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A comparative analysis of pre-collegiate students' college preparation determined by academic achievement, achievement test performance, and learning style preference

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A comparative analysis of pre-collegiate students’ college preparation determined by academic achievement, achievement test performance, and learning style preference

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A comparative analysis of pre-collegiate students' college preparation determined by academic achievement, achievement test performance, and learning style preference

by

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CHAPTER 1. INTRODUCTION

Our nation is committed to providing educational opportunity for all Americans regardless of race, ethnic background, or economic circumstance. Yet, for many Americans a college education seems like an impossible dream. For others, a college education is beyond their dreams. The barriers to equal educational opportunity are double-edged. In addition to economic barriers, there are class, social, and cultural barriers that limit access to higher education. Many low-income young people and their parents simply do not know what most middle-income and college-educated families take for granted about the value, advantages, availability, and requirements of a college education (National Council of Educational Opportunity Associations (NCEOA), 1989).

All too often, disadvantaged high school youth are not encouraged to consider post-secondary education. Nor do they understand the importance of taking high school courses that will help them prepare for college. Those disadvantaged students who do make it to college tend to be underprepared academically (NCEOA, 1989).

Disadvantaged students are often unaware of the costs of post-secondary education, their eligibility for financial aid programs, and how to apply for aid. Many lack confidence in themselves and their ability to learn, and, therefore, would benefit from support programs which help students to overcome these barriers (NCEOA, 1989).

In support of this commitment to providing educational opportunities for all Americans, Congress established a series of programs to help disadvantaged students enter college, graduate, and move on to participate more fully in America's economic and social life. They are funded under Special Programs for Students from Disadvantaged Backgrounds (TRIO),

TRIO refers to seven programs funded under the Special Programs for Students from Disadvantaged Backgrounds, Higher Education Act of 1965: Educational Opportunity Centers, The Ronald E. McNair Post-baccalaureate Achievement Program, Student Support Services, Talent Search, Upward Bound, Upward Bound Math and Science and training programs for TRIO Programs staff.

While student financial aid programs are designed to help students overcome financial barriers to a college education, TRIO programs are designed to help students overcome class, social, and cultural barriers to a college education. TRIO provides disadvantaged high school and college students with a comprehensive array of information, counseling, academic instruction, tutoring, encouragement, support services, and assistance in applying for financial aid (NCEO, 1987).

TRIO Programs also reach out with opportunity where there was none and help provide opportunity where it did not exist. TRIO Programs create opportunity, but, because of inadequate funding, TRIO Programs are only available for an estimated 10 percent of the targeted population (NCEO, 1987).

The rationale for the Federal commitment to educational opportunity was elucidated most eloquently by President Lyndon Johnson, when he proposed the Higher Education Act more than 25 years ago:

Nothing matters more (than education) to the future of our country: not our military preparedness, for armed might is worthless if we lack the brain power to build a world of peace; not our productive economy, for we cannot sustain growth without trained manpower; not our democratic system of government, for freedom is fragile if citizens are ignorant. (p.6)
The purpose of the TRIO program is to identify qualified individuals from low-income families who are potential first-generation college students, to prepare these students for post-secondary education, to provide special supportive services to low-income, first-generation, and physically handicapped students while they pursue a college education, to motivate and prepare such students for doctoral studies, and to train persons serving or preparing for service in programs and projects so designed.

A total of 1,340 TRIO projects operate in over 850 higher education institutions and 80 community agencies. In FY 1992 TRIO projects served a total of 500,000 students. Two-thirds of these students are from families where (1) the total taxable income is less than 150% of the poverty level, and (2) neither parent had graduated from college. Two-thirds of TRIO students also come from families with incomes of less than $18,000 per year; most are academically underprepared; and most must overcome tremendous economic class and social barriers in order to participate in higher education. The majority of TRIO students, 65 percent, are members of minority groups: 41% are Black, 17% are Hispanic, 4% are American Indian, 3% are Asian, and 35% are white. Fourteen thousand TRIO students are physically handicapped.

