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**An investigation and analysis of ninth-grade academic profiles
and plans after high school**

Simon, Nancy Tysinger, Ed.D.

The University of North Carolina at Greensboro, 1991

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AN INVESTIGATION AND ANALYSIS OF NINTH GRADE
ACADEMIC PROFILES AND PLANS
AFTER HIGH SCHOOL


by

Nancy T. Simon

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
1991

Approved by



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APPROVAL PAGE

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Date of Acceptance by Committee

MARCH 21, 1991
Date of Final Oral Examination

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SIMON, NANCY TYSINGER, Ed.D. An Investigation and Analysis of Ninth Grade Academic Profiles and Plans After High School. (1991) Directed by Dr. Lloyd Bond. 86 pp.

Using information readily available in a student's cumulative folder, this study provides a practical model to assist schools in identifying, early in high school, the educational/career path an individual student is likely to pursue immediately after graduation. Knowing the possible postsecondary plans of students would assist schools in planning additional relevant information and experiences so each student might maximize his chance of making wise decisions about postsecondary plans.

Ninth grade information from the cumulative folders of 242 high school graduates and a survey of their postsecondary plans taken approximately a month after graduation were analyzed using discriminant function analysis. The study includes a detailed discussion of results when using five ninth grade variables (California Achievement Test language scale score [CAT-V], number of ninth grade absences, grade point average at the end of the ninth grade [GPA], gender and race) to determine which of the four categories of postsecondary plans a student is likely to choose. The four groups include those who plan to: (1) attend a four-year college/university; (2) attend a technical, community, or junior college, trade or business school; (3) pursue no further education (now working or looking for work, or have entered the military); or (4) pursue no further education (not working, want more education but have taken no action, or are undecided about further education).

The CAT-V and GPA at the end of the ninth grade were the strongest discriminators, followed by gender, race and ninth grade absences in that order. Students planning on attending four-year colleges or universities were easiest to classify into the correct category of plans after high school and tended to have high CAT scores and high GPAs. Groups 2 and 3 were placed into the correct category of postsecondary plans at a higher rate than prior probability would suggest. Students with

no definite plans, however, were extremely difficult to accurately classify with none of the 24 cases initially classified accurately.

A review of information available early in a student's high school career can help provide insight into what postsecondary plans they are likely to pursue and help the school provide supplemental information and experiences to assist students in making wise career and educational decisions. Additional study and information is needed to provide insight into how to assist those who graduate with no definite plans for work or education and are undecided about their future.

ACKNOWLEDGEMENTS

I wish to thank my dissertation chairman, Dr. Lloyd Bond, for his assistance and patience. I also wish to thank Dr. Dale L. Brubaker, who served as chairman of my program committee, and the other members of my committee, Dr. Harold R. Snyder and Dr. J. Christian Busch.

Gratitude is expressed to the Guilford County Schools and Guilford Technical Community College for support in obtaining necessary data for this study.

Special appreciation goes to my family for their encouragement and support throughout my doctoral program.

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CHAPTER 1

NATURE AND SCOPE OF THE STUDY

Introduction

Throughout time, historians have noted that the "educational practices of different nations are a result of historical factors and social conditions, which differ from nation to nation" (Mulhern, 1959, p. 716). As educational institutions in individual countries emerged, governments organized programs in a variety of ways to meet the needs of the citizens and those in power. An examination of the structure of the educational patterns in numerous countries indicates that systems are also structured to accommodate the manifest differences in the academic and vocational skills students exhibit as they progress beyond the elementary years of schooling (Mulhern, 1959, p. 717). Some countries, at a specific stage of the student's education, "track" pupils into a vocational or academic school (Mulhern, 1959, chap. 16). Others have "hurdles" that students must overcome to stay in a formal educational setting (Mulhern, 1959, pp. 702-703), making it more difficult for some students to continue, and placing increased pressure on them to achieve at high academic levels.

Every institution, including the public schools in the United States, has a set of assumptions and beliefs, a "way of doing things", that, although unwritten, is binding in the everyday operation of that organization. This is the culture of the institution and it is founded on a set of values and traditions developed and integrated into the organization over a period of time (Sheive & Schoenheit, 1987). The culture of the American public secondary schools includes the right of the parents and student to make decisions concerning his educational plans.

In middle and high schools, even though there are slight variations in different parts of the United States, generally, the student and his family choose an educational path and emphasis by the courses selected. As a student matriculates to secondary school, decisions concerning course selection become related to career goals and/or postsecondary educational plans. Information the school provides to each student regarding the educational requirements, job skills, personal traits and other qualifications for various careers forms a knowledge base for him to make both educational and career decisions.

Although the school offers suggestions and guidance based on an individual's performance, abilities, test scores and interests, the actual academic and career goals each student selects and follows are primarily a choice of the pupil and his/her family (Powell, Farrar & Cohen, 1985).

In school systems where there are no specific secondary schools that have an academic emphasis or vocational specialization, the comprehensive high school helps each student identify aptitudes, interests, abilities and values, and decide on options he may wish to pursue regarding educational and career plans (Conant, 1967; Perrone, Ryan & Zeran, 1970). Early identification of the student's needs in the career/educational areas can help the school guide each student in course selection and educational planning so that he uses high school years to better prepare for the future.

Adolescence is one of the most crucial periods in a lifetime of career development decisions, and, as noted in the American College Testing (ACT) report for a number of years, young people realize and are concerned about the importance of the decisions they face. In 1983, 71% of high school students indicated that career planning issues were "a concern for which they would have liked much help; while 43% said they had received

little or no career planning services through their high school years" (Prediger & Sawyer, 1986; Krieshok, 1988).

The decisions made concerning educational training and career plans shape the future of the student, and these choices should be based on adequate, timely, and correct information (Perrone, Ryan & Zeran, 1970). Schools can pursue several avenues to help each student make informed decisions. Early identification of any student who has low readiness scores on a vocational planning instrument and provisions for more intensive guidance concerning careers could help an individual make better vocational decisions (Perrone, Ryan & Zeran, 1970). A student could be provided the opportunity to explore the real world of work through job experiences while attending school (Perrone, Ryan & Zeran, 1970). Various other strategies would also provide increased opportunities for individual students.

Choices are made on the basis of what one knows. Choices cannot be made unless one has access to information about alternatives: no alternatives really means no choices. When the individual has knowledge of himself, of the major field of work, worker trait areas, or job clusters and some of the specific occupations embraced within these major structures then his decision making becomes more accurate and meaningful. (Perrone, Ryan & Zeran, 1970, p. 98)

The same rationale stated above can apply to the knowledge of postsecondary educational opportunities. Each student should be aware of the types of educational opportunities available after graduation and the types of training each institution provides.

The emerging adolescent should become knowledgeable about all types of posthigh school [sic] preparation . . . Frequently the issue is less one of altering aspirations and more one of making opportunities available and of making knowledge available about the opportunities and how to take advantage of them. (Perrone, Ryan & Zeran, 1970, p. 99)

As a student progresses through high school, he makes decisions concerning what career/educational opportunities he may pursue beyond high school. The role the secondary institution and its staff assumes in preparing a student to make these decisions has an historical and cultural precedent in American education.

Chapter 2 will briefly examine the historical origin and development of the American high school and its role in helping students plan for further education, as well as entry into the job market. This discussion will provide a context for understanding the current cultural and philosophical influences concerning career and educational opportunities and the role the school has in providing information to both the student and his family.

Philosophical Base

James B. Conant in both The American High School Today: A First Report to Interested Citizens (1959) and The Comprehensive High School: A Second Report to Interested Citizens (1967) explains how the comprehensive high school is a somewhat unique product of American history. In the foreword to Conant's 1959 book, John Gardner, former President of the Carnegie Corporation, both defines a comprehensive high school and speaks of the uniqueness of this type of school in relationship to educational systems in other countries when he states:

. . .the "comprehensive" high school - a peculiarly American phenomenon. It is called comprehensive because it offers, under one roof (or a series of roofs), secondary education for almost all the high school age children of one town or neighborhood . . . It is responsible, in sum, for providing good and appropriate education, both academic and vocational, for all young people within a democratic environment which the American people believe serves the principles they cherish. (p. ix-x)

Restating the three objectives of the American comprehensive high school in his 1967 book, The Comprehensive High School, Conant asserts that a school should provide: a general education for all future citizens; good elective programs to teach skills for

those who wish to enter the job market immediately after graduation; and satisfactory programs for those who wish to continue their education in a college or university. He goes beyond this to state that "a high school staff should assist each student in the choice of his or her elective program" (p. 24).

As students move from middle schools to high schools, their abilities, interests, and skills in academic and vocational areas, as well as their ability to plan, become more evident and distinct (Adelson, 1980, ch. 7). Conant states that the counseling staff should be familiar with aptitude and achievement tests and, in consultation with the parent, help each student select courses that correspond "to the student's interest and ability as determined by tests of scholastic aptitude, the recorded achievement as measured by grades in courses and by teachers' estimates" (Conant, 1967, p. 25). The purpose of this is to place students in courses commensurate with their ability level and interests, as well as to prepare them for future career/educational plans they may have.

The recommendations for schools to provide career information and direction to students are still prevalent in the 1990's. In July, 1990, The National Governor's Association's task force on education expressed concern for improving the system that prepares students for the work force in its report entitled "Excellence At Work: Principles and Options for State Action." One strategy to achieve their goal is for states to "strengthen career counseling for students who plan to go to work directly from high school" (Education Daily, p. 2).

Statement of Problem

The freedom to choose one's educational path is a central theme in the current culture of American high schools. "Schools assume responsibility for providing opportunities, but most often they place the responsibility for choice and the responsibility for involvement on the students" (Powell, Farrar, & Cohen, 1985, p. 3).

The Shopping Mall High School (Powell, Farrar, & Cohen, 1985) compares the American high school to a shopping mall with a variety of specialized stores (various courses and extra-curricular activities) that cater to the desires of diverse consumer groups (students, parents and the community). The American high school of the 1980's and 1990's, like a mall, provides many opportunities for students; but, to some degree, fails to equip the student with the information needed to make the decisions a good consumer must make when faced with many choices.

The authors indicate that school personnel, to accommodate the diversity among students, often fail to provide adequate direction and guidelines for the students to make wise educational and career decisions. The "shops attempt to shape choice; but power fundamentally resides in the hands of the consumer" (i.e., the students and parents) (Powell, Farrar & Cohen, 1985, p. 39).

School personnel, trying to meet both their responsibility to inform students, as well as follow society's wish to allow an individual to make decisions, often are ambivalent about which path to follow. The belief that the individual/parents should have a prominent voice in a student's educational experience - especially at the high school level - is fundamentally embedded in the culture of high schools in the United States in the 1990's. As will be shown in the review of the literature in Chapter 2, this belief is a cornerstone of American secondary schools and is one of the primary factors that shapes the culture of American schools.

School personnel may best serve both the interests of society and the individual by providing the maximum amount of information for students concerning both career and educational opportunities. With more information about their abilities and aptitudes given to students earlier in high school, it is assumed they will be more likely to make

sound decisions concerning their plans directly after high school (Perrone, Ryan & Zeran, 1970).

Given specific information which is easily accessible in a student's cumulative folder early in his high school career, this writer proposes a useful method to find the likelihood that he will choose a certain postsecondary path in regard to education/work experience soon after graduation. If the educational/career paths that students are likely to pursue after graduation can be determined using variables available at the end of the ninth grade, then schools will be able to provide additional exposure to career/educational opportunities and information for the students during their high school career. The intent for utilization of this research would be to supplement the opportunities students already receive and, perhaps, broaden and expand the scope of their considerations as they make postsecondary plans. It should be pointed out that the concern is a practical one of classification, not a theoretical one of attempting to provide underlying theories that explain why a given student was classified in a particular way. The reader is reminded: "Few students are planning their career and educational programs systematically, bringing together information about themselves with that about occupations and the educational avenue for preparing and entering these occupations" (Tyler, p. 4). The school must assume some of this organizational task. A warning is given that this study provides a model that should be only one of a variety of methods used to assist students in making this important decision. Field trips to visit work sites/educational institutions and opportunities to discuss job skills and requirements with those in specific careers are only two suggestions of options for added opportunities for specific target groups.

Research Questions

For the purposes of this study, students' plans immediately after high school were classified into one of the following eight categories: (1) four-year college/university, (2) two-year technical, community, or junior college, (3) one-year (or less) trade or business school, (4) no further education at this time (now working or looking for work) (5) no further education - entering the military, (6) no further education - other (not currently working or looking for work), and (7) want to further education, but have taken no action, and (8) undecided about further education.

Information from the cumulative files of 1989 high school graduates was used to determine how accurately classification of students into the correct category of "plans after high school" could be accomplished using specific information available at the end of the ninth grade. Initially, the discriminant analysis statistic was to be used to address the following questions:

1. Is there a statistically significant relationship between the eight categories of "plans after high school" and (a) grade point average at the end of the ninth grade, (b) ninth grade absences (c) ninth grade California Achievement Test verbal scores (d) ninth grade California Achievement Test math scores, (e) parent/legal guardian information, (f) gender, (g) race, (h) the number of honors courses taken in the ninth grade, or (i) the number of college preparatory courses taken in the ninth grade.
2. Is there a statistically significant relationship between "plans after high school" and combinations of two or more of the nine variables listed above?

3. What equation, using the nine variables above, provides the best classification of students into the various categories of "plans after high school"?
4. Using the nine ninth grade variables mentioned above, how well does the equation obtained using half of the 1989 data classify the students in the other half into the correct category of "plans after high school"?

After an initial analysis of the data and some concern about violations of assumptions necessary for use of the discriminant analysis statistic, the original questions were restated for detailed review as follows:

1. Is there a statistically significant relationship between the four combined categories of "plans after high school" and (a) grade point average at end of the ninth grade, (b) ninth grade attendance, (c) ninth grade California Achievement Test verbal scores (d) or gender?
2. Is there a statistically significant relationship between "plans after high school" and all of the four variables listed above?
3. What equation, using the four variables above, provides the most accurate classification of students into the four categories of "plans after high school"?
4. Using the four ninth grade variables mentioned above, how well does the equation obtained using half of the 1989 data classify the students in the other half into the correct category of "plans after high school"?

A separate analysis was conducted with race included as an independent variable, the same four dependent groups and corresponding research questions. Although race was coded in three groups and did not meet the multivariate normality assumption, the

robustness of the discriminant analysis procedure with a large sample provides rationale for inclusion of race in the analysis.

Purpose and Importance of the Study

One of the primary functions of secondary schools in America, from the establishment of the Latin grammar schools until the present, has been to prepare students for further study and for careers. The curriculum of the early American secondary schools served two general purposes: to prepare students for college entrance and to train church and government leaders (Mulhern, 1959). Although the high school of the 1990's is different in many respects from early secondary education in America, a primary role of the school remains to prepare students for further education and to develop skills for the job market.

The purpose of this study is to provide validated methods useful to assist schools in identifying, early in high school, the educational/career paths individual students are likely to pursue. This information would allow schools to provide additional relevant data and/or experiences to students concerning educational and career opportunities in order that students could maximize their chances for making wise decisions concerning plans immediately after high school graduation, whether it be further education or direct entry into the work force.

