 12). College leaders must act firmly to end racial resegregation on their campuses. The Chronicle of Higher Education, B1, B3.

Worthen, B. R. and Spandel, V. (1991). Putting the standardized test debate in perspective. Educational Leadership, 48 (5), 65-69.

Youngblood, S. A. & Martin, B. J. (1982). Ability testing and graduate admissions: decision process modeling and validation. Educational and Psychological Measurement, 42 (2), 1153 - 1162.

Zapata, J. T. (1988). Early identification and recruitment of Hispanic teacher candidates. Journal of Teacher Education, 19-23.

Appendix A

Sample Graduate Management Admission Test*

Sample Questions

The sample questions that follow will familiarize you with the types of questions in the test. Although the sample questions represent the general nature of the test, it is possible that a type of question not illustrated may appear in the test or that material illustrated may not appear. Directions are similar to those in the test.

All GMAT test books contain seven separately timed sections, but all examinees at an administration do not necessarily receive the same test book. For any particular test book, one of the seven sections contains trial questions needed for pretesting and equating, but they are not identified and appear in varying locations within the test. You should therefore do your best on all sections. Answers to the trial questions are not counted in the scoring of your test.

All questions are in English and are of the multiple-choice type. Each question is followed by five lettered choices from which you are asked to choose the one you think best. After you complete the sample questions, check your answers against the key on page 19. A separate answer sheet will be provided on the day of the test.

You may use the answer sheet below to mark your answers to the questions that follow.

PRACTICE ANSWER SHEET

1 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	19 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	
2 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	20 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	
3 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	21 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	
4 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	22 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	
5 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	23 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	
6 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	24 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	
7 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	25 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	
8 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	26 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	
9 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	27 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	
10 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	28 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	
11 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	29 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	
12 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	30 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	
13 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	31 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	
14 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	32 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	
15 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	33 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	
16 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	34 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	
17 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	35 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	
18 Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ		

Reading Comprehension

Directions: Each passage in this group is followed by questions based on its content. After reading a passage, choose the best answer to each question and fill in the corresponding oval on the answer sheet. Answer all questions following a passage on the basis of what is stated or implied in that passage.

One sample reading passage follows.

SAMPLE PASSAGE

Historians have long thought that America was, from the beginning, profoundly influenced by the Lockean notion of liberty, with its strong emphasis on individual rights and self-interest. Yet in his recent book, historian J. G. A. Pocock argues that early American culture was actually rooted in the writings of Machiavelli, not Locke. The implications of this substitution are important: if Pocock's argument is right, then Americans may not be as deeply individualistic and capitalistic as many believe.

Pocock argues that out of the writings of antiquity Machiavelli created a body of political thinking called "classical republicanism." This body of thought revived the ancient belief that a human being was by nature a citizen who achieved moral fulfillment by participating in a self-governing republic. Liberty was interpreted as a condition that is realized when people are virtuous and are willing to sacrifice their individual interests for the sake of the community. To be completely virtuous, people had to be independent and free of the petty interests of the marketplace. The greatest enemy of virtue was commerce. This classical republican tradition is said by Pocock to have shaped the ideology of America during the eighteenth century.

Many events in early American history can be reinterpreted in light of Pocock's analysis. Jefferson is no longer seen as a progressive reader of Locke leading America into its individualistic future; instead Jefferson is understood as a figure obsessed with virtue and corruption and fearful of new commercial developments. Influenced by Pocock, some historians have even argued that a communitarian and precapitalist mentality was pervasive among the eighteenth-century farmers of America.

Yet Pocock's thesis and the reinterpretation of the history of eighteenth-century America engendered by it are of dubious validity. If Americans did believe in the ideals of classical virtue that stressed civic duty and made the whole community greater than its discrete parts, then why did the colonists lack a sense of obligation to support the greater good of the British Empire? If indeed America has not always been the society of individual rights and self-interest that it is today, how and when did it become so? Classical republicanism is elitist, and it certainly had little to offer the important new social groups of artisans and shopkeepers that emerged in America during the eighteenth century. These middle-class radicals, for whom John Wilkes and Thomas Paine were spokesmen, had none of the independence from the market that the landed gentry had. They were less concerned with virtue and community than they were with equality and private rights. They hated political privilege and wanted freedom from an elite-dominated state. In short, the United States was created not in a mood of classical anxiety over virtue and corruption, but in a mood of liberal optimism over individual profits and prosperity.