**Upward Bound**

Upward Bound, one of the oldest TRIO Programs, is a highly successful, college-based support program of rigorous academic instruction, individual tutoring, and counseling for low-income, disadvantaged high school students, most of whom are the first generation of their families to consider a college education.

During the summer, Upward Bound students live on a college campus and are involved in an intensive academic study program with an emphasis on English, mathematics, science, reading, and...
writing. The students begin the program with a battery of tests to determine their strengths and weaknesses. Instruction is individualized, often with as few as four students per teacher. Individual and group counseling is also an important element of the program. The residential program usually runs for six to eight weeks during the summer and is available for all Upward Bound students.

During the academic year, Upward Bound students receive academic instruction, tutoring and counseling after high school and on Saturdays. Upward Bound counselors follow their students' academic progress in high school, and the students learn about the college application process and how to apply for student financial assistance. In 1976-77 the first Upward Bound Program follow-up was conducted by the Research Triangle Institute (RTI), for the United States Office of Education (USOE, 1977). The findings showed that Upward Bound increased post-secondary expectations and immediate or eventual participation in post-secondary education. In 1978-79, the second follow-up conducted by RTI concluded that the participants in the study benefitted from the Upward Bound projects they participated in, and that they were provided with skills and motivation needed for post-secondary success (USOE, 1979). A 1981 study conducted by the Research Triangle Institute found that "Upward Bound is a highly successful, college-based program of rigorous academic instruction, individual tutoring, and counseling" (RTI, 1981 P.2). The study followed 3,710 Upward Bound twelfth graders from 54 randomly selected projects and a comparison group of similar students for four years. The Research Triangle Institute found that more than seventy-five percent (75%) of Upward Bound graduates enter institutions of higher learning and are more than twice as likely to enroll in four-year post-secondary institutions as students from similar backgrounds. Four years after high school graduation, Upward Bound graduates were four times as likely to
have earned an undergraduate degree as are students from similar backgrounds who did not participate in Upward Bound.

A 1981 longitudinal study of Upward Bound students at the University of Maryland at College Park found that five years after entering the university, sixty-five to sixty-eight percent of the group of Upward Bound high school graduates had received post-secondary degrees or were still in college (NCEO, 1992). That compares to the forty-four to forty-seven percent of the general college population, who had graduated or were still in school five years later at the University of Maryland at College Park. Only twenty-seven percent (27%) of a group similar in socioeconomic background to the group of Upward Bound students had graduated or were still in school five years later (at the University of Maryland at College Park). Approximately 33,000 students participate in more than 400 Upward Bound programs nationwide each year.

According to a 1982 study conducted by American Institutes for Research (AIR), the Upward Bound cohorts included in the National Center for Educational Statistics (NCES) longitudinal survey were more likely to be enrolled in college preparatory courses than were a comparison group with similar socioeconomic status and all other students in the survey, and also were more likely to be planning to attend and complete college.

The General Accounting Office (1982 p.1) concluded that, "Although Upward Bound has been in operation since the summer of 1965, it is unclear whether the program is achieving its intended purpose of generating for disadvantaged youths the skills and motivation necessary for success in post-secondary education."

**Talent Search**

Talent Search, also one of the original TRIO Programs, is an outreach program on information, educational guidance
counseling, and support for low-income high school students, high school dropouts, and high school graduates.

Most Talent Search projects reflect the concern that without early intervention, most disadvantaged students would be lost to post-secondary education because they would not be aware of their educational opportunities and because they would not select the appropriate high school courses. Thus, the objective of many Talent Search projects is to identify, encourage, and help potentially able students as early as possible.

In addition to educational counseling, Talent Search projects provide information about college admissions requirements and the availability of scholarships and student financial aid programs. Students also get help in completing and submitting admission and financial aid applications.

A report by the House Committee on Education and Labor (1982) found that Talent Search projects and another TRIO Program, Educational Opportunity Centers, were responsible for placing an estimated twenty percent (20%) of all minority freshmen who entered college in 1982 (NCEO, 1992).