Due to time and personnel constraints in high schools, comprehensive follow-up surveys of entire graduating classes are an uncommon practice; therefore, information about students' career/educational plans after they have graduated is not easily accessible. A survey of the literature revealed few longitudinal studies, especially at the school or school system level, that investigated the relationship between such variables as achievement test scores, attendance, and grade point average with plans very recently after high school graduation. The small number of follow-up surveys may account for

the shortage of studies of the other variables with postsecondary plans. Several studies located used data collected in the National Longitudinal Study of the High School Class of 1972 or information collected in the High School and Beyond study, both conducted by the National Center for Education Statistics.

In addition to filling a gap in the literature, this study should also encourage others to conduct follow-up surveys that can provide valuable information concerning individual students and their personal decisions in career/educational planning. The additional information presented to students should help them leave high school better prepared for the plans they hope to immediately pursue.

CHAPTER 2

REVIEW OF THE LITERATURE

An examination of the literature concerning high school graduates' educational and career plans after graduation with regard to such variables as grade point average, attendance, and achievement test scores is discussed in Chapter 2. To help understand the current role of the American high school and its staff in the career/educational decisions of students, the origin, development and mission of the American high school as it applies to aiding students make career and educational plans is reviewed.

Post-secondary Plans and Selected Independent Variables

A review of the professional literature conducted by the Educational Research Service, Inc. searched for a relationship between achievement test scores and plans directly after high school graduation. No studies were found that examined these factors and how they might be related. The publisher of the California Achievement Test [CAT], CTB/McGraw-Hill, was unable to locate any information concerning studies in their material involving research conducted on the CAT in relation to plans after graduation (L. M. Fabrizio, personal communication, November, 1988). A review of Education Index from 1979 through 1990 revealed no articles relating these two factors. Some of the descriptors used included: academic ability, achievement tests, high school graduates, graduate surveys, test validity, and high school seniors.

Several reasons for the absence of studies that compare students' plans after high school graduation with other variables can be advanced. Studies at the high school level are limited in number due to time and lack of personnel to conduct research. The administrative staff in public secondary schools fails to encourage and reward high

school personnel for research, while just the opposite practice is the case in an institution of higher education. Longitudinal studies are more difficult and time-consuming to set up; and since comprehensive follow-up surveys are often not a common practice of many high schools, information about students' plans after graduation are not easily accessible.

Many of the studies noted during the review of the literature involved special groups of students (often those who had taken a vocational track or some vocational courses in high school) and their subsequent careers/educational plans. These surveys failed to poll all students and did not include information on achievement tests. Most surveys that included an "ability" component used aptitude test scores rather than achievement scores, or self-reported grades rather than actual earned grade point average. Other surveys were conducted several years after graduation rather than soon after students had completed high school (National Center for Education Statistics [NCES], 1981).

A number of longitudinal studies utilized data from one of several national studies: National Longitudinal Study of the High School Class of 1972 (NLS), High School and Beyond (HSB), 1961 Project Talent data or the Youth in Transition Project (YTP). The YTP, which collected data from 1969 high school graduates, surveyed only males, while both the NLS and HSB studies used self-reported letter grades and a set of six aptitude tests (vocabulary, picture-number, reading, letter groups, mathematics and mosaic comparisons) given for the ability component of the data collected. Other articles and studies selected a specific segment of the entire graduating class and focused on them rather than looking at the entire group.

A search of Education Index from 1979 through 1990 involving grade point average and/or absences in high school and how these variables might relate to plans

after high school also failed to locate any studies that had considered these factors. The following terms were used as descriptors: absences, attendance, graduates (high school), high school and beyond, high school, grade point average, follow-up studies, and surveys (high school).

Most studies involving high school grade point average involved predicting college admissions or success in college. Many of the articles involving absences related attendance to achievement in school.

In summary, no studies were located that surveyed entire classes soon after graduation concerning each student's postsecondary plans and examined the relationship between educational/career plans and previous high school achievement test scores, GPA or absences.

Although not identical in terms of examining achievement test results, articles have been published that use data from the NLS and HSB studies and that speak to similar topics. Using the Talent Project, NLS and HSB data from the period 1961 to 1982, Clowes, Hinkel and Smart (1986) examined postsecondary enrollment trends based on gender, race, socioeconomic levels and aptitude levels.

Navaratnam and Asche (1988) compared the college preparatory seniors in the NLS 1972 graduating class with the HSB senior class of 1980 with regard to changes in (1) demographic characteristics, (2) tested student achievement, and (3) school experiences and postsecondary educational and career plans (p. 128).

In addition to examining the literature related to similar studies, it is important to understand what role American secondary schools accept in regard to advising students concerning career and educational plans and how the schools acquired this function.

Origin of American High Schools and Their Role. Past and Present. in Career/Educational Plans of Students

Why is it important for the high schools of the 1990's to assume an active role in providing students with career/educational information? Meyer and Rowan noted in 1983 that schools "show a remarkable consistency across time and national boundaries" (Deal, p. 3), but perhaps Terrence Deal's quotation from Seymour Sarason best illustrates why schools continue to assume the role of career and educational advisor:

. . . history and tradition have given rise to roles and relations, to interlocking ideas, practices, values and expectations that are "givens" not requiring thought or deliberation. These "givens" . . . are far less the products of characteristics of individuals than they are of what we call the culture and its traditions. . . (*Ibid.* p. 5)

The origin, development and mission of the secondary school in America explains how our current culture has evolved.

The early schools in America, though different in purpose and governance from current high schools, served the varied needs of the specific culture and religious beliefs of their community just as current American high schools vary according to the needs and expectations of the community they serve (Powell, Farrar, & Cohen, 1985, ch. 5).

The early immigrants who settled in America brought with them a variety of experiences and beliefs that shaped the basic governing strategies and philosophy of the government and institutions that would evolve in the new world. The beginnings of the educational system and the development of what we know as high schools are prime examples of organizations that reflect the influence of the American melting pot of cultures and experiences (Mulhern, 1959, pp. 377-408).

With their roots in the European humanistic Latin schools, the early American secondary schools in various geographic areas had a curriculum that included the

teaching of religious doctrine as well as Latin and other classics (Mulhern, 1959, p. 392). The curriculum of the early American secondary schools served two general purposes: to prepare students for college entrance and to train church and government leaders (Mulhern, 1959, p. 394). A thorough knowledge of Latin and Greek was necessary for college admission and, therefore, comprised a large portion of the secondary school curriculum. Since practically all the early colonial colleges in the United States were theological seminaries, the secondary school curriculum included religious training to prepare for college (Button & Provenzo, Jr., 1983, ch. 2). The purpose of the secondary school, and its utility for the community, could be summarized by the "Old Deluder Satan Act" passed by the General Court in Massachusetts in 1647. Since it was believed that one of Satan's main goals was to keep men from knowing the true meaning of the Scripture by presenting it in an unknown tongue, the purpose of the school was to promote learning and to train a new generation of clergy so that the truth could be passed on to future generations (Button & Provenzo, Jr., 1983, pp. 15-16).

In the early colonial period, the majority of the people spent much of their time involved in basic daily survival practices and had little time or interest in establishing schools - especially at an advanced level. Many of the Latin schools that were organized had support from state and local government; however, governance of schools was by private individuals. The churches, and later the government, played primary roles in establishing and developing the culture and functions of secondary schools (Button & Provenzo, Jr., 1983).

After the American Revolution, changes in society brought about the need for education that was practical for a larger portion of the people. Such changes as the rapidly increasing population of the United States, the growth of a strong middle class, spread of religious dissent, growth of a more democratic society, the scientific

movement, and economic expansion all contributed to the need for a different type of education (Gutek, 1983). Academies began to spring up to meet the needs of those people interested in such topics as commerce and business skills, and other more modern and useful topics that better met the needs of the community (Button & Provenzo, Jr., 1983). This same cycle of "practical education" was evident in the early 1900's.

In 1750, Benjamin Franklin opened the nonsectarian Philadelphia Academy for the following purposes: "(a) the education of civil officials in a country swarming with foreigners, and (b) the training of rural teachers" (Mulhern, 1959, p. 398). The trustees and Franklin also described the mission of the academy in terms of helping "preserve civil and religious liberty" and in preparing "youths for useful living" (Mulhern, 1959, p. 398).

After the United States declared independence and the government was established, there was increased support for public secondary schools. However, across the United States it took nearly 75 years for widespread popular approval for the taxation necessary to fund public, or common schools (Spring, 1986). Since the United States' Constitution failed to delegate responsibility for education to the federal government, such powers, by virtue of the Tenth Amendment, went by default to the individual states.

In regard to educational institutions, many states prior to 1815 failed to provide leadership and organization from the state level. The state government in most areas followed the "popular Jeffersonian philosophy of inaction - that the government which governs least is best. . ." (Lefler & Newsome, 1963, p. 309). Individuals and/or communities met educational needs as they deemed best for the people in their area. As various individuals, local communities, and states took on the responsibility to expand educational opportunities to all youth, the size and types of schools, the methods of

finance, the form of governance, curriculum, and other key issues that shape the culture of a school evolved in unique ways. Each state developed a group of independent systems, with some states having thousands of separate systems, each reflecting the uniqueness of the people it served (Mulhern, 1959, ch. 14).

As state education governing bodies were organized, more uniform guidelines within the states were established to control and standardize the organization of the public educational institutions. These schools reflected the underlying beliefs expressed in the Constitution, including strong feelings concerning individual rights. The belief that the student, his family and the community should have a strong voice in the type of education provided developed from the birth of schools in the United States and is one of the unique traits that shape the culture of American schools.

During the period from 1900 until 1930, "the American high school population rose from 630,000 to almost 5 million, and it continued to expand" (Sewall, 1983, p. 26). Several factors led states to pass compulsory attendance laws and thus increase the number of high school students. The most prevalent reasons included: (1) a desire to shelter and protect immigrant and farm youth, (2) a need for workers with specialized skills, (3) a push from trade unions to reduce competition for jobs, and (4) a desire by police to clear young trouble-makers from the streets (Sewall, 1983). The addition of practical vocational and business courses helped retain students in school. School became the vehicle to socialize students into society.

During the early to mid 1900's, the curriculum in high schools underwent various changes in response to society's needs - especially the increasing number of students in public high schools. Before these changes, the traditional role of the high school was no longer responsive to the large number of students it served. Educators were concerned that the school should be able to address the needs of the students and the

community (Spring, 1986). The progressive education movement changed the schools from subject centered to a more student centered atmosphere (Ravitch, 1983, ch. 2). The curriculum became more centered on active learning, projects, and a recognition of the individual differences in abilities and interests. Each new course was justified by its utility to students, and the relationship to skills needed in real life. A report issued by vocational education advocate Charles Prosser in 1945 stated that 60% of current high school students could not benefit from the academic and vocational courses then offered. This played a large role in the introduction of life adjustment courses to the high school curriculum (Ravitch, 1983, pp. 64-65).

During the period from 1945 to 1980, when the number of school systems decreased from 100,000 to 16,000, the enrollment in elementary and secondary schools grew from 23 to 40 million students (Ravitch, 1983, p. 327). The tremendous growth in the number of students, the varied needs students had, and reports such as Charles Prosser's made a great impact on high school curriculum. The circumstances re-emphasized the high school's goal to provide appropriate education for students to enter either the work force or pursue further formal education. The launching of Sputnik I in October of 1957 led to a re-emphasis of the academics, especially science and mathematics. This set the stage for former Harvard University president James B. Conant's The American High School Today, published in 1959. This report became a best-seller and had a great impact on educational practices as well as the size of high schools. Conant recommended the elimination of high schools that could not offer comprehensive programs for both academic and vocational students.

The civil rights movement, fast developing technology, changes in the family structure and other emerging patterns in society during the 1960's and 1970's all impacted the structure and goals of the schools of the 1980's and 1990's. In their 1987

discussion of public and private schools, Coleman and Hoffer note the schools, especially the public schools, were still viewed as "agents of the family, community and the larger society. Public schools come closest to being agents of the larger society" (p. 152). Schools continued to value the individual's right (student's as well as parent's) to actively participate in decisions about educational matters.

As these changes in society occurred, the schools, through the insistence of advocacy groups, began to assume new roles in meeting the needs of a changing society and its students. Society's increasing interest in the needs of special populations during this time was reflected in the school's expanded programs for handicapped students. The 1990's saw the public schools begin to serve handicapped students as young as three years old and to provide services for other special populations developing from needs in the general population.

The American high school has long had a vested interest and mission in providing information and training for all students to either continue their education beyond the public schools or to be prepared to go directly into the job market. While the average attendance in secondary schools in most European countries is less than 20%, in the early 1980's, "more than 95 percent of the population between the ages of fourteen and seventeen were enrolled in school" (Guterk, 1983, p. 212) in America. Through the compulsory attendance regulations instituted in the early 1900's, America made a commitment to provide secondary education for all students.

The response of public educational institutions to the business world and the needs and demands of the public has provided the impetus for a relevant education for all students to remain a paramount mission of the high school. The role of schools in providing career and educational information is imbedded in the culture of American education and has strong roots in our society. In fulfilling this mission, the school

personnel should provide the most thorough information available so that each student can make the best career/educational decision as he exits the secondary schools.

CHAPTER 3

METHODOLOGY

Sample Population

From the class of 1989, a random sample of 242 students was selected from 1,454 graduates of seven high schools in the Guilford County School system, located in the Piedmont area of North Carolina. Each of the schools in the system had participated in a post secondary survey of graduates. One of the eight high schools in the system, which had 305 graduates, gathered data on plans from graduates of the class of 1988 rather than 1989 and, therefore, was excluded from this survey. The size of the graduating classes included in this study ranged from 145 to 259.

"Graduates" included only those students who met Guilford County graduation requirements and passed the North Carolina State Competency Test. Students in North Carolina who complete all graduation requirements, but do not pass all sections of the competency test are not considered high school graduates. Instead of earning a high school diploma and graduating, they simply finish school with a certificate of attendance. In 1989 there were 23 students in Guilford County who received a certificate rather than a diploma.

The graduating classes of the seven surveyed high schools in the Guilford County School System have been similar in total enrollment as well as gender and racial ratios. The statistics for the 1989 graduating class were very similar to graduating classes of the previous two years (Guilford County Schools) (see Table 1 and Figure 1). In the population from the 1989 graduating class, 51.38% were female (747) and 48.62% male (707). The population included 1,181 white students (81.22%), 242 black

students (16.64%) and the remaining 31 students (2.13%) were of other races, (Guilford County Schools).

Permission to gather data from graduates' cumulative folders was secured through the Research Committee of Guilford County Schools. The writer visited each of the seven high schools in the survey and gathered data from students' records. A total of 242 students were randomly selected for the study from the total population of 1,454. Using random numbers, a student was selected from the alphabetized graduation list of each school. From that point, every sixth student on the list was selected until the sample included one sixth of each school's graduating class.

Procedure

The Area Schools Assistance Program (ASAP), in operation since the summer of 1984, provides a follow-up survey of high school graduates in the Guilford County School system. The results of this survey were used for this study. Guilford Technical Community College (GTCC) provides training and stipends for those conducting the survey. Each school provides personnel to work in the ASAP project, so surveyors are often personally acquainted with students they contact (Lochra & Strickland, 1987). Within six weeks after graduation, public school personnel contact recent graduates, record their plans concerning education and/or work, and offer assistance to graduates who need help. In the follow-up surveys, graduates are contacted by telephone, with an attempt to contact by mail anyone not reached by phone. In previous years, only a very small number of students could not be reached (approximately 1% in each graduating class).