SAMPLE QUESTIONS

1. Which of the following best states the author's main point?
   (A) Classical republicanism could not have been the ideological basis of eighteenth-century America.
   (B) Classical republicanism is an elitist theory that was rejected by eighteenth-century artisans and shopkeepers.
   (C) Pocock understates the importance of the contributions Machiavelli made to the formation of early American culture.
   (D) Pocock fails to capture the great extent to which eighteenth-century Americans were committed to a sense of civic duty.
   (E) Pocock's account of Jefferson is incompatible with Jefferson's commitment to a Lockean notion of liberty.

2. The conception of liberty that, according to Pocock, formed the basis of America's eighteenth-century ideology is most clearly exhibited by which of the following individuals?
   (A) The merchant who rebuilds the damaged sidewalk in front of his store in order to avoid potential lawsuits by customers who might fall there
   (B) The professor who allows her students to help her design the content and the format of the courses she teaches
   (C) The doctor who bows to government pressure and agrees to treat a small number of low-income patients at no cost
   (D) The lawyer who argues that a state law prohibiting smoking in public places unfairly encroaches on the rights of smokers
   (E) The engineer whose business suffers as a result of the personal time and energy he devotes to a program to clean up city streets

3. According to the author, eighteenth-century American artisans and shop-keepers had little reason to
   (A) support the political efforts of Thomas Jefferson
   (B) reject the ideals of classical virtue
   (C) embrace the principles of classical republicanism
   (D) renounce the political objectives of the British Empire
   (E) worry about increasing profits and maintaining general prosperity

4. The author mentions which of the following as a fact that weakens Pocock's argument about the ideology of eighteenth-century America?
   (A) Jefferson's obsession with virtue and corruption and his fear of commercial development
   (B) The precapitalist mentality that was pervasive among farmers in early America
   (C) The political decline of artisans and shopkeepers in eighteenth-century America
   (D) The colonists' lack of commitment to support the general welfare of the British Empire
   (E) The existence of political privilege in early American society

5. The passage suggests that, if classical republicanism had been the ideology of eighteenth-century America, which of the following would have resulted?
   (A) People would have been motivated to open small businesses and expand commercial activity.
   (B) Citizens and politicians would not have been encouraged to agitate for increased individual rights.
   (C) People would have been convinced that by pursuing their own interests they were contributing to the good of the group.
   (D) The political and social privileges enjoyed by the landed gentry would have been destroyed.
   (E) A mood of optimism among people over individual profits and prosperity would have been created.

6. The author implies that Pocock's argument about the ideology of eighteenth-century America would be more plausible if the argument explained which of the following?
   (A) How a society that was once committed to the ideals of classical virtue could be transformed into a society of individual rights and self-interest
   (B) How Thomas Jefferson could have become obsessed with individual rights and with prosperity and profits
   (C) Why classical republicanism had such wide appeal among those who were free from the demands of the marketplace
   (D) Why many colonists who embraced classical republicanism were reluctant to place their individual interests above those of Great Britain
   (E) Why the landed gentry in eighteenth-century America should have believed that moral fulfillment is achieved by participating in a self-governing republic

7. According to the passage, Pocock's theory suggests that many eighteenth-century Americans believed that increasing commercial activity would
   (A) force the landed gentry to relinquish their vast holdings
   (B) enrich the nation and increase individual rights
   (C) cause some people to forfeit their liberty and virtue
   (D) create a mood of optimism about national prosperity
   (E) strengthen the political appeal of middle-class radicals

8. The author is primarily concerned with
   (A) refuting a proposed thesis about eighteenth-century America
   (B) analyzing a long-established interpretation of American history
   (C) criticizing a set of deeply held beliefs about early American ideology
   (D) reconciling opposing interpretations of eighteenth-century American ideology
   (E) defending a novel reading of the ideology of eighteenth-century America

Critical Reasoning

Directions: For each question in this section, select the best of the answer choices given.

9. If a car was built after 1965, it has harness-style seat belts in the front seats.
   From which of the following can the statement above be properly inferred?
   (A) Harness-style seat belts first appeared in cars in the late 1950's.
   (B) No seat belts other than harness-style seat belts were used in the front seats of cars after 1965, but all cars built after 1965 were required to have seat belts in the front seats.
   (C) Some cars built before 1965 have harness-style seat belts in the front seats.
   (D) Seat belts were not required in cars built before 1965, but many people who had observed the benefits of seat belts on racing cars had them installed.
   (E) All cars built after 1960 were required to have seat belts in the front seats, but not necessarily harness-style seat belts.