A 1982 Department of Education study found that in 1982, half of all matriculated Talent Search students were enrolled in four-year post-secondary institutions. This is a particularly impressive study when it is considered that a disproportionate number of college-enrolled minority students attended community colleges. Approximately 185,000 students are currently involved in more than 100 Talent Search projects nationwide each year (NCEO, 1992).

A 1982 study of college placement rates by Florida A&M University's Talent Search program showed that eighty percent (80%) of Talent Search seniors entered post-secondary institutions, a rate nearly twice that of all seniors in the 22 high schools where the project works. This program primarily served black high school students from rural areas and small towns around Tallahassee, Florida (NCEO, 1992).
A 1986 study of college placement rates of Columbia University's Talent Search program showed that eighty percent (80%) of high school seniors went to college. Of the 148 high school seniors in Columbia University's program in 1986, eighty percent (80%) went on to colleges and universities, including Columbia University, Yale University, Cornell University and Vassar. Their average family annual income was less than $9,500 (NCEO/A, 1992).

**Student Support Services**

Student Support Services programs provide low-income, disadvantaged, and physically handicapped college students with supportive services such as especially designed workshops and basic skills instruction in reading, writing, math, and science. Students enrolled in the program also receive tutoring, personal counseling, academic advice, and assistance in obtaining financial aid.

Student Support Services programs are designed to improve the retention and graduation rate of low-income, first-generation, and handicapped college students. The needs of students accepted in the programs are thoroughly assessed through testing and counseling. The Student Support students are assigned to courses that will upgrade their skills based on the results of those tests. The students are encouraged to schedule progress reviews during the year, and those with below a C average must obtain weekly progress reports from their instructors.

In order to participate in the Student Support Services programs, students must meet eligibility requirements and need academic support. They must come from low-income families, qualify as first-generation college students, or be physically handicapped.
A 1979 longitudinal study of the Student Support Services program at Purdue University found that students in the program had a higher rate of retention than does the general population of students not involved in the support program. The study also found that, although the Student Support Services Program students were significantly less academically prepared for college and were believed to be much less likely to succeed academically, the SSSP students performed just as well as the control group of students, which was made up of the general population of students. Seventy-five percent (75%) of the Student Support Services students in the study were members of minority groups.

A 1981 study conducted for the Department of Education by Systems Development Corporation found that students who receive the full range of Student Support Services (SSSP) services (counseling, tutoring, and basic skills instruction) are more than twice as likely to complete their first year of college as are students who do not receive the services (Coulson, Bradford, and Kaye, 1981). The study tracked the performance of 5,800 freshmen students enrolled in a total of 58 Student Support Services projects. The Student Support Services students were compared with a control group of 5,800 students drawn from the same institutions.

**Educational Opportunity Centers**

Educational Opportunity Centers (EOCs) provide low-income adults with information about educational and career opportunities. They provide information on admissions requirements to post-secondary programs and available financial aid programs. EOC counselors also help with the preparation of college admissions and financial aid applications.

The Centers promote post-secondary education in communities with low-income populations and offer information and counseling
on educational and career opportunities. Professional career and education counselors help people, mostly adults, select and apply to schools suited to career interests; identify grants and loans to help pay for educational expenses; and help applicants complete admissions and financial aid applications. They provide information about the available post-secondary programs at local colleges and universities, including adult night courses and General Equivalent Degree testing programs.

Educational Opportunity Centers launch large-scale campaigns, such as college and job fairs, mass media efforts, and public workshops, to provide information about educational opportunities and new careers. Low-income, disadvantaged adults are often unaware of the educational opportunities that may be appropriate and available to them. Many are unemployed, have few job skills, and lack the support systems necessary to pursue an education. Educational Opportunity Centers help address these problems.