Post-secondary plans that students had listed on a county-wide questionnaire just prior to graduation were confirmed or up-dated during the follow-up. Based on information given during the follow-up, plans were recorded into one of the following

eight categories: (1) four-year college/university, (2) two-year technical, community, or junior college, (3) one-year (or less) trade or business school, (4) no further education at this time (now working or looking for work), (5) no further education - entering the military, (6) no further education - other (not currently working or looking for work), (7) want to further education, but have taken no action, and (8) undecided about further education.

The results of the ASAP survey (dependent variables) and information in nine areas secured from a review of the cumulative folders (independent variables) were recorded for analysis.

From each cumulative folder, test results from the California Achievement Test (CAT), Form C, were utilized to assess achievement. The total scale scores for the CAT in math (CATM) and language (CATV) were recorded for each student in the sample. The CAT was selected since it was the standardized test given to all North Carolina students in the spring of the ninth grade as part of the North Carolina Testing Program.

Other types of standardized tests given, such as the Strong-Campbell Interest Inventory and the Differential Aptitude Test, were considered. Since their use has been discontinued in the Guilford County School System's testing program and would therefore not have any predictive validity for future groups, they were rejected. The CAT will continue to be given to all North Carolina students, although the form was updated to the Form E, and the grade level for administration was changed to the eighth grade, effective in the spring of 1986 (for the graduating class of 1990).

For each student in the sample, the total number of days missed during the ninth grade (ABSEN9), grade point average at the end of the ninth grade based on semester grades (GPA9), gender, race, number of college preparatory courses taken as a freshman (NCPREP), number of honors courses taken as a freshman (NHONOR), and

whether a male, a female or both were listed as parents/guardians (PARORLG) were recorded in addition to their CAT math and language scores.

Graduates who had pertinent information missing (9th grade absences, CAT scores and information on "plans after high school") were excluded from the statistical evaluation of the data. Students who attended other schools any time during their high school career were included in the study if the needed information was available. For students that may have been in the ninth grade more than one year, information from the first year they were assigned to the ninth grade was used.

Data Analysis

For examination of the data, the discriminant analysis procedure provided the statistical method to develop a classification for membership into groups indicating plans after high school. The same procedure identified the independent variables and/or groups of variables previously mentioned (CAT language scale score, CAT math scale score, ninth grade GPA, number of ninth grade absences, gender, race, number of college preparatory courses taken in the ninth grade, number of honors courses taken in the ninth grade and parent/guardian information) that best distinguished among the groups. A stepwise selection method based on Wilks' lambda was employed to determine the strength of a variable or combination of variables in predicting placement into the correct category of plans after high school. This allowed for some independent variables to be eliminated as discriminators, yet maintain a high level of classification into the correct dependent groups.

CHAPTER 4

RESULTS

Pilot Study

A pilot study was conducted to analyze the feasibility of a more detailed investigation of postsecondary educational and occupational plans of high school graduates in relation to specific information available at the end of the ninth grade (i.e., CATV, CATM, gender, race, ninth grade absences and ninth grade GPA). A sample of 60 graduates of the 1988 graduating class of one high school were chosen for this investigation. A series of discriminant analysis statistical procedures were computed to determine possible relationships between some of the ninth grade variables previously mentioned and the categories of "plans after high school".

Since the number of subjects in some of the eight categories of "plans after high school" was small, the eight categories were combined into three: (1) four-year college/university, (2) two-year technical, community or junior college and (3) all other categories. The following independent variables were paired with the three categories as the dependent variables: gender, race, CAT total language scale scores, CAT total math scale scores, 9th grade absences, and 9th grade GPA.

An analysis was run using all identified variables as well as one using stepwise discriminant analysis. The stepwise procedure was able to classify more cases correctly with the ninth grade GPA as the best predictor of the plans after high school categories, and race as the second variable added. No other variables were entered.

With these two variables, a total of 61.67% of the categories were classified correctly. The highest degree of classification was in the four-year college group

(n=27) where 74.1% were correctly labeled. The two-year schools group (n=21) had 52.4% correctly classified, while the combination of other groups (n=12) had 50% correct. The classification rate of all three postsecondary categories were well above expected prior probabilities.

The pilot study indicated that further analysis of this topic had promise as an aid in identifying, by the end of the ninth grade, the educational/career path students were likely to choose directly after high school.

Initial Analysis

In the more detailed investigation of this topic, data concerning the 242 randomly selected students was entered in the Statistical Package for the Social Science (SPSS-X) computer program and examined using the discriminant analysis technique. Prior to a discussion of the results of the initial analysis, a brief review of the utility and underlying assumptions of discriminant analysis is in order.

In addition to its direct statistical uses, the multiple discriminant analysis procedure serves several important functions in the study of groups: (1) to help describe differences in each of the dependent groups, based on the independent variables, (2) to determine the importance of the independent variables in distinguishing the groups and (3) to classify individual cases into one of the dependent groups, based on known information about the independent variables.

For maximum accuracy for both discrimination and classification purposes, certain criteria should be met when using this procedure. Each of the dependent variable groups should be mutually exclusive. Each group should be a sample from a population that is multivariate normal in respect to the classification variables, and the population covariance matrices should be equal. Although the procedure is not overly sensitive to moderate violations of the normality assumption, careful consideration must be given to

variables which have modes near the end of their range or which have values that are nearly dichotomous (Cliff, p. 409). A violation of this assumption may influence the precision of the significance test and the probabilities of group membership (Iversen, p. 10).

The efficacy of the discriminant function can be determined by several criteria - the classification rate and actual discriminant scores in the groups. Although the accuracy of classification is often taken as the primary indicator of the success of a discriminant function, the percent of cases classified correctly by chance alone should be considered. When a small number of groups with equal prior probability are being considered, higher classification rates are necessary for the function to perform better than chance.

"A good discriminant function is one that has much between-groups variability when compared to within-groups variability. In fact, the coefficients of the discriminant function are chosen so that the ratio of the between-groups sum of squares to the within-groups sum of squares is as large as possible." (Norusis, p.86)

Since the eigenvalue represents this ratio, "Large eigenvalues are associated with 'good' functions" (Norusis, p. 87).

To check for equality of group covariance matrices, Box's *M* Test is computed. This is a variation of Bartlett's test for homogeneity of variances which uses the F-distribution (Statistics Guide, p. B-31; Glass and Hopkins, 1984, p. 267).

Although there was a concern in including some of the independent variables due to their categorical nature, the initial analysis was run using all nine variables (CAT language scale score, CAT math scale score, ninth grade GPA, number of ninth grade absences, gender, race, number of college prep courses taken in the ninth grade, number of honors courses taken in the ninth grade and parent/guardian information) and all eight groups of plans after high school (dependent variables).

Preliminary examination indicated that the sample closely resembled the population from which it was chosen with regard to gender and race (see Table 2, Figures 2 and 3).

The number of students from the sample in each of the eight dependent groups of plans after high school is shown in Table 3 and Figure 4.

Analysis of the data, using the nine independent variables and the eight dependent variables of plans after high school, showed a 67.77% rate of classification into the correct after school category (see Table 4). The independent variables contributing to this rate were, in order of entry: number of college prep classes in the ninth grade (NCPREP), number of honor courses taken in the ninth grade (NHONOR), race, CAT verbal scale score (CATV), 9th grade absences (ABSEN9), gender, 9th grade GPA (GPA9), and CAT math scale score (CATM). The parent/legal guardian information did not contribute significantly to the classification. Several of the eight categories of plans after high school were rather small (Table 3), rendering the test for equality of covariance matrices difficult to apply (Table 5). In the initial investigation, **none** of the twenty four students in several of the small categories, categories 6, 7 or 8 (no education-other plans, want more education-no action taken, and undecided about more education), were correctly classified. For the discriminant analysis procedure to be used appropriately, dependent groups should contain a larger number of cases than some of the original eight groups (Cliff, p. 408).

Examination of an all-groups scatterplot showing group centroids (Figure 5) indicates the distinctiveness of Group 1 (4-year college/university) students compared to other groups, while also pointing out the closeness of several group centroids, especially to the Group 2 centroid. The three groups that were all misclassified are

widely scattered, especially Group 6. The histogram shown in Figure 6 shows the distribution of cases based on the first canonical discriminant function.

In order to answer research questions with more accuracy and provide larger groups for better analysis of covariance matrices, the investigator examined combining categories (Cliff, p. 408). A reduction of the design into six, four, three and two groups indicated that the percent of students classified into the correct group of plans after high school increased as the number of groups decreased with a high of 82.23% when the original eight categories were collapsed into two groups based on plans after graduation (i.e., 4 year college/university and all other groups). The four year college/university category was easiest to classify in each instance. Factors contributing to this classification and the order of their entry were generally similar across the varied number groups. CATV, NCPREP, NHONOR and race, in various order, were the top four discriminators when postsecondary plans were in eight, six, four and three categories. With two categories of plans after high school, GPA9 was a factor rather than CATV.

Although further condensing into two groups which included students planning on attending a four year college or university and all others groups provided greater classification accuracy, an examination of the original categories and the purpose of this study led to the formation of four distinct groups in terms of educational/vocational plans immediately after graduation. The four category grouping seemed to be theoretically more sound in terms of length of commitment to education and/or commitment to beginning additional educational experiences. These groups also have utility for those providing post-secondary educational/vocational information to high school students. The four groups examined further included students who planned to:

1. attend a four-year college/university;

2. attend a technical, community, or junior college; or trade or business school;
3. pursue no further education (now working or looking for work); or enter the military;
4. pursue no further education (not working); continue educational training, but have taken no action; and undecided about further education.

A more detailed look at several of the nine independent variables and how each one met the assumptions of normality was conducted. Figures 7 and 8 provide a graphic representation of how many students took a given number of college preparatory and honors courses as freshman. Although these variables were instrumental in discriminating among the groups even when combined groups were examined, the author decided to eliminate them from the more detailed analysis for several reasons in addition to the normality assumption. Since some school systems do not have courses labeled "college preparatory" or "honors" or, if they are available, the selection of honors courses may be limited in the ninth grade, the utility of future use of this study may be limited. Since the number of honors courses taken also correlated highly with a strong discriminating variable, the CATV (.50682), eliminating this variable reduced the number of independent variables needed to examine possible postsecondary plans while not greatly reducing the classification rate.

Since one of the independent variables, parent/guardian information, played no significant role in placement into categories of plans after high school, it was also excluded.

Although initially the CATM was a potential high discriminator, its relatively high correlation with the CATV (.56606) greatly weakened the impact to predict groups

once CATV was entered into the analysis. For this reason, this independent variable was also eliminated from additional consideration.

One of the assumptions of discriminant function analysis is that the variables used in the analysis are normally distributed. However, this assumption is rarely met, and, as Tatsuoka (1988) notes, "With large n . . . discriminant function analysis and similar processes such as multivariate analysis functions are robust under the multi-normality assumption" (Tatsuoka, p. 100). Gender and race will be considered further in the analysis.

A more complete statistical examination of data concentrated on the four categories outlined above as dependent variables and the following four independent variables: ninth grade absences (ABSEN9), gender, grade point average at the end of the ninth grade (GPA9), and the scale score of the California Achievement Test Language section (CATV). Race was added as a fifth independent variable in an additional analysis.

Detailed Analysis of Four Combined Groups

Although summary information from the 1989 ASAP program results were not available for all seven schools, the 1988-89 N. C. High School Graduate Survey results were obtained from the Guilford County Schools. This survey, which was conducted with each graduate just prior to graduation, lists plans after high school, divided into groups similar to the four combined groups that were further examined. Table 6 and Figure 9 show the plans of the 1454 graduates from this survey as compared to the sample groups. As seen from the Figure, the sample group appears to be representative of the population with regard to Groups 1 and 2. The sample has a smaller percent in Group 3 while Group 4 is represented to a larger degree. The number of cases included in each of the four reorganized groups was: Group 1 - 107 students; Group 2 - 80 students; Group 3 - 31 students; and Group 4 - 24 students.

Table 7 presents means and standard deviations for the independent variables by group. Group 1, who are more likely to be female, has the highest mean CATV (776.03), and GPA9 (3.031) and the fewest mean absences (6.13). Group 3, who are more likely to be males (1.39 mean on gender scale), have the lowest mean CATV (714.68) and GPA9 (1.999) and the highest mean absences (9.94). The means for Group 2 and 4 are similar with respect to CATV, GPA9 and ABSEN9 while Group 2 is more likely to be female (1.61) and Group 4 is more likely to be male (1.46). Figure 10 depicts each of the four groups by gender and race.

Wilks' lambda values showed a high discriminating value of CATV and GPA9 prior to analysis, with "ninth grade absences" more discriminating initially than gender. As shown in the Summary Table (Table 8), once CAT language scores and ninth grade GPA are entered, gender has more discriminating power and is entered third, followed by ninth grade absences.

The information in Table 9 shows that the test for equality of covariance matrices was met. Table 9 also presents the eigenvalues as well as the coefficients for each of the three discriminant functions. These values show the strong discriminating power of the first function. The equation which best discriminates among the four groups of plans after high school is:

$$D(f_1) = .65349 (\text{CATV}) + .51195 (\text{GPA9}) - .16236 (\text{Gender}) - .14923 (\text{ABSEN9})$$

This discriminate function employs high CATV scores, high GPA9, a low number of absences and a low gender score (indicating student is more likely to be male) to maximize differences between the groups. The second discriminant function is:

$$D(f_2) = -.52366 (\text{CATV}) + .77110 (\text{GPA9}) - .62489 (\text{Gender}) + .53622 (\text{ABSEN9})$$

Students scoring high on the second function tend to have low CATV scores, high GPA9, a low gender score (male) and a high number of absences. This profile could represent

students who may not have high verbal CAT scores, but who have selected a high school curriculum in which they have been fairly successful. The third function maximizes differences by using high scores on all four variables and is defined by the equation:

$$D(f_3) = .06247 (\text{CATV}) + .07965 (\text{GPA9}) + .59568 (\text{Gender}) + .74968 (\text{ABSEN9}).$$

The canonical discriminant functions are evaluated at group centroids in Table 10. The table indicates that function 1 distinguishes Group 1 students from the other groups quite well. Using function 1, the other three groups are closer together, with Group 2 (-.54412) and Group 4 (-.67122) much more likely to be misclassified as the other group. The first discriminant function is clearly an academic function with high correlations between CATV and GPA9 and the function. Function 2 helps distinguish Groups 2 and 3; however, in this analysis, it accounts for very little of the discrimination (approximately 7.7 %). The second function is more highly correlated with gender (males) and absences (a high number). The third discriminant function, which contributes little at all, attempts to distinguish Group 4 cases from the other groups and has a high correlation with high absences and females.

A stacked histogram representing all cases and each group in relation to centroids and the first canonical discriminant function is presented in Figure 11. These illustrate the information presented above concerning the close centroids of Groups 2 and 4 and the distinctness of Group 1.

The twenty four graduates from the sample in the fourth category - those who had plans other than education, wanted to continue their education, but had taken no action to do so, and those undecided - were most difficult to classify (see Table 11). None of the 24 students in Group 4 - or any other students in the study- were classified into Group 4. This group was difficult to classify properly inasmuch as they were fairly heterogeneous and amorphous with respect to post high school plans.