10. Each year's increase or decrease in productivity — that is, in the amount of goods and services produced in an hour's paid working time — is calculated in relation to that of the previous year. In 1982, the productivity of workers in nonfarm private business was 5 percent higher than in 1981, while overall private business productivity, when farming was included, was 4.8 percent higher than in 1981. That 4.8 percent increase in 1982 was double the increase recorded in 1981.
    If the information above is accurate, which of the following must be true?
    (A) More workers left farming for work in nonfarm private business in 1982 than in 1981.
    (B) Average hourly wages of workers in nonfarm private business in 1982 declined from 1981.
    (C) In 1982, the increase in the productivity of nonfarm private business was more than double the increase recorded in 1981.
    (D) In 1982, the increase, if any, in the profits of nonfarm private business was smaller than the increase in the profits of farming.
    (E) In 1982, the increase, if any, in the productivity of farming was smaller than the increase in nonfarm private business productivity.

11. From a letter to the editor of a newsmagazine:
    Your report of July 9 attributes the recent electoral victory of the Liberal party to shameless manipulation of the boundaries of electoral districts. Your claim is plainly wrong. If the election results are analyzed as if the redrawing of electoral boundaries had never happened, the Liberal party still ends up with a majority of seats.
    The writer of the letter above makes which of the following assumptions?
    (A) Voter turnout and voting preferences would have been the same if the electoral districts had remained unchanged.
    (B) Before its recent victory, the Liberal party had a smaller majority of seats than at present.
    (C) Even after they were redrawn, the electoral boundaries remained fair and equitable to all political parties.
    (D) The voting public did not recognize the true motivation behind the redrawing of electoral boundaries.
    (E) The newsmagazine is pursuing an editorial policy of trying to tarnish the public image of the Liberal party.

12. Ms. Jones has concluded that she would be better off if she stopped fertilizing her corn crops. "Fertilizers are expensive. True, if all goes well, a bumper crop results. But, as an old rule of economic life teaches us, a large supply of a commodity depresses its price. So I figure that using fertilizers is counterproductive."

Which of the following distinctions would be most useful in analyzing a major flaw in Ms. Jones' reasoning?

(A) Synthetic fertilizers vs. natural fertilizers
(B) Prices paid to farmers vs. prices paid by end users
(C) Individually produced supply vs. aggregate supply on the market
(D) "Expensive" in comparison with alternatives vs. "expensive" in relation to ultimate benefits
(E) Economic goals vs. agricultural goals

13. In studying the global effects of oil price fluctuations, some analysts argue that oil price increases have a greater impact on curtailing the economic growth and increasing the trade deficits of industrial countries than of developing countries, which use less energy per capita than industrial countries.

Which of the following, if true, would weaken the argument above?

(A) Rapid fluctuations in oil prices discourage investors from financing new oil discovery ventures because the rate of return on investment cannot be predicted.
(B) The aggregate trade deficits of developing countries are larger than the aggregate deficits of oil-importing industrial countries.
(C) A drop in the revenues of oil-producing countries reduces their ability to import essential goods from both industrial countries and developing countries.
(D) Developing countries use energy for more essential purposes than industrial countries do and are less able to cut demands when oil prices rise.
(E) Oil companies that receive more revenue from production than from refining and distribution of oil pay less in taxes when oil prices decline.

14. In 1930 there were, on the average, 4.1 persons reported as living in each household. By 1950 there were 3.5, and by 1970 there were 3.1. Today there are 2.8 persons reported per household, and it appears that the trend toward smaller households is continuing.

Each of the following, if true, could help to account for this trend EXCEPT:

(A) The divorce rate has increased.
(B) The birth rate has decreased.
(C) Institutional geriatric care has become more widely practiced.
(D) Tax advantages for claiming resident dependents have decreased.
(E) The enrollment of children at day-care centers has increased.