According to a study of the Washington, D.C., Educational Opportunity Center (1982), in 1981-82, fifty percent (50%) of "college-ready" clients, that is, adults and students with high school diplomas or the equivalent, enrolled in post-secondary institutions. Another 25 percent (25%) had applied and been admitted to college, but were awaiting enrollment for the fall term. A statewide EOC program in Massachusetts (1982) conducted a follow-up study of a sampling of clients who had planned to enroll in college. Four years later, ninety-three percent (93%) had actually enrolled and half of them had earned a certificate or degree. Another twenty-two percent (22%) were still in school. The study also found that full-time employment among all clients increased from 18 to 45 percent. Approximately 103,000 low-income adults participate in 36 Educational Opportunity Center programs nationwide each year (NCEOA, 1992).
Problem Statement

Disadvantaged students, particularly low-income students, have long been underserved by the education system. The problems they face - poverty, neglect, low self-esteem, poor basic academic concepts, and poor study habits - puts these youngsters on the road to failure at an early age (Bloomfield, 1989). Various reports, using family poverty indicators such as low income, and lower achievement and limited educational background, show that disadvantaged youth have lower academic achievement and lower achievement and standardized test scores than do their advantaged classmates across town (National Center for Educational Statistics, 1988). Although academic achievement and learning style competencies required for success and effectiveness in the classroom environment have been explored by many scholars (Dunn and Griggs, 1988; Dunn, 1981; Griggs, 1981; and Claxton and Murrell, 1987), no study has investigated directly the learning style of educationally and economically disadvantaged high school students with little propensity for high test scores and high academic achievement in coursework.

The impetus for this study was generated from the lack of research on the impact of Upward Bound programs, as revealed in the review of literature. Similarly, there is a fundamental need to assess the impact of Upward Bound to determine the degree to which the participants are benefiting from program services. The need for such evaluation is further supported by Mitchem (1986), who emphasized the evaluation of such discretionary programs as a means of addressing accountability.

This study is designed to investigate whether there is a relationship between Upward Bound Program students' achievement test performance demonstrated by scores on the California Achievement Test (CAT), Stanford Diagnostic Reading Test
(SDRT), Science Research Associates Achievement Series (ACH), Sequential Tests of Educational Progress (STEP), Tests of Achievement and Proficiency (TAP), Tests of Adult Basic Education (TABE), and the Wide Range Achievement Test Revised (WRAT-R) and cumulative grade point average. The study will investigate whether there is a relationship between Upward Bound Program students' learning preference demonstrated by the Learning Style Profile and academic achievement (demonstrated by a cumulative grade point average above or below 2.0); whether Upward Bound Program school students who have high cumulative grade point averages also have a propensity for high achievement test scores; and whether high achievers who have a propensity for high achievement scores also have positive study skills habits and attitudes. Results from this study will provide information about multiple indicators of achievement among educationally and economically disadvantaged high school students that will be useful in empowering them to realize more fully their potential in academic and classroom settings. The target population in this study is eight groups of high school students in grades 9 - 12. The students are identified by ethnic group, economic background, parents' educational background, grade level, achievement test scores, cumulative grade point average, learning style profile, study skills inventory, and gender. The statistical analyses that will be used in this study are General Linear Models procedures, correlational studies, and comparative analyses.

**Purpose of Study**

According to Bobowski (1984), Brewer and Morgan (1984), Mitchem (1986), and Tanara and Lee (1989), the effectiveness, of Upward Bound Programs on grade point averages, achievement test scores, and college enrollment has not been well-documented in the literature. Very few studies have been conducted to
determine the impact of Upward Bound. Tanara and Lee (1989) examined the impact of the Eastern Kentucky University (EKU) Upward Bound Program (UBP) on students’ performance in high school subjects (grades), as measured by Grade Point Average (GPA), ACT scores, and enrollment in a post-secondary education institution after completion of the program. A random sample (n=232) of non-UBP students and 101 EKU Upward Bound participants who completed the program were included in the study to examine the impact of UB on student academic performance and achievement. The results indicate that students who participated in the UBP demonstrated a considerable increase in their GPA from the end of the ninth grade until graduation from high school, and showed a significant increase in GPA in comparison to students in the non-UBP. The UBP students also performed significantly better on the ACT than did non-UBP students, which could reflect the increase in academic preparedness that UBP students are receiving as reflected by their GPA’s. Finally, the results of this study show that students who participated in the UBP overwhelmingly chose to enroll in college (92%). The study indicated that sex and race were not significant variables in differentiating those who enrolled in college from those who did not enroll.