Aside from this group, the use of discriminant analysis with the four variables (CATV, GPA9, ABSEN9 and gender) allowed placement in the correct category substantially better than chance placement would allow (see Table 12). Group 1, as indicated above, was easiest to classify (79.4%), while 62.5% of Group 2 students were classified correctly. Most of the Group 2 students misclassified were placed in Group 1. Aside from Group 4, students in Group 3 were next most difficult to classify, with a larger percent of them being misclassified into Group 1 (16.1%) and Group 2 (45.2%) than being classified correctly into Group 3 (38.7%).

Discriminant analysis, in a manner similar to multiple regression, takes advantage of any peculiarities in the sample and, hence, tends to inflate classification accuracy. If the discriminant functions were developed and then used on another sample from the same population, the classification results would differ.

Classification/misclassification rate, a cross validation analysis, was undertaken. Odd number cases were selected to develop the classification function and then applied to the even number cases. The same four dependent groups were used with the same four independent variables.

The analysis of cross validation noted similar patterns as the entire sample. The independent variables were entered in the same order and the means of the independent variables showed identical patterns in describing the four dependent groups. Other statistical data exhibited similar results as the entire sample.

Group 1 was still the easiest to classify and Groups 3 and 4 the most difficult, (See Table 13). The discriminant function developed with the odd cases classified 64.46% of the students correctly. When applied to the rest of the cases, the function classified 56.2% of the students into the correct group.

Cross validation, even though within the same sample, indicates that the discriminate function still does better in classifying the first three groups. One case in Group 4 was correctly placed in both groups of the cross validation, although none had been accurately classified with the entire sample.

Analysis Including Race as Independent Variable

An additional analysis was conducted with race added to the previous four independent variables (CATV, ninth grade absences, grade point average at the end of ninth grade, and gender). The same four combined groups regarding postsecondary plans were considered and corresponding research questions were addressed. When the initial data were gathered, race was coded into three groups (white, black and other). The distribution did not meet the multivariate normality assumption; however, with a large sample, the robustness of the discriminant analysis procedure in regard to this assumption provides rationale for inclusion of race in the analysis.

Table 14 indicates the racial make up of each group based on postsecondary plans. Group 3, students who were working or in the military, represented the group with the highest non-white population (35.5% black and 64.5% white). They tended to be male, had the lowest mean CATV and GPA9 values and had the highest value for mean absences, (See Table 15). Students planning on attending technical schools or two year colleges (Group 2) represent the largest white population (83.8%). Based on group means, these students had the second highest CATV and GPA, tended to be female and had the second highest number of ninth grade absences.

Race had the largest Wilks' lambda value of the five factors to be entered when the stepwise discriminant analysis procedure was begun. The discriminators were entered in similar order as the analysis without race through the third variable (i.e.,

with the best discriminator being CATV, then GPA9, then gender). Race was the fourth entry and ninth grade absences last (Table 16).

When race is added as a fifth independent variable, the function that provides the best discrimination (Table 16) among groups is:

$$D_r(f_1) = .71361 (\text{CATV}) + .52303 (\text{GPA9}) + .26080 (\text{RACE}) - .21471 (\text{GENDER}) - .10019 (\text{ABSEN9}).$$

The students scoring high on this function tend to have high CATV scores, high GPA9 values, a low number of absences, a low gender score (more likely to be male) and a high race score (more likely to be non-white). As shown by the groups centroids (Table 17), this function distinguishes Group 1 from the other groups, especially Group 3. The large correlations in Table 17 indicate that the first function is an academic discriminator with CATV and GPA9 with large correlations.

The second function that discriminates the groups based on postsecondary plans is:

$$D_r(f_2) = -.37283 (\text{CATV}) + .64012 (\text{GPA9}) + .51198 (\text{RACE}) - .62752 (\text{GENDER}) + .55519 (\text{ABSEN9}).$$

Students scoring high on the second function have low CATV scores, high ninth grade GPA, a high number of ninth grade absences and high race (tend to be non-white) and low gender (male). This equation discriminates best between those students who work or enter the military (Group 3) and those who attend technical schools or junior colleges (Group 2).

As in the previous analysis with the four variables, the third function plays only a small role in discrimination while the first function, as indicated by its eigenvalue, plays the major role in discrimination (see Table 16). The third function is defined by the equation:

$$D_r(f_3) = - .07467 (\text{CATV}) + .21202 (\text{GPA9}) - .27876 (\text{RACE}) + .50997 (\text{GENDER}) + .74776 (\text{ABSEN9}).$$

The students scoring high on this function tend to have low CATV scores, high grade point averages at the end of ninth grade, high ninth grade absences, high gender scores (tend to be female) and low race scores (more likely to be white). This function plays a role in separating Group (4) from the other three groups and is highly correlated with a high number of absences and females (Table 17).

The location of cases in relation to group centroids is illustrated in Figure 12 by the histogram in relation to the first canonical discriminant function.

The test for equality of covariance matrices, Box's M Test, was met as shown in Table 18.

When including race as an independent variable, the accuracy classification was better than chance or prior probability for the first three groups of postsecondary plans (see Table 12 and Table 19). With race added as the fifth independent variable, an additional eleven students from the sample of 242 cases were accurately classified into the correct category of postsecondary plans (from 147 cases to 158 cases). The overall classification rate for all four groups increased from 60.74% to 65.29%. The same patterns of misclassification occurred; and, again, none of the students in Group 4 were correctly classified.

A cross validation analysis was undertaken with race included as an independent variable. An examination of the group means of the independent variables by the four postsecondary plans shows some differences in the odd numbered cases and the entire sample. As a whole, the sample chosen for cross validation (odd numbered cases) tended to have higher CATV and ninth grade GPA (especially Group 1), higher absences (especially Group 1 and 3), and to be similar with respect to race and gender.

The odd numbered cases, which provided the basis for discriminant functions, had a classification rate of 71.9% and 54.55% of the even numbered cases were accurately classified. The odd numbered case results followed the same pattern as previously mentioned; however, in the even numbered cases, Group 2 had 67.6% accurately classified, compared to a rate of 64.3% for Group 1 (see Table 13). Group 4 had a 21.4% classification rate for odd numbered cases; however, none of the even numbered cases were accurately classified. The results indicate classification rates substantially better than expected by prior probabilities, with some success in classifying Group 4 that was not noted in previous data.

With race included as an independent variable, both the classification rate and the eigenvalue of the discriminant functions increased. The assumption for equality of covariance matrices was also met. The data indicates that the analysis including race provides a stronger model with the information collected for this study.

CHAPTER 5

DISCUSSION

Summary of Results/Conclusions

The development of the structure and mission of the public secondary schools in America has determined the culture in which the schools of the 1990's function. The belief that, especially at the secondary level, both a student and his parents have the freedom and responsibility to choose the educational path he follows is imbedded in the origins of the secondary schools in America.

The school, in an effort to meet the needs and expectations of its various constituencies, provides information, yet limited direct assistance, in helping an individual student make both career and educational decisions. The purpose of this study is to provide information to assist schools in identifying, early in high school, the educational or career paths students are likely to pursue at graduation. Utilization of this information would allow schools and their staffs to provide to individuals more detailed, relevant information concerning educational and career opportunities. This additional information should help students maximize their chances for making wise decisions concerning plans immediately after graduation, either to further their education or enter the work force.

The investigator collected ninth grade information from cumulative folders of 1989 graduates and results of a post high school survey which indicated educational and employment plans each student would pursue immediately after graduation. Although the original data included nine independent variables and eight categories of postsecondary plans, variables were eliminated in order to comply with statistical assumptions and to

provide simpler classification procedures. The discriminant analysis statistic was employed to see how accurately certain variables (ninth grade California Achievement Test Verbal scores [CATV], grade point average at the end of the ninth grade [GPA9], ninth grade absences [ABSEN9], and gender) provided classification of students into the correct category of "plans after high school". The four categories of postsecondary plans included students who intended to:

(Group 1): attend a four-year college/university;

(Group 2): attend a technical, community, or junior college; trade or business school;

(Group 3): pursue no further education (now working or looking for work); or enter the military;

(Group 4): pursue no further education (not working); want more education, but have taken no action; and undecided about further education.

The following questions were addressed in the analysis of the data:

1. Is there a statistically significant relationship between the four combined categories of "plans after high school" and (a) grade point average at end of the ninth grade, (b) ninth grade attendance, (c) ninth grade California Achievement Test verbal scores or (d) gender?
2. Is there a statistically significant relationship between "plans after high school" and all of the four variables listed above?
3. What equation, using the four variables above, provides the most accurate classification of students into the four categories of "plans after high school"?

4. Using the four ninth grade variables mentioned above, how well does the equation obtained using half of the 1989 data classify the students in the other half into the correct category of "plans after high school"?

A separate analysis was conducted with race included as an independent variable, the same four dependent groups and corresponding research questions. Although race was coded in three groups and did not meet the multivariate normality assumption, the robustness of the discriminant analysis procedure with a large sample provides the rationale for inclusion of that variable in the analysis.

With regard to the first question, the contribution of each independent variable alone to the classification of postsecondary plans was examined. CATV (59.09%) produced the highest accurate classification, with GPA9 (57.02 %) and ABSEN9 (45.87%) also providing fairly accurate classification of cases into the correct group of postsecondary plans.

When the classification rate was examined for each postsecondary category, CATV predicted the first three groups better than chance; GPA9 did better than chance prediction for Groups 1 and 2; and ABSEN9 predicted better than chance only in Group 1. None of the three variables correctly classified any student in Group 4 (those who had plans other than education, wanted to continue their education, but had taken no action to do so, and those undecided).

When all independent variables were considered for entry for analysis in answering the second question, CATV and GPA9 were the strongest discriminators in both the analysis with and without race. Gender was relatively unimportant in the classification and entered third in each instance. Race was a stronger predictor than ninth grade absences when all five independent variables were considered for classification into the correct postsecondary category.

When using both the four and five independent variables, the accuracy classification was better than chance or prior probability for the first three groups of postsecondary plans. None of the students in Group 4 were correctly classified with either four or five independent variables.

The function with the four independent variables that best discriminates among the four groups based on postsecondary plans is:

$$D(f_1) = -.65349 (\text{CATV}) + .51195 (\text{GPA9}) - .16236 (\text{Gender}) - .14923 (\text{ABSEN9}).$$

This discriminate function employs high CATV scores, high GPA9, a low number of absences and a low gender score (indicating student is more likely to be male) to maximize differences between the groups. This function serves to distinguish those students planning on attending a 4 year college or university (Group 1) from the other three groups.

When race is added as a fifth independent variable, the function that provides the best discrimination among groups is:

$$D_r(f_1) = .71361 (\text{CATV}) + .52303 (\text{GPA9}) + .26080 (\text{RACE}) - .21471 (\text{GENDER}) - .10019 (\text{ABSEN9}).$$

The students scoring high on this function tend to have high CATV scores, high GPA9 values, a low number of absences, a low gender score (more likely to be male) and a high race score (more likely to be non-white). This function distinguishes Group 1 from the other groups, especially Group 3.

A cross validation analysis was conducted with the original four independent variables as well as when race was added as the fifth independent variable. In both studies, the odd number cases were chosen to determine the classification functions and the functions were tested on the even numbered cases. The four independent variables classified 64.46% of the odd cases correctly and 56.2% of the even cases accurately.

The functions in both the even and odd cases classified more students in Groups 1, 2 and 3 into the correct postsecondary category than chance or prior expected probabilities. One student was classified into Group 4 in each classification.

When race was included, 71.9% of the odd cases were classified correctly and 54.55% of the even cases were accurately classified. More students in the first three groups of both the even and odd cases were classified into the correct postsecondary category than chance or prior expected probabilities. Three students were accurately classified in the odd cases into Group 4 while none were classified in the even cases. I will return later to the issue of race as one of the discriminating variables.

Difficulty in Accurately Classifying Some Students

The difficulty in accurately classifying members of Group 4, using the five variables of this study, was evident in each analysis of the data. The investigator proposes that other factors not examined in this study may provide insight into this group of students and cites several articles as sources.

In their 1981 article entitled "Highly Able Students Who Did Not Go To College," Graham Burkheimer and Jay Jaffe examined the profile of highly able students in the National Longitudinal Study of the High School Class of 1972 who resembled students choosing college as a postsecondary plan, but who themselves did not attend college. The strongest predictor in identifying these students in their study was "low educational expectation," which accounted for approximately 30% of the variation of the group of variables examined. Their group of five variables accounted for about one third of the variation in college attendance of highly able students (Burkheimer and Jaffe, p. vii). The authors found factors associated with not attending college were similar across all ability levels and included low socio-economic status, poorer high school background and lower expectations for additional education (plans as reported by each student in the

spring of his senior year). The authors suggested a need for "coordinated counseling of the highly able student" since the suggestion is a student's failure to properly prepare for college entry may be due to improper guidance. Other possible factors related to college matriculation mentioned include: marriage, financial considerations, and the tight job market for college graduates (Burkheimer & Jaffe, p. 40).

Grant and Sleeter (1988) also discussed the impact of educational expectation, from both the school as well as the home. In their longitudinal study of twenty four lower-middle class junior high school students, they noted the role both institutions played in "the abandonment of students' dreams" (p. 39).

In their report "The Transition from High School to Work" Jerome Johnston and Jerald Bachman reported on the Youth in Transition Project and noted that in the group of unemployed high school graduates were a number of men with high intelligence who had repeatedly said they planned to go to college, but, for a variety of reasons, had failed to go. To avoid facing the reality of not achieving their goal, they made "a 'non-choice' - unemployment" (ISR Newsletter, p. 7).

Surveying students in the mid-1970's a month after graduation, Neal Schmitt (1978) found educational plans related to the interests as noted on the Strong Vocational Interest Blank. Schmitt examined three groups of postsecondary plans: "(1) attendance at four year college, (2) attendance at a junior or two-year college, or (3) employment" (p. 168) in relation to gender and student achievement as measured by letter grade average in high school. Referring to the interest areas included in the Strong Vocational Interest Blank, Schmitt noted that, regarding educational choices, "correlations among interests were greater for low ability groups than for high ability groups" (p. 167).

The heterogeneous makeup of subjects in Group 4, along with data from previous studies suggest that variables other than the five considered in this study may provide more accurate classification information for this group. An examination of socio-economic influences, prior expectations of postsecondary education, maturity level in terms of decision making skills and other factors may enhance the chance to better understand those in Group 4.

Implications

The results of this investigation have both theoretical and practical implications for secondary schools.

As noted through historical references as well as through the current culture of secondary schools, one primary role of high school remains to prepare students for further education and career plans. The accuracy noted in this research with which students may be matched early in their high school career with postsecondary plans they are likely to pursue, creates an interesting dilemma. Should the high school assume the main role for presentation of career/educational information or should information be presented earlier in a student's educational career to prepare students to make necessary decisions? This may involve adjusting the culture of schools to change their roles or assume new roles with regard to preparing students for postsecondary plans. Terrence Deal discusses the difficulty of changing the culture of an organization in the first chapter of the 1987 Yearbook of the Association for Supervision and Curriculum Development (Sheive and Schoenheit, pp. 3-15).