Data Sufficiency

Directions: Each of the data sufficiency problems below consists of a question and two statements, labeled (1) and (2), in which certain data are given. You have to decide whether the data given in the statements are sufficient for answering the question. Using the data given in the statements plus your knowledge of mathematics and everyday facts (such as the number of days in July or the meaning of counterclockwise), you are to fill in oval

A if statement (1) ALONE is sufficient, but statement (2) alone is not sufficient to answer the question asked;
B if statement (2) ALONE is sufficient, but statement (1) alone is not sufficient to answer the question asked;
C if BOTH statements (1) and (2) TOGETHER are sufficient to answer the question asked, but NEITHER statement ALONE is sufficient;
D if EACH statement ALONE is sufficient to answer the question asked;
E if statements (1) and (2) TOGETHER are NOT sufficient to answer the question asked, and additional data specific to the problem are needed.

Numbers: All numbers used are real numbers.
Figures: A figure in a data sufficiency problem will conform to the information given in the question, but will not necessarily conform to the additional information given in statements (1) and (2).
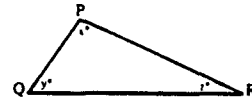You may assume that lines shown as straight are straight and that angle measures are greater than zero.
You may assume that the positions of points, angles, regions, etc., exist in the order shown.
All figures lie in a plane unless otherwise indicated.

Example:

In △ PQR, what is the value of x?
(1) PQ = PR
(2) y = 40

Explanation: According to statement (1), PQ = PR; therefore, △PQR is isosceles and y = z. Since x + y + z = 180, x + 2y = 180. Since statement (1) does not give a value for y, you cannot answer the question using statement (1) by itself. According to statement (2), y = 40; therefore, x + z = 140. Since statement (2) does not give a value for z, you cannot answer the question using statement (2) by itself. Using both statements together you can find y and z; therefore, you can find x, and the answer to the problem is C.

15. What was the gross income of Corporation C for year X?
(1) For year Y, the gross income of Corporation C was $8,300,000.
(2) The gross income of Corporation C for year X represented a 5 percent increase over the gross income for year Y.

16. What is the value of x?
(1) y − x = 7
(2) 3x + y = 39

17. During the first year after a homeowner had installed a solar-powered attic fan, the cost of air-conditioning her home was x dollars less than it was the previous year. What was the value of x?
(1) The total cost of purchasing and installing the fan was $350.
(2) During the first year after the fan was installed, the homeowner's cost for air-conditioning was reduced by 24 percent of the previous year's cost.

18. Are the integers p, q, and r consecutive integers?
(1) The sum of p, q, and r is 15.
(2) r is 1 greater than q and q is 1 greater than p.

19. A wire 22 meters long is cut into three pieces. How long is the longest piece?
(1) Two pieces are each 1 meter shorter than the longest piece.
(2) One piece is 7 meters long.

20. What is the ratio of the area of circular region A to the area of circular region B?
(1) The ratio of the circumference of A to the circumference of B is 3 to 1.
(2) The radius of A is 9 centimeters and the circumference of B is 6π centimeters.

21. If t and r are positive integers and r is a divisor of t, is r a prime number?
(1) 5r = t
(2) The smallest divisor of t that is greater than 1 is r.

Problem Solving

Directions: In this section solve each problem, using any available space on the page for scratchwork. Then indicate the best of the answer choices given.

Numbers: All numbers used are real numbers.

Figures: Figures that accompany problems in this section are intended to provide information useful in solving the problems. They are drawn as accurately as possible EXCEPT when it is stated in a specific problem that its figure is not drawn to scale. All figures lie in a plane unless otherwise indicated.

22. An earth science class had a 50-minute laboratory period during which 5 minutes were spent in distributing and collecting material and 10 minutes were spent in discussing the project for the day. If the remaining time was spent in work on the project, what percent of the period was devoted to work on the project?
(A) 80% (B) 75% (C) 70% (D) 60% (E) 50%

23. On the number line, what is the number that is 1/4 of the distance from 5.1 to 5.3?
(A) 5.125 (B) 5.15 (C) 5.2 (D) 5.25 (E) 5.35

24. One-third of the rooms in the Chateau Hotel have a narrow view, and the rate for each of these is 1.2 times the rate for each of the remaining 180 rooms. If the rate for the rooms without a harbor view is d dollars per day, what is the hotel's maximum income, in dollars, from room rentals for one day?