Some investigations on academic performance are based on the social learning principles expounded by Bandura (1969), Mischel (1973), and others within the general domain of behavior modification. Successful academic achievement and test performance methods focus on learnable skills and capitalize on operant principles and cognitive processes. Many high achievers use self-control methods, which are individual efforts to manipulate the environment by adjusting cues and consequences of specific behaviors so that the probability of manifesting desired behavior is greater than the probability of expressing the opposite behavior.
The study basically will examine the extent to which achievement tests predict success. This study also will determine whether particular learning style preferences increase achievement test scores, and cumulative grade point averages, and enhance positive study habit behavior. This study will identify, describe, and compare achievement test scores and cumulative grade point averages of disadvantaged high school students across selected demographic variables (ethnicity, economic background, and parents' educational background), and will investigate the relationship of the demographic variables to learning styles and to the propensity for high grade-point average achievement and for high achievement test scores. The study will also verify whether learning style preference is associated with increased student academic achievement and more favorable attitudes towards learning and performing as a function of aptitude. The study has as its criteria of effectiveness educational achievement and achievement test scores. It is designed to determine whether Upward Bound generates the academic and test-taking skills needed for success in high school courses and on standardized achievement tests. The primary and ultimate purpose of the study is to investigate the extent to which standardized tests and GPAs predict academic success of this group.

The rationale for doing the study is that the research will help TRIO administrators assess exactly how well measures of achievement test performance among TRIO programs for disadvantaged students address students' academic needs. Programs will benefit beyond meeting the United States Department of Education's (USDOE) achievement testing requirements. The study will have implications for basic student needs assessment, developing and improving curriculums, increasing effectiveness of services and will have implications for how programs can perform all of the required activities more effectively. This study will add to the literature by
identifying effective evaluation processes, identifying those elements in programs that greatly impact students, and will help all of the eight programs have a greater impact on their students.

This study is an important study in that it will make a significant contribution to knowledge in the field. The study will show how students perform in a variety of Upward Bound programs which have unique characteristics such as population differences, achievement test differences and differences in the use of achievement tests. The study will show that there is a wide variation in student ability and that the students are similar in many ways also. It will also show the importance of using achievement tests as a type of diagnostic tool to determine students' individual needs within specific programs. The eight Upward Bound programs used in the study will benefit tremendously from knowing how their students performed on achievement tests on an on-going basis as characterized by several demographic variables and can use this aggregate baseline data for continual study.

This study will be conducted to generate a large research data base for future studies of this type and to generate further interest in research on the impact of Upward Bound programs on students' lives. The study will have implications regarding training needs of TRIO staff, educational preparations and the skills needed to conduct qualitative research on achievement test performance and academic performance of Upward Bound students. Also, the findings will have implications for the TRIO administrators' use of achievement test and academic performance data to implement a comprehensive assessment program which will yield useful findings.
Objective of the Study

The study will examine relationships among student academic achievement on tests and school grades and learning styles. The specific objectives include:

1. To determine the extent to which standardized achievement tests predict success.

2. To determine the effects of Upward Bound on factors on the California Achievement Test (CAT), Science Research Associates Achievement Series (ACH), Stanford Diagnostic Reading Test (SDRT), Survey of Study Skills Habits and Attitudes (SSHA), Tests of Achievement and Proficiency (TAP), Test of Adult Basic Education (TABE), the Wide Range Achievement Test Revised (WRAT-R), and basic academic courses, English, math, science, and social studies.

3. To compare achievement test scores and student academic achievement across selected demographic variables - ethnicity, economic status, and parents' educational background.