The information examined in this study provides a method for high school staff members to investigate the educational path a student is likely to pursue and to provide additional assistance in helping students make wise decisions. However, time

constraints, other priorities, and lack of training and experience in understanding and using research are likely to be deterrents in the use of this study.

North Carolina schools pursuing school based management principles and school systems which presently use Senate Bill 2 funds to allow individual staff members to pursue research interests may provide the initiative necessary to utilize this research.

One aspect of the results of this study may contribute to a reluctance to replicate this research. School personnel may view the one group most in need of additional attention and information as the group which defied accurate classification. Rather than embarking on a study to more accurately identify this group, professionals may turn to other research interests.

Suggestions for Further Investigation

The investigator suggests that schools conduct postsecondary surveys with recent graduates. In addition to information about educational and career plans of former students, the survey could include questions relating to the graduate's perceived value of educational and extra curricular experiences during his high school career.

Since no study was located that had a similar configuration of variables, or that investigated how these independent variables related to postsecondary plans, this research should be replicated. Results of cross validation studies indicate that classification accuracy should be better than chance for different populations; therefore, additional studies should be useful to high school counselors and other school staff members.

The difficulty in classification of those students who are uncertain or have made no definite plans concerning their educational and career choices provides an opportunity for further study. Since this study investigated academic variables, (CATV and grade point average at the end of the ninth grade), and found the profile of students

who had made no definite plans to be similar to the other three groups, perhaps other factors would discriminate this group from those students who leave high school with definite career or educational plans. A study including additional variables, such as financial concerns about seeking further education, cultural factors, educational expectations, family influence, student interests, self-esteem level, personality variables, student level of decision making skills, and socioeconomic status could provide a method to identify this group early in high school and allow the school to better serve them by focusing on their needs.

The verbal scale score of the California Achievement Test was used while the math score was discarded because of the high correlation between the two. A combination of the two scores or the use of the total battery scale score may provide a stronger discriminant variable and deserves further investigation.

While the CAT is used extensively throughout the United States, other similar achievement tests are used nationally. This study could be replicated, using another tests such as the California Test of Basic Skills or the Iowa Test of Basic Skills, to find if similar classification results can be obtained.

Since the use of race as a variable in both the pilot study and this analysis added significantly to the ability to correctly classify postsecondary plans, this variable needs further study. One area for further investigation would be the association of race and socioeconomic status to see if this is the issue that contributes to its classification success.

As public schools are held more accountable for their graduates, the need to identify early those students who are likely to flounder after graduation becomes more important. Continued research along the lines of this study could be a great help in identifying for counseling and other interventions those students who are likely to fall

into this pattern. The investigator believes this research provides valuable information for school personnel and that further investigation of related topics is necessary.

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APPENDIX A
TABLES

Table 1

Profile of Graduates of Seven Surveyed High Schools - 1987-1989

	1986-87		1987-88		1988-89	
	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT
TOTAL GRADUATES	1415	100	1479	100	1454	100
MALE	716	50.6	746	50.44	707	48.62
FEMALE	699	49.4	733	49.56	747	51.38
WHITE	1183	83.6	1228	83.03	1181	81.22
BLACK	213	15.05	233	15.75	242	16.64
OTHER*	19	1.34	18	1.22	31	2.13

*Asian, American Indian, Hispanic

Table 2

Number of Graduates in Population and Sample by Gender and Race

	POPULATION		SAMPLE	
	NUMBER	PERCENT	NUMBER	PERCENT
TOTAL GRADUATES	1454	100	242	100
MALE	707	48.62	109	45.04
FEMALE	747	51.38	133	54.96
WHITE	1181	81.22	191	78.93
BLACK	242	16.64	46	19.01
OTHER	31	2.13	5	2.07

Table 3

Number of Graduates from Sample in Each of the Eight Original Postsecondary Categories

<u>EIGHT CATEGORIES</u>	<u>NUMBER IN SAMPLE</u>	<u>PERCENT OF SAMPLE</u>
FOUR-YEAR COLLEGE/UNIVERSITY	107	44.21
TWO-YEAR TECHNICAL, COMMUNITY OR JUNIOR COLLEGE	75	30.99
ONE YEAR (OR LESS) TRADE OR BUSINESS SCHOOL	5	2.07
NO FURTHER EDUCATION NOW (WORKING/LOOKING FOR WORK)	23	9.5
NO FURTHER EDUCATION (ENTERING MILITARY SERVICE)	8	3.31
NO FURTHER EDUCATION (OTHER PLANS)	5	2.07
WANT TO CONTINUE EDUCATION (HAVE TAKEN NO ACTION)	6	2.48
UNDECIDED ABOUT ADDITIONAL EDUCATION	13	5.37
TOTAL N =	242	100

Table 4

Classification Results of Graduates by Eight Original Postsecondary Categories

Actual Group	No. of Cases	Predicted Group Membership							
		1	2	3	4	5	6	7	8
GROUP 1	107	94 87.9%	10 9.3%	0 0.0%	1 0.9%	2 1.9%	0 0.0%	0 0.0%	0 0.0%
GROUP 2	75	16 21.3%	55 73.3%	1 1.3%	3 4.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%
GROUP 3	5	0 0.0%	3 60.9%	2 40.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%
GROUP 4	23	6 26.1%	7 30.4%	0 0.0%	8 34.8%	2 8.7%	0 0.0%	0 0.0%	0 0.0%
GROUP 5	8	1 12.5%	2 25.0%	0 0.0%	0 0.0%	5 62.5%	0 0.0%	0 0.0%	0 0.0%
GROUP 6	5	2 40.0%	3 60.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%	0 0.0%
GROUP 7	6	0 0.0%	4 66.7%	0 0.0%	1 16.7%	1 16.7%	0 0.0%	0 0.0%	0 0.0%
GROUP 8	13	2 15.4%	9 69.2%	0 0.0%	1 7.7%	1 7.7%	0 0.0%	0 0.0%	0 0.0%

Percent of "Grouped" cases correctly classified: 67.77%.

Table 5

Test of Equality of Group Covariance Matrices Using Box's M

The ranks and natural logarithms of determinants printed are those of the group covariance matrices.

<u>GROUP LABEL</u>	<u>RANK</u>	<u>LOG.DETERMINANT</u>
1	8	23.944737
2	8	22.514184
3	< 5	(Too few cases to be non-singular)
4	8	22.837427
5	< 8	(Too few cases to be non-singular)
6	< 5	(Too few cases to be non-singular)
7	< 6	(Too few cases to be non-singular)
8	8	21.710174
Pooled Within-Groups Covariance Matrix	8	24.518024

Since some covariance matrices are singular, the usual procedure will not work. The non-singular groups will be tested against their own pooled within-groups covariance matrix. The log of its determinant is: 25.232784.

Box's M	Approximate F	Degrees of Freedom		Significance
432.68	3.3894	108	6387.0	0.0000

Table 6

Number of Graduates in Population and Sample by Four Postsecondary Categories

<u>FOUR CATEGORIES</u>	<u>NUMBER/PERCENT IN POPULATION</u>		<u>PERCENT OF IN POPULATION</u>	
Four-Year College/University	628	43.19	107	44.21
Two-Year Institution OR				
One Year (Or Less) Trade or Business School	499	34.32	80	33.06
No Education Now -- Work or Military	288	19.81	31	12.81
No Education Plans/Undecided/ Want Education but No Plans	39	2.68	24	9.92
TOTAL N =	1454		242	

Table 7

Number of Cases by Group/Group Means and Standard Deviations by Four Postsecondary Categories (Four Independent Variables)

<u>NUMBER OF CASES BY GROUP</u>		
<u>PLANS</u>	<u>NUMBER OF CASES</u>	
	<u>UNWEIGHTED</u>	<u>WEIGHTED LABEL</u>
1	107	107.0
2	80	80.0
3	31	31.0
4	24	24.0
TOTAL	242	242.0

<u>GROUP MEANS</u>				
<u>PLANS</u>	<u>CATV</u>	<u>GPA9</u>	<u>GENDER*</u>	<u>ABSEN9</u>
1	776.02804	3.03105607	1.57009	6.13084
2	738.83750	2.15490000	1.61250	7.26250
3	714.67742	1.99932258	1.38710	9.93548
4	730.83333	2.12833333	1.45833	7.20833
TOTAL	751.39256	2.51972727	1.54959	7.09917

<u>GROUP STANDARD DEVIATIONS</u>				
<u>PLANS</u>	<u>CATV</u>	<u>GPA9</u>	<u>GENDER*</u>	<u>ABSEN9</u>
1	34.58118	.66697185	0.49739	5.31300
2	28.11524	.64197992	0.49025	5.92729
3	39.12151	.83699886	0.49514	6.40799
4	30.35538	.77504040	0.50898	5.41318
TOTAL	40.01025	.82804029	0.49857	5.77073

*Gender: 1 = male, 2 = female

Table 8

Summary Table

STEP	ACTION ENTERED	WILKS' LAMBDA	SIGNIFICANCE LEVEL	
1	CATV	.66438	.0000	California Achievement Test Verbal
2	GPA9	.59896	.0000	
3	GENDER	.58108	.0000	
4	ABSEN9	.56606	.0000	9th Grade Absences

Table 9

Canonical Discriminant Functions and Box's M Test of Equality of Group Covariance Matrices

FCN	Eigenvalue	PCT of Variance	CUM PCT	Canonical Corr	After FCN	Wilks' Lambda	ChiSquare	DF	Sig
1 *	0.6666	91.77	91.77	0.6324	0	0.5661	134.867	12	0.0000
2 *	0.0559	7.69	99.46	0.2301	1	0.9434	13.809	6	0.0318
3 *	0.0039	0.54	100.00	0.0623	2	0.9961	0.921	2	0.6309

*Marks the 3 Canonical Discriminant functions remaining in the analysis.

Standardized Canonical Discriminant Function Coefficients

	Func 1	Func 2	Func 3
CATV	0.65349	-0.52366	0.06247
GPA9	0.51195	0.77110	0.07965
GENDER	-0.16236	-0.62489	0.59568
ABSEN9	-0.14923	0.53622	0.74968

Test of equality of group covariance matrices using Box's M

(The ranks and natural logarithms of determinants printed are those of the group covariance matrices.)

Group Label	Rank	Log Determinant
1	4	21.502185
2	4	21.457663
3	4	22.688383
4	4	21.819553
Pooled within-groups covariance matrix	4	21.791553

Box's M	Approximate F	Degrees of Freedom	Significance
29.501	0.93779	30 26986.1	0.5634

Table 10

Structure Matrix: Pooled Within-Groups Correlations between Discriminating Variables and Canonical Discriminant Functions (Variables ordered by size of correlation within function)

	<u>Func 1</u>	<u>Func 2</u>	<u>Func 3</u>
CATV	0.86591*	-0.30348	0.22146
GPA9	0.80888*	0.33655	0.15287
ABSEN9	-0.22274	0.43347	0.77106*
GENDER	0.08137	-0.55871	0.66470*

Unstandardized canonical discriminant function coefficients

	<u>Func 1</u>	<u>Func 2</u>	<u>Func 3</u>
CATV	0.1991320E-01	-0.1595710E-01	0.1903543E-02
GPA9	0.7379430E-03	0.1111502E-02	0.1148053E-03
GENDER	-0.3274238	-1.260145	1.201234
ABSEN9	-0.2628090E-01	0.9443564E-01	0.1320285
(Constant)	-16.12810	10.47165	-4.518296

Canonical discriminant functions evaluated at group means (group centroids)

<u>Group</u>	<u>Func 1</u>	<u>Func 2</u>	<u>Func 3</u>
1	0.88664	0.05795	0.00238
2	-0.54412	-0.26902	0.03135
3	-1.13648	0.48005	0.04965
4	-0.67122	0.01833	-0.17927

Table 11

Classification Results by Category of Postsecondary Plans*

Actual Group	No. of Cases	Predicted Group Membership			
		1	2	3	4
Group 1	107	85 79.4%	22 20.6%	0 0.0%	0 0.0%
Group 2	80	26 32.5%	50 62.5%	4 5.0%	0 0.0%
Groups 3	31	5 16.1%	14 45.2%	12 38.7%	0 0.0%
Group 4	24	6 25.0%	15 62.5%	3 12.5%	0 0.0%

Percent of "grouped" cases correctly classified: 60.74%

*Four independent variables: Ninth grade absences, gender, California Achievement Test Verbal Score, and Grade Point Average at end of ninth grade.

Table 12

Classification Rates into Correct Category of Postsecondary Plans

	CHANCE	PRIOR PROBABILITY	FOUR INDEPENDENT VARIABLES*	FIVE INDEPENDENT VARIABLES**
Group 1	25%	44.21%	79.4%	81.3%
Group 2	25%	33.05%	62.5%	71.3%
Group 3	25%	12.81%	38.7%	45.2%
Group 4	25%	9.91%	0%	0%
	Percent of Cases Correctly Classified in Total Group:		60.74%	65.29%

*California Achievement Test (Verbal), 9th grade GPA, 9th grade absences, gender

**California Achievement Test (Verbal), 9th grade GPA, 9th grade absences, gender, and race

Table 13

Cross Validation Rates into Correct Category of Postsecondary Plans

	CHANCE	PRIOR PROBABILITY	FOUR INDEPENDENT VARIABLES*		FIVE INDEPENDENT VARIABLES**	
			Odd # Cases	Even # Cases	Odd# Cases	Even # Cases
Group 1	25%	44.21%	88.2%	64.3%	86.3%	64.3%
Group 2	25%	33.05%	67.4%	73.0%	79.1%	67.6%
Group 3	25%	12.81%	23.1%	22.2%	46.2%	27.8%
Group 4	25%	9.91%	7.1%	10.0%	21.4%	0%
Percent of Cases Correctly Classified in Total Group:			64.46	56.20	71.90	54.55

*California Achievement Test (Verbal), 9th grade GPA, 9th grade absences, gender

**California Achievement Test (Verbal), 9th grade GPA, 9th grade absences, gender, and race

Table 14

Profile of Four Categories of Postsecondary Plans by Race

	GROUP 1	GROUP 2	GROUP 3	GROUP 4
White	86	67	20	18
Black	19	11	11	5
Other	2	2	0	1

Table 15

Group Means and Standard Deviations by Four Postsecondary Categories (Five Independent Variables)

<u>Group Means</u>					
Plans	CATV	GPA9	GENDER*	RACE**	ABSEN9
1	776.02804	3.03105607	1.57009	1.21495	6.13084
2	738.83750	2.15490000	1.61250	1.18750	7.26250
3	714.67742	1.99932258	1.38710	1.35484	9.93548
4	730.83333	2.12833333	1.45833	1.29167	7.20833
Total	751.39256	2.51972727	1.54959	1.23140	7.09917

<u>Group Standard Deviations</u>					
Plans	CATV	GPA9	GENDER*	RACE**	ABSEN9
1	34.58118	.66697185	0.49739	0.45615	5.31300
2	28.11524	.64197992	0.49025	0.45266	5.92729
3	39.12151	.83699896	0.49514	0.48637	6.40799
4	30.35538	.77504040	0.50898	0.55003	5.41318
Total	40.01025	.82804029	0.49857	0.46914	5.77073

*Gender: 1=male, 2=female

**Race: 1=white, 2=black, 3=other

Table 16

Summary Table and Canonical Discriminant Functions

STEP	ACTION ENTERED	VAR IN	WILKS' LAMBDA	SIGNIFICANCE LEVEL	
1	CATV	1	.66438	.0000	California Achievement Test Verbal
2	GPA9	2	.59896	.0000	
3	GENDER	3	.58108	.0000	
4	RACE	4	.55853	.0000	9th Grade Absences
5	ABSEN9	4	.54377	.0000	

FCN	EIGEN VALUE	PCT OF VARIANCE	CUM PCT	CANONICAL CORR	AFTER FCN	WILKS' LAMBDA	CHISQUARE	DF	SIG
				:	0	0.5438	144.083	15	0.0000
1 *	0.7063	90.12	90.12	0.6434:	1	0.9278	17.713	8	0.0235
2 *	0.0732	9.33	99.45	0.2611:	2	0.9957	1.014	3	0.7979
3 *	0.0043	0.55	100.00	0.0654					

* Marks the 3 canonical discriminant functions remaining in the analysis.