(A) 204d (B) 234d (C) 240d (D) 270d (E) 288d

25. If $\frac{1}{x} - x = \frac{3}{2}$ and $x > 0$, then $x =$

(A) $\frac{1}{2}$ (B) 1 (C) $\frac{3}{2}$ (D) 2 (E) $\frac{5}{2}$

26. If the volume of cube X is 8 cubic meters, what is its total surface area in square meters?

(A) 8 (B) 16 (C) 24 (D) 48 (E) 64

27. The driving time for a 100-mile trip from Townsville to Cityville was $2\frac{1}{2}$ hours. The return trip was made by the same route but at an average rate of speed that was 50 percent faster. What was the total amount of driving time for the entire round trip?

(A) 3 hours, 45 minutes
(B) 4 hours, 10 minutes
(C) 4 hours, 16 minutes
(D) 4 hours, 45 minutes
(E) 6 hours, 15 minutes

28. Last year, a car company sold 4 times as many large cars as small. This year, it sold 3 times as many small cars as large. If, in both years, it sold the same number of cars and the average (arithmetic mean) price of a small car was $5,000 whereas the average price of a large car was $8,000, what is the ratio of dollar sales this year to last?

(A) $\frac{15}{32}$ (B) $\frac{22}{37}$ (C) $\frac{115}{148}$ (D) $\frac{29}{28}$ (E) $\frac{6}{5}$

Sentence Correction

Directions: In each of the following sentences, some part of the sentence or the entire sentence is underlined. Beneath each sentence you will find five ways of phrasing the underlined part. The first of these repeats the original; the other four are different. If you think the original is better than any of the alternatives, choose answer A; otherwise, choose one of the others. Select the best version and fill in the corresponding oval on your answer sheet.

This is a test of correctness and effectiveness of expression. In choosing answers, follow the requirements of standard written English; that is, pay attention to grammar, choice of words, and sentence construction. Choose the answer that expresses most effectively what is presented in the original sentence; this answer should be clear and exact, without awkwardness, ambiguity, or redundancy.

29. As farmland has continued to erode, farmers have applied more fertilizer both so that eroded topsoil will be substituted for and fertility should be enhanced.

(A) so that eroded topsoil will be substituted for and fertility should be enhanced
(B) to substitute for eroded topsoil and to enhance fertility
(C) that eroded topsoil might be substituted for and fertility enhanced
(D) so as to substitute for eroded topsoil and fertility will be enhanced
(E) to substitute for eroded topsoil and that fertility might be enhanced

30. The migration of industries and workers from the states of the Northeast to the Southwest is greater this year than it was in other recent years.

(A) the Southwest is greater this year than it was in other recent years
(B) the Southwest is greater this year than recent years were
(C) those of the Southwest is greater this year than it has been in recent years
(D) the Southwest was greater this year than it was recently
(E) those of the Southwest was greater this year than it had recently been in other years

31. As the British criminologist Radzinowiez maintains, the harsher the penalties formally required by statute, judges and juries are less willing to impose them.

(A) judges and juries are less willing to impose them
(B) imposing them becomes something judges and juries are less willing to do
(C) judges and juries become less willing about imposing them
(D) the less willing does imposing them by judge and jury become
(E) the less willing judges and juries are to impose them

32. Perhaps only among populations that have raised dairy animals for the past 10,000 years or so people retain beyond childhood the ability that they can produce lactase, the enzyme that enables them to digest milk products.

(A) people retain beyond childhood the ability that they can produce
(B) people retain beyond childhood the ability to produce
(C) is the ability of people retained beyond childhood to produce
(D) do people retain beyond childhood their ability for producing
(E) do people retain beyond childhood the ability to produce

33. Usually Alsatian children choose German as their first foreign language at school, unlike in other areas of France, where English is the first foreign language.

(A) Usually Alsatian children choose German as their first foreign language at school, unlike in other areas of France, where English is the first foreign language.
(B) Unlike those in other areas of France where English is the first foreign language, usually Alsatian children choose German as their first foreign language at school.
(C) Alsatian children usually choose German as their first foreign language at school; in other areas of France, English is the first foreign language.
(D) In other areas of France English is the first foreign language; but, usually, Alsatian children at school choose German to be their first foreign language.
(E) German is usually chosen as the first foreign language at school by Alsatian children, unlike in other areas of France in which English is the first foreign language.

34. Cleveland that Sarah Short Austen, former vice president of the National Urban Coalition, remembers was a progressive city, the first of its size to elect a Black man, Carl Stokes, as mayor.

(A) Cleveland that Sarah Short Austen, former vice president of the National Urban Coalition, remembers
(B) The Cleveland that Sarah Short Austen, former vice president of the National Urban Coalition, remembers
(C) The city of Cleveland that Sarah Short Austen, who has been a former vice president of the National Urban Coalition, remembered
(D) The Cleveland that Sarah Short Austen, once a former vice president of the National Urban Coalition, has remembered
(E) Cleveland, a city remembered by Sarah Short Austen, once a former vice president of the National Urban Coalition,

35. Implicit in the manifesto were a rejection of the belief that government can solve all social problems with new programs, acknowledging that capital formation and business growth are important for a healthy economy, and a realization that military resolve is necessary to counter the Soviet threat.

(A) acknowledging that capital formation and business growth are important for a healthy economy, and a realization
(B) acknowledging that capital formation and business growth are important for a healthy economy, and realizing
(C) to acknowledge that capital formation and business growth are important for a healthy economy, and to realize
(D) an acknowledgment that capital formation and business growth are important for a healthy economy, and a realization
(E) an acknowledgment of capital formation and business growth being important for a healthy economy, and a realization

Answer Key

1. A	7. C	13. D	19. A	25. A	31. E
2. E	8. A	14. E	20. D	26. C	32. E
3. C	9. B	15. C	21. B	27. B	33. C
4. D	10. E	16. C	22. C	28. C	34. B
5. B	11. A	17. E	23. B	29. B	35. D
6. A	12. C	18. B	24. E	30. C	

Appendix B

Table B

ETS CLASSIFICATION OF MAJORS FOR GMAT ADMINISTRATION	
Major	Components of Major
Science	Architecture
	Biological Sciences
	Chemistry
	Computer Science
	Engineering
	Mathematics
	Physics
	Statistics
	Other Science
Business and Commerce (Business Majors)	Accounting
	Business Education
	Finance
	Hotel Administration
	Industrial Relations
	Management
	Marketing
	Other Business and Commerce
Humanities	English
	Fine Arts
	Foreign Language
	Philosophy
	Other Humanities
Social Science	Economics
	Education
	Government
	History
	Political Science
	Psychology
	Sociology
	Other Social Science
Other	Major Components not listed above.

Appendix C1

Table C-1

SUMMARY OF FINDINGS ON VARIABLES FOR UNDERGRADUATE MAJORS					
	SCIENCE	BUSEC	HUM	SOCSC	OTHER
Total Sample GMATV	.	—	.	.	--
Total Sample GMATQ	+	.	.	+	.
Total Sample GMATT	+	.	+	+	.
HBCU GMATV	.	.	.	+	.
HBCU GMATQ	+	.	.	.	.
HBCU GMATT	.	.	.	.	.
PWI GMATV	.	—	.	.	--
PWI GMATQ	+	.	+	+	.
PWI GMATT	+	.	+	+	.

+ indicates that the regression coefficient for that variable was
    significant and positive
-- indicates that the regression coefficient for that variable was
    significant and negative

Appendix C2

Table C-2

SUMMARY OF FINDINGS BY GMAT PREPARATION METHODS					
	BULL	ETSG	PREPB	COAC	OWNM
Total Sample GMATV	.	.	+	.	.
Total Sample GMATQ	.	.	+	.	.
Total Sample GMATT	.	.	+	.	.
HBCU GMATV	.	.	.	--	.
HBCU GMATQ	.	.	+	.	.
HBCU GMATT	.	.	+	--	.
PWI GMATV	.	.	+	.	.
PWI GMATQ	.	.	+	.	.
PWI GMATT	.	.	+	.	.

+ indicates that the regression coefficient for that variable was significant and positive

-- indicates that the regression coefficient for that variable was significant and negative

Appendix C3

Table C-3

SUMMARY OF FINDINGS BY SELECTED DEMOGRAPHIC VARIABLES				
	AGE	SEX	GPA	ETHNIC
Total Sample GMATV	--	.	+	--
Total Sample GMATQ	--	--	+	--
Total Sample GMATT	--	--	+	--
HBCU GMATV	.	.	+	NA
HBCU GMATQ	.	--	+	NA
HBCU GMATT	.	--	+	NA
PWI GMATV	--	.	+	NA
PWI GMATQ	--	--	+	NA
PWI GMATT	--	--	+	NA

+ indicates that the regression coefficient for that variable was significant and positive

-- indicates that the regression coefficient for that variable was significant and negative (for SEX: male coded as "1" and female coded as "0")