Standardized Canonical Discriminant Function Coefficients

	<u>FUNC 1</u>	<u>FUNC 2</u>	<u>FUNC 3</u>
CATV	0.71361	-0.37283	-0.07467
GPA9	0.52303	0.64012	0.21202
GENDER	-0.21471	-0.62752	0.50997
RACE	0.26080	0.51198	-0.27876
ABSEN9	-0.10019	0.55519	0.74776

Table 17

Structure Matrix: Pooled Within-Groups Correlations between Discriminating Variables and Canonical Discriminant Functions (Variables Ordered by Size of Correlation within Function)

	<u>FUNC 1</u>	<u>FUNC 2</u>	<u>FUNC 3</u>
CATV	0.83677*	-0.37735	0.21623
GPA9	0.78901*	0.18895	0.24925
RACE	-0.05951	0.39144*	-0.33704
ABSEN9	-0.21147	0.39873	0.78855*
GENDER	0.07204	-0.50449	0.54846*

Unstandardized Canonical Discriminant Function Coefficients

	<u>FUNC 1</u>	<u>FUNC 2</u>	<u>FUNC 3</u>
CATV	0.2174515E-01	-0.1136091E-01	-0.2275400E-02
GPA9	0.7539125E-03	0.9226986E-03	0.3056134E-03
GENDER	-0.4329870	-1.265453	1.028398
RACE	0.5563447	1.092180	-0.5946678
ABSEN9	-0.1764485E-01	0.9777702E-01	0.1316911
(Constant)	-18.12767	6.133429	-0.8565565

Canonical Discriminant Functions Evaluated at Group Means (Group Centroids)

<u>GROUP</u>	<u>FUNC 1</u>	<u>FUNC 2</u>	<u>FUNC 3</u>
1	0.92025	0.05332	0.00356
2	-0.60261	-0.30558	0.02939
3	-1.10173	0.55470	0.05751
4	-0.67103	0.06440	-0.18814

Table 18

Test of Equality of Group Covariance Matrices Using Box's M (The ranks and natural logarithms of determinants printed are those of the group covariance matrices).

Group Label	Rank	Log Determinant
1	5	19.708731
2	5	19.623615
3	5	20.948738
4	5	20.543200
Pooled Within-Groups Covariance Matrix	5	20.112967

Box's M	Approximate F	Degrees of Freedom	Significance
46.539	0.97430	45 25003.3	0.5209

Table 19

Classification Results by Category of Postsecondary Plans*

Actual Group	No. Of Cases	Predicted Group Membership			
		1	2	3	4
Group 1	107	87 81.3%	19 17.8%	1 0.9%	0 0.0%
Group 2	80	21 26.3%	57 71.3%	2 2.5%	0 0.0%
Group 3	31	6 19.4%	11 35.5%	14 45.2%	0 0.0%
Group 4	24	7 29.2%	13 54.2%	4 16.7%	0 0.0%

Percent of "Grouped" cases correctly classified: 65.29%

*Five Independent Variables: Ninth Grade Absences, Gender, California Achievement Test Verbal Score, Grade Point Average at End of Ninth Grade, and Race.

APPENDIX B
FIGURES

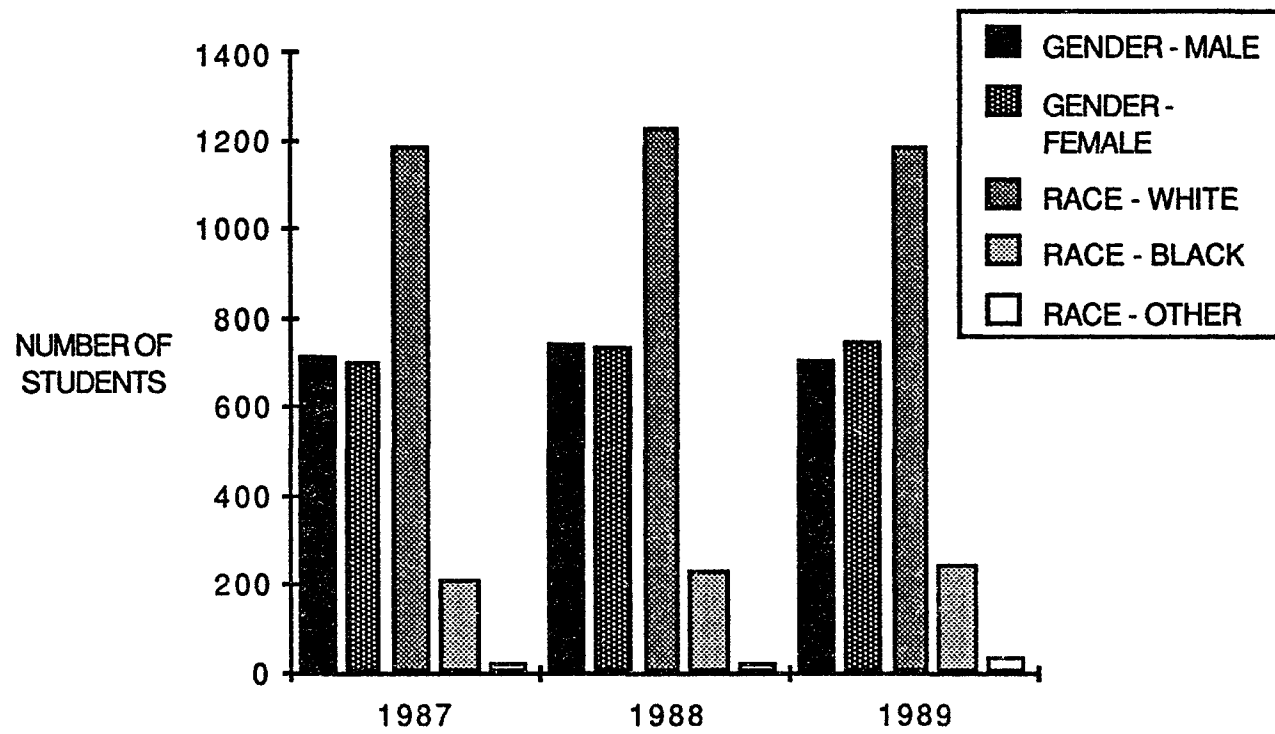


Figure 1. Profile of Graduates of Seven Surveyed High Schools by Gender and Race - 1987-1989

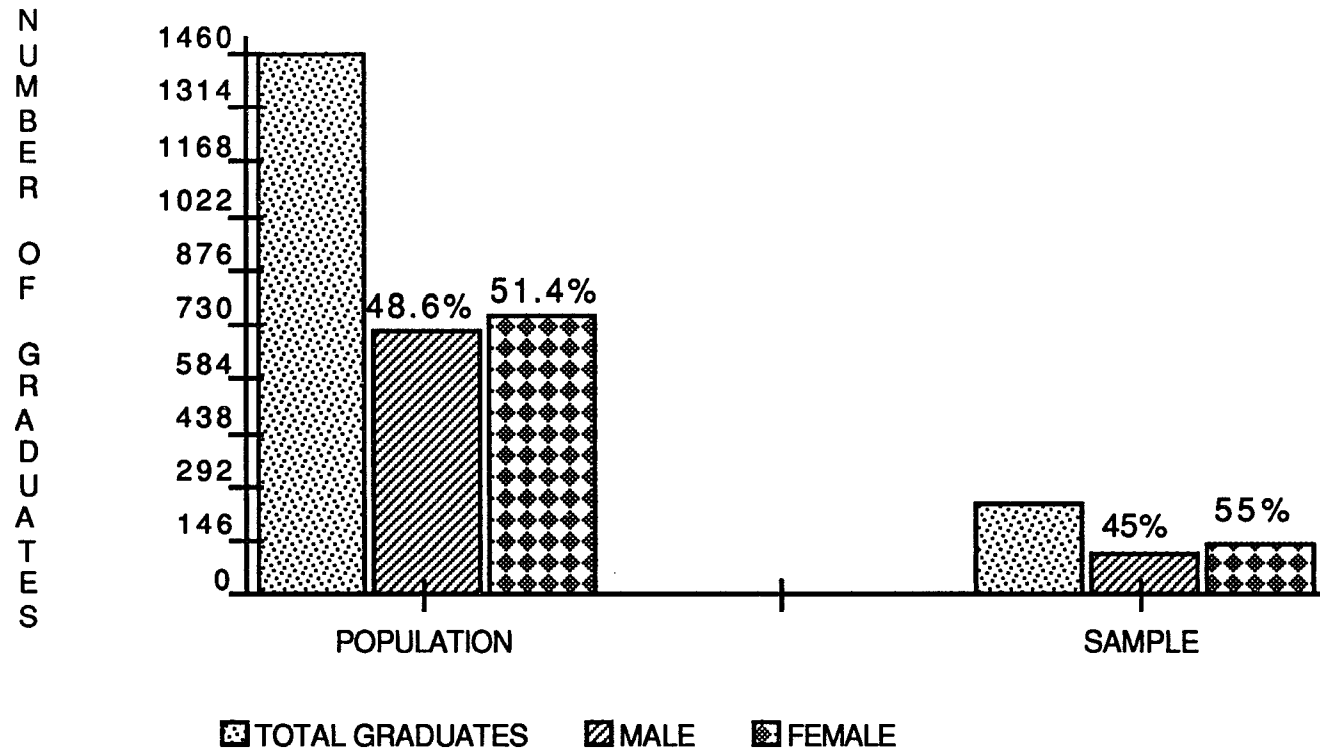


Figure 2. Number of Graduates in Population and Sample by Gender

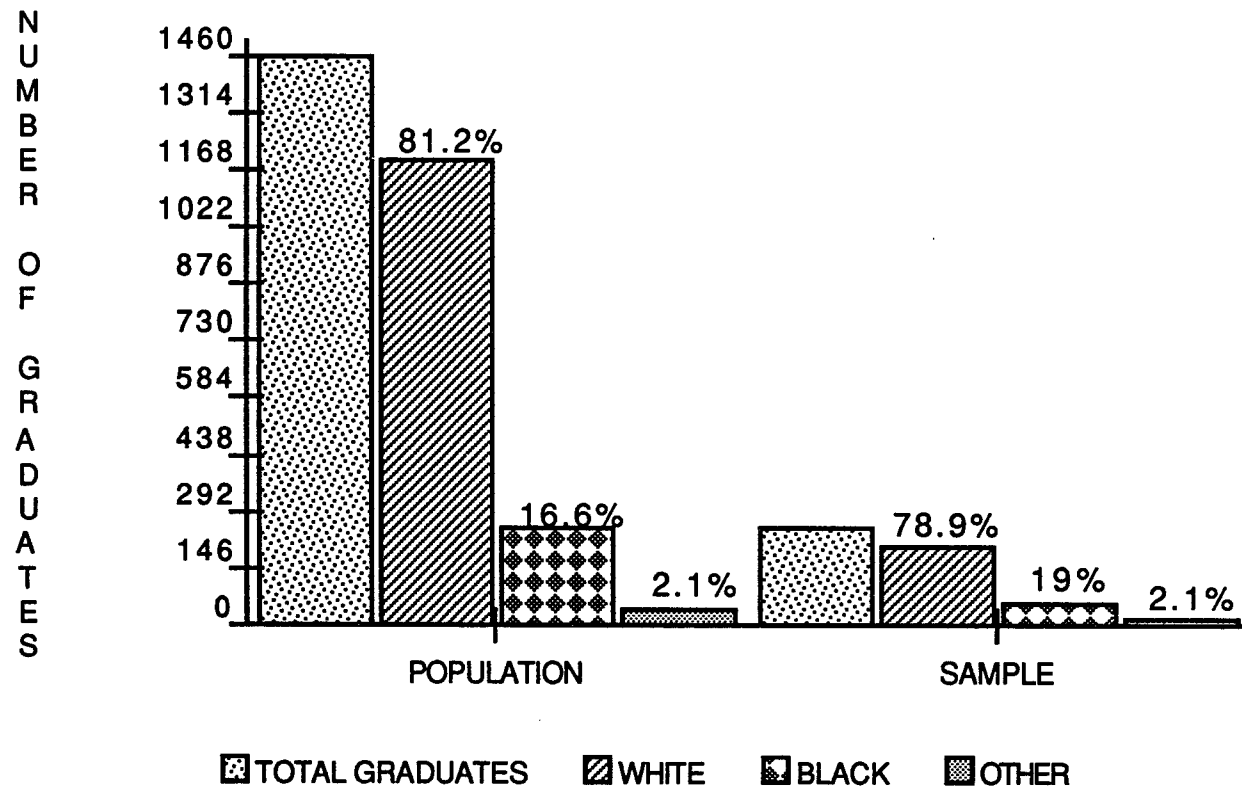


Figure 3. Number of Graduates in Population and Sample by Race

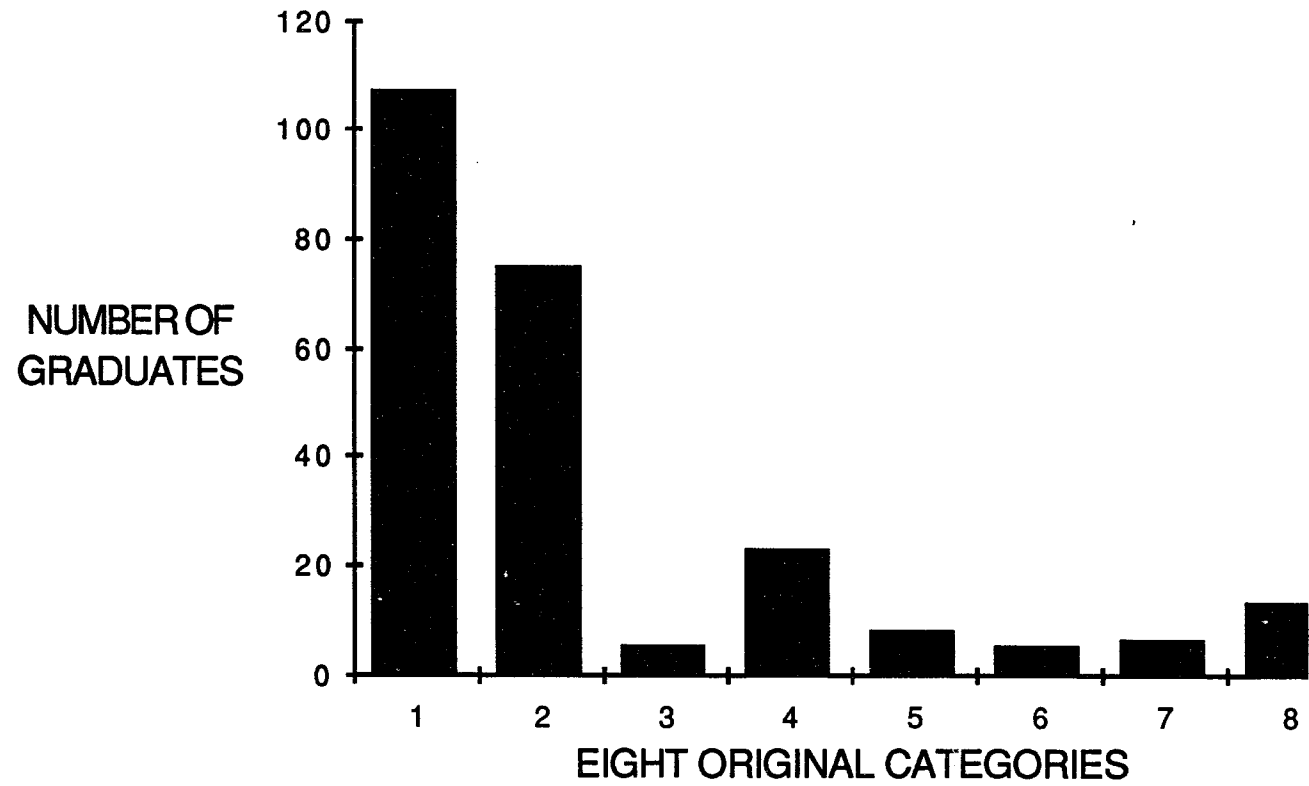


Figure 4. Number of Graduates in Eight Original Postsecondary Categories

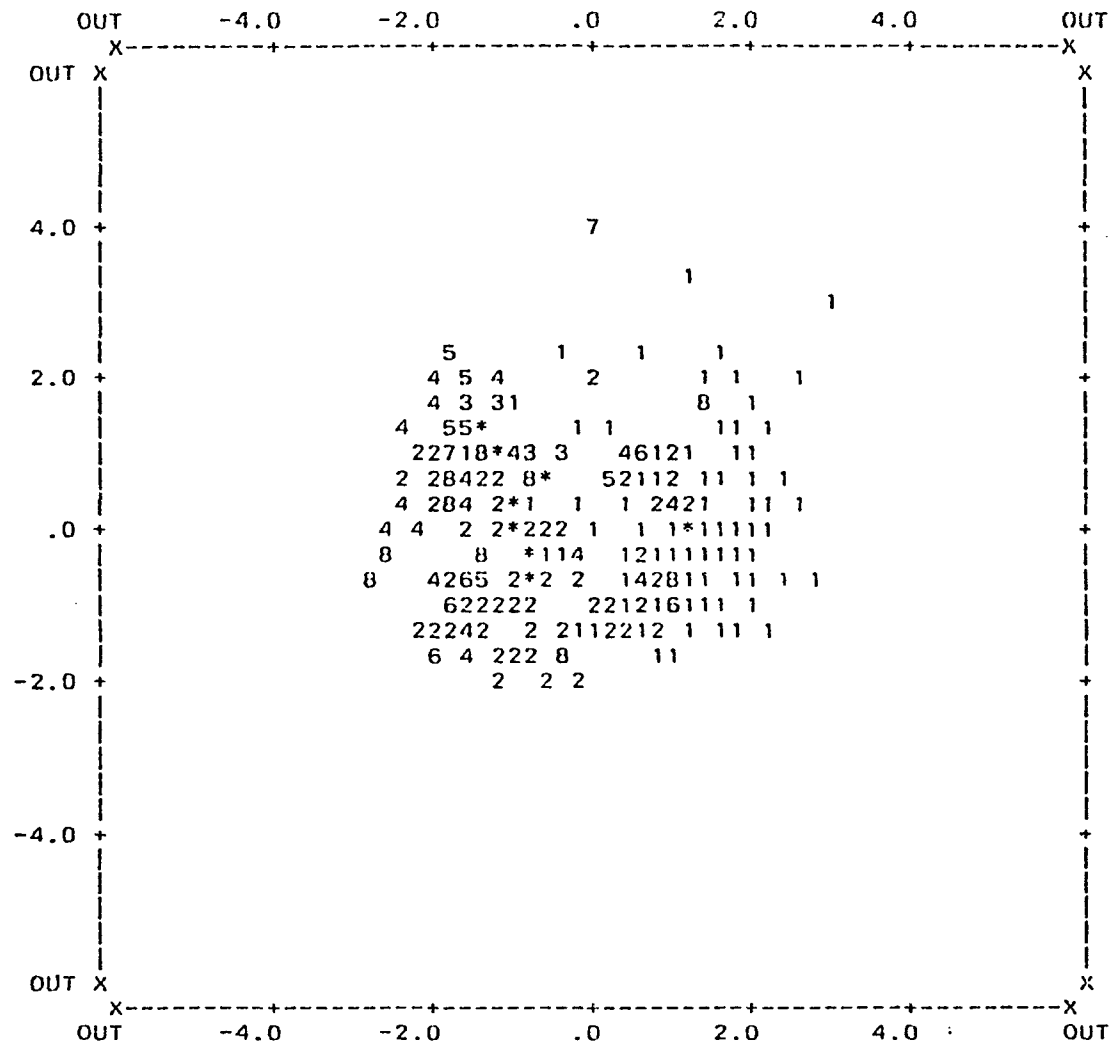


Figure 5. Scatterplot of All Eight Groups of Postsecondary Plans Based on First Canonical Discriminant Function (* Indicates a Group Centroid)

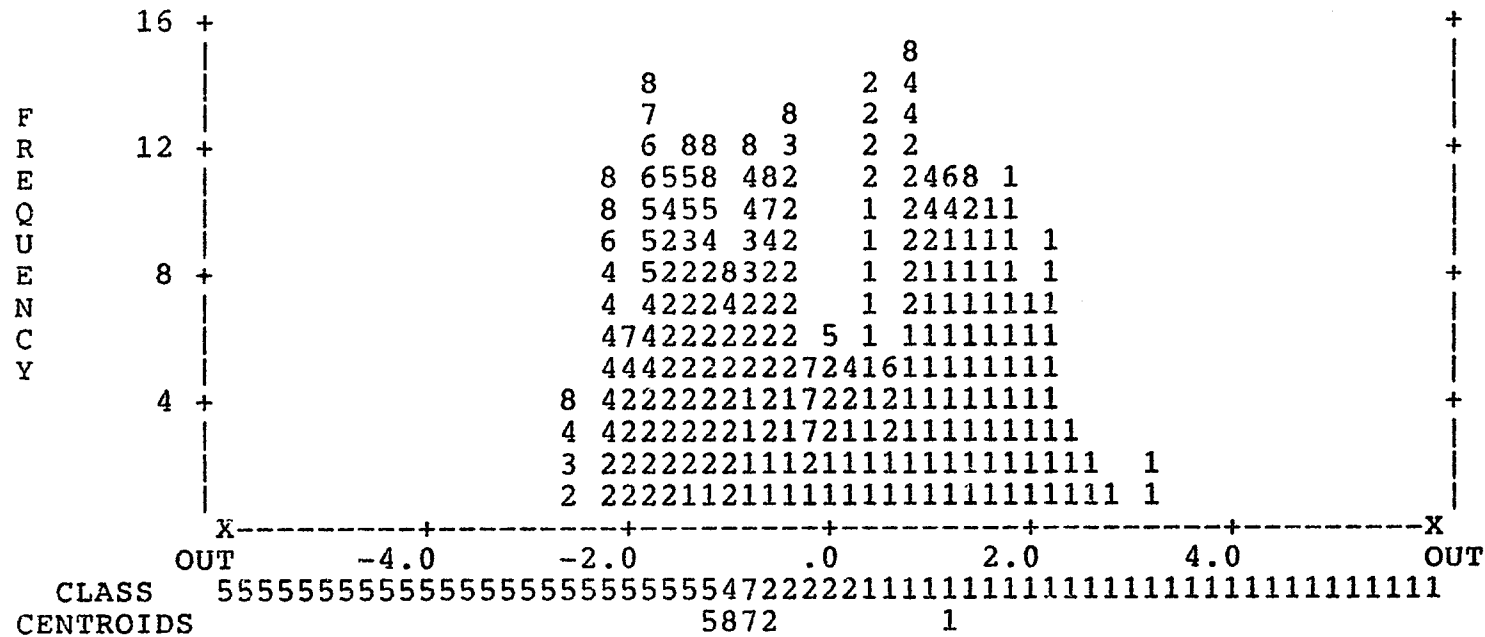


Figure 6. Stacked Histogram of Eight Postsecondary Categories Based on First Canonical Discriminant Function When CAT-Verbal Score, Ninth Grade GPA, Gender, Number of Ninth Grade College Preparatory Courses Taken, Number of Ninth Grade Honors Courses Taken, Parent/legal Guardian Information, Race and Ninth Grade Absences Are Used as Independent Variables

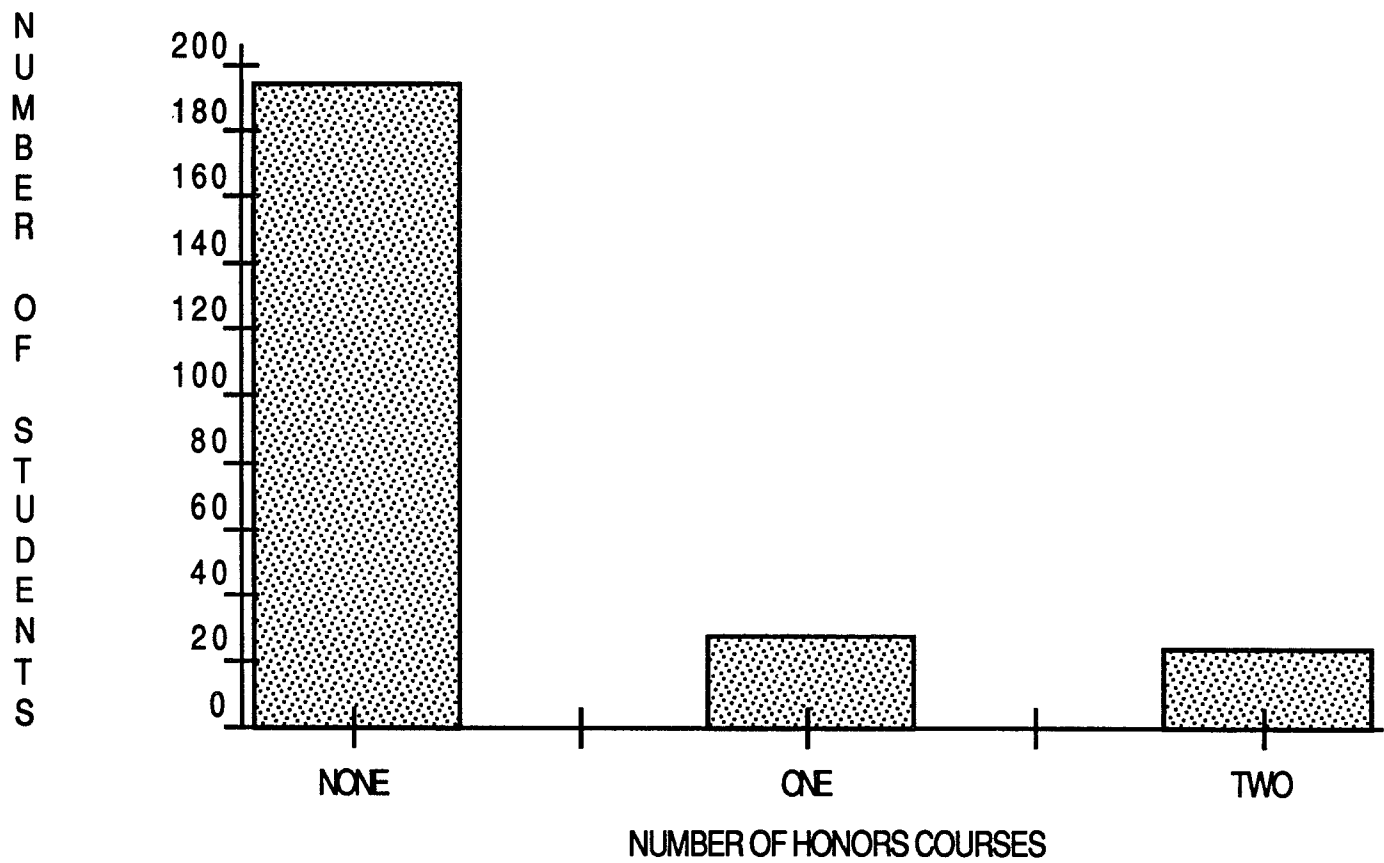


Figure 7. Ninth Grade Student Enrollment in Honors Courses

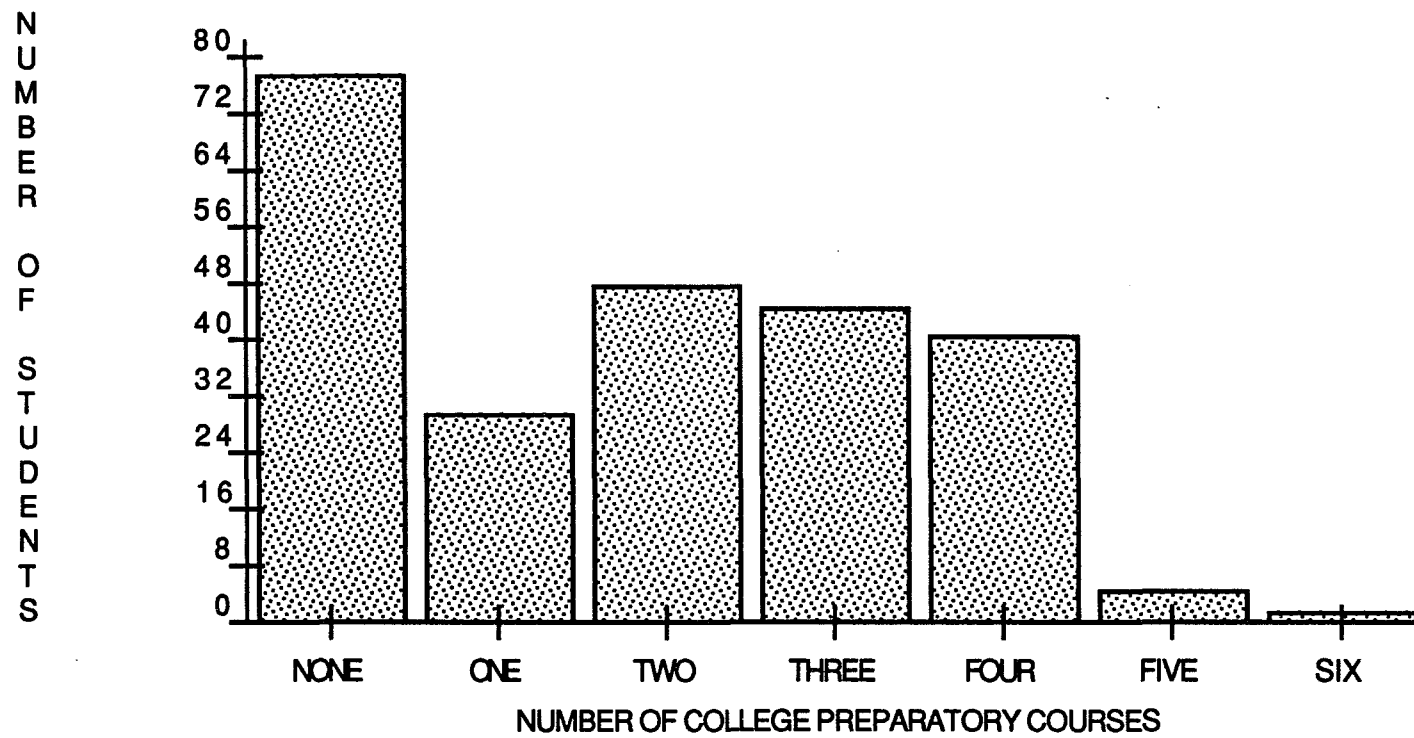


Figure 8. Ninth Grade Student Enrollment in College Preparatory Courses

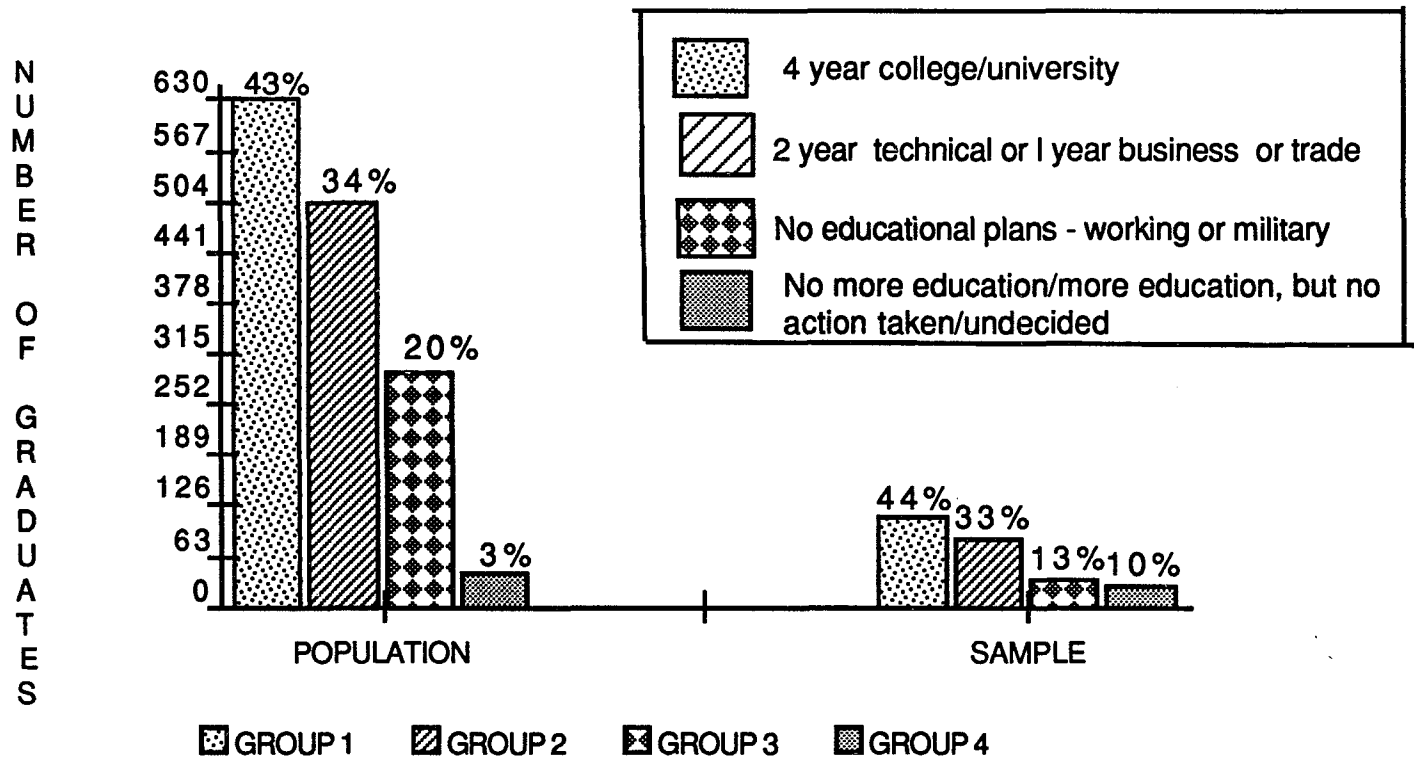


Figure 9. Size of Each of the Four Postsecondary Groups in the Population and Sample

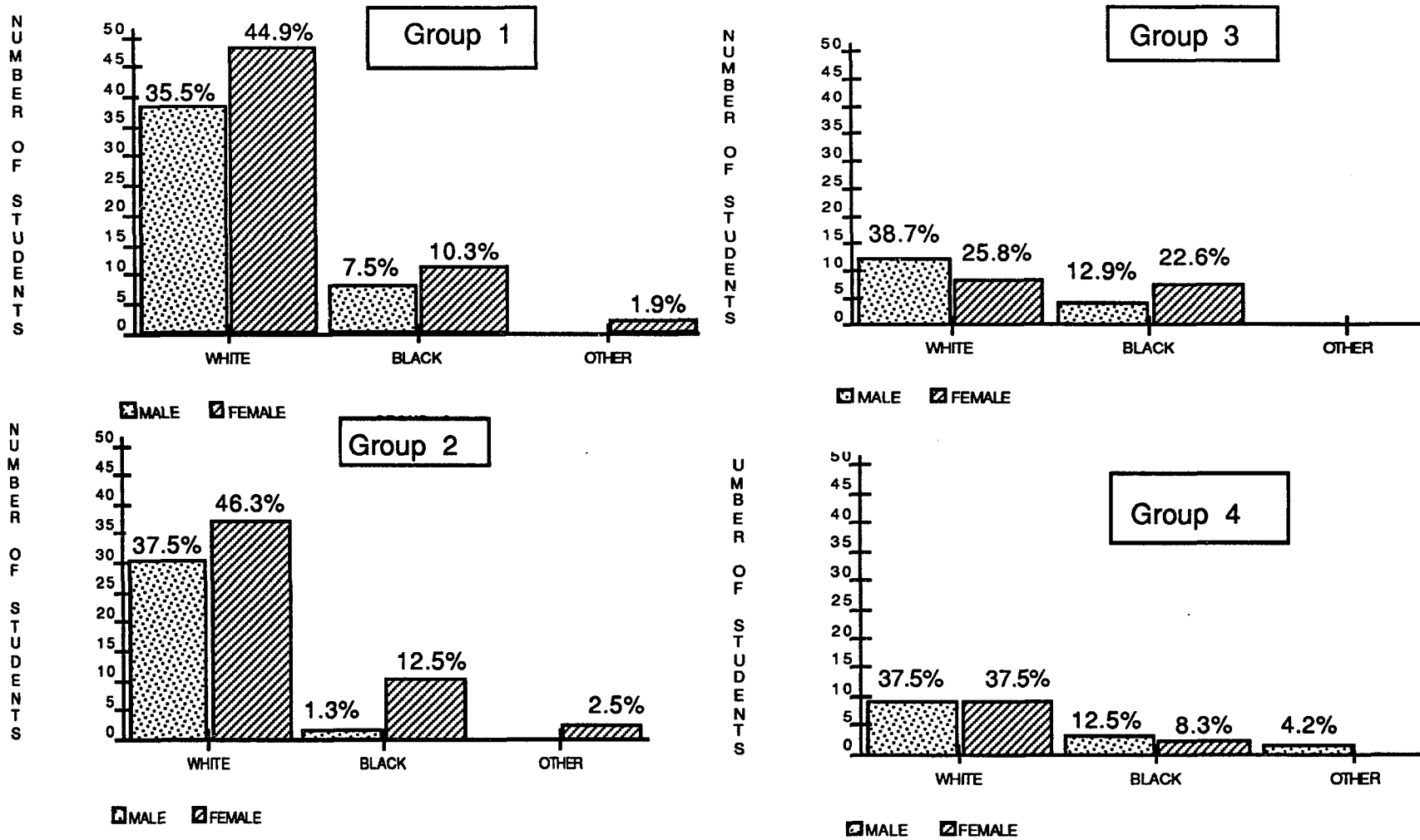


Figure 10. Profile of Student by Race and Gender Based on Four Groups of Postsecondary Plans

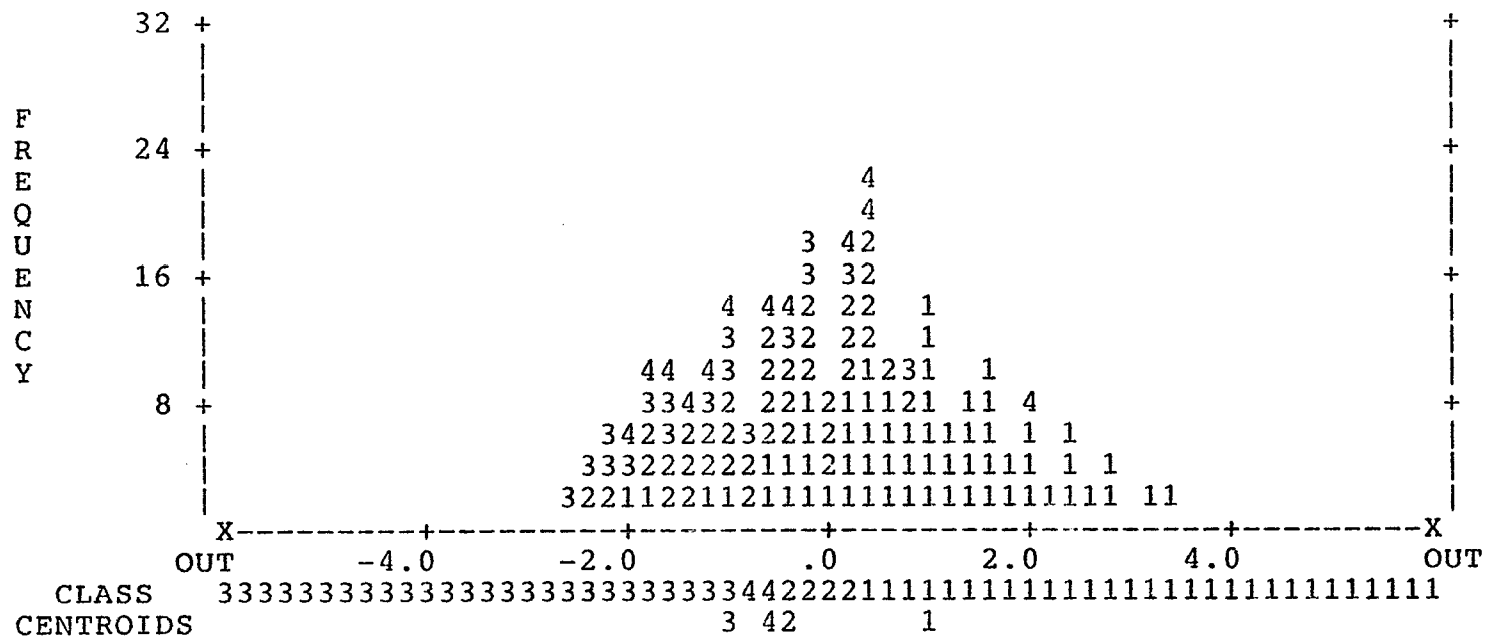


Figure 11. Stacked Histogram of Four Combined Groups of Postsecondary Plans Based on First Canonical Discriminant Function When CAT-Verbal Score, Ninth Grade GPA, Gender, and Ninth Grade Absences Are Used as Independent Variables

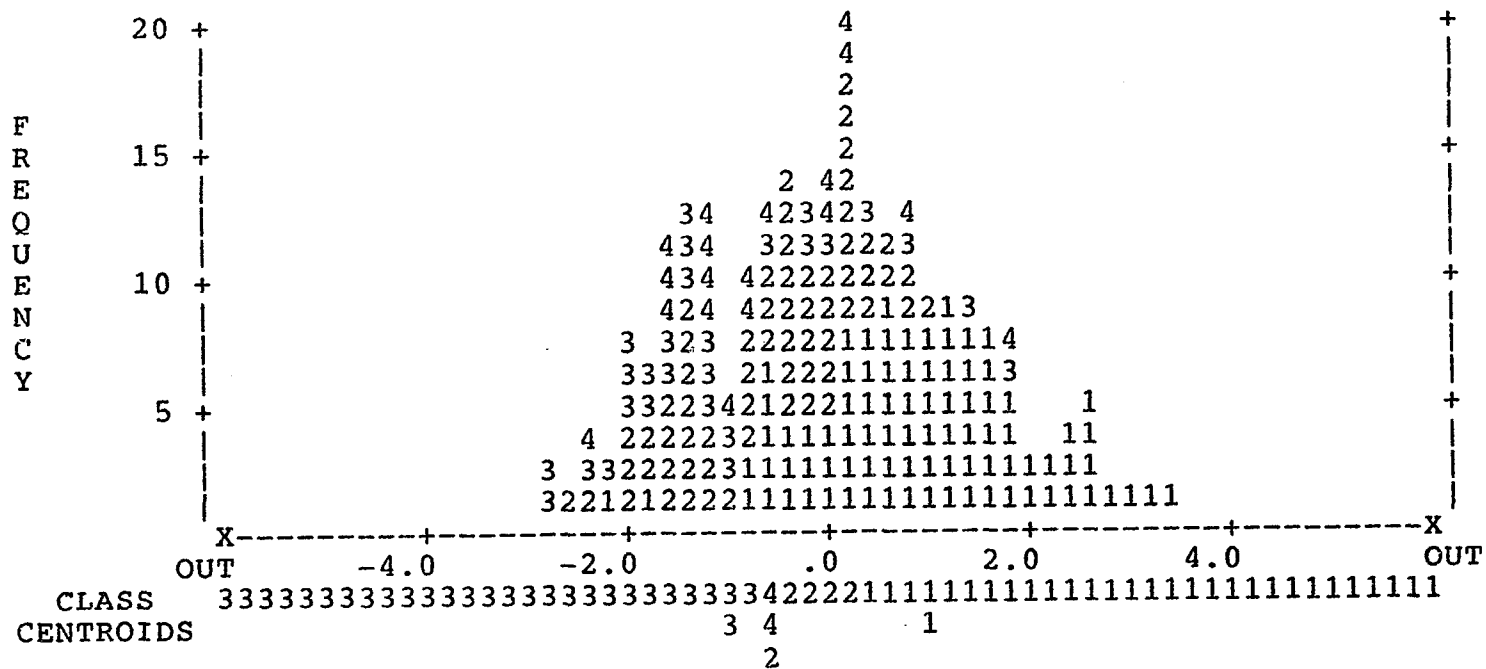


Figure 12. Stacked Histogram of Four Combined Groups of Postsecondary Plans Based on First Canonical Discriminant Function When CAT-Verbal Score, Ninth Grade GPA, Gender, Race and Ninth Grade Absences Are Used as Independent Variables