4. To compare achievement test scores and student achievement across Upward Bound Programs.

5. To investigate the relationship between achievement test scores and academic preparation of the respondents.

6. To determine whether the learning style preferences of high school students enrolled in the Iowa State University Upward Bound Program during Spring, 1990 and Spring, 1991, using the National Association of Secondary School Principals' (NASSP) Learning Style Profile (Keefe and Letteri, 1986) is a function of aptitude.
Hypotheses to Examine

In order to address effectively the research questions and objectives of the study, several research hypotheses will be examined. The following hypotheses to be tested in this study relate to how achievement test scores and student academic achievement improve as a result of Upward Bound. Also, a hypothesis will examine how learning style preference variables differ. Therefore, the basic presumption is that educationally and economically disadvantaged students as a function of aptitude have a valid and substantive learning style which may be somewhat different from but equally as effective as learning styles among more advantaged students.

Hypothesis 1. There is a significant difference in achievement test performance due to Upward Bound participation, as characterized by test scores.

Hypothesis 2. There is a significant difference in student academic achievement due to learning style preference, as characterized by high success on achievement tests and grade point-average.

Hypothesis 3. There is a significant difference in academic performance due to Upward Bound participation, as characterized by grade point average.

Hypothesis 4. There is a significant difference in achievement test performance, as characterized by economic status, ethnicity, gender, and grade level.
Hypothesis 5. There is a significant difference in achievement test performance due to Upward Bound participation, as characterized by grade point average.

Hypothesis 6. There is a significant difference in academic performance due to Upward Bound participation, as characterized by economic status, ethnicity, and gender.

Hypothesis 7. There will be significant differences between students as characterized by ethnicity, income status and gender, and their Stanford Diagnostic Reading Test (Psychological Corporation) and California Achievement Tests (Green, 1972).

Hypothesis 8. There will be significant differences in student academic achievement due to learning style preference.

Hypothesis 9. There will be significant differences in achievement test performance across eight Upward Bound Programs, using six different achievement tests.

Hypothesis 10. There will be significant differences in student academic performance of ethnic minorities across programs.

The foregoing hypotheses will be used to investigate overall student achievement with respect to achievement test scores, academic performance, study behavior, and attitudes and learning styles preference. This research will contribute knowledge to the way that pre-college programs prepare economically and educationally disadvantaged students for success in high school and college. The research will enhance an institution's knowledge about preparing low-income achievers and underprepared students with the basic skills necessary for successful academic performance.
Basic Assumptions

1. Keefe and Letteri's (1986) Learning Style Profile is a valid and reliable instrument for determining subjects' learning style preferences, and for diagnosing the cognitive styles, perceptual response tendencies, and study/instructional preferences of middle-level and senior high school students.

2. The California Achievement Test (CAT), Science Research Associates Achievement Series (ACH), Test of Adult Basic Education (TABE), Tests of Achievement and Proficiency (TAP), and Wide Range Achievement Test Revised (WRAT-R) are valid instruments for measuring student achievement in various broad areas of curriculum.

3. The Stanford Diagnostic Reading Test (SDRT) is appropriate for measuring the four general skill areas of comprehension (both literal and inferential), decoding, rate, and vocabulary (word meaning, word parts).

4. The Survey of Study Habits and Attitudes (SSHA) is appropriate to examine study habits and attitudes.

5. The subjects will respond honestly to the questions contained in the achievement and standardized tests and learning profile.

6. The subjects will be able to comprehend, evaluate, and report effectively their perceptions about the questions asked.

Limitations

1. Upward Bound Program students at each of eight academic institutions participating in the testing and assessment component of the program for the 1987-88 and 1991-92 school year
constitute the population from which the study will be conducted. This population was selected because of the following considerations: Homogeneity of educational attainment, economic background, parents' educational and economic status, cost, accessibility, student data, and time.

2. Also since self-reporting instruments will be utilized in collecting the data for the study, the results may not represent actual or overt behavior.

3. The extent to which statistical inference about actual behavior can be attempted is limited by the effectiveness and correlation of the above-mentioned self-reporting instruments to actual behavior.

4. The possible effects of interaction among CAT, LSP, SDRT, SRA (ACH), TABE, SSHA, TAP, WRAT-R tests, GPA, and demographic variables could confine the results of the study.

5. The study is limited to one southern school and one southwestern school, six midwestern schools (primarily Iowa); also, five are rural and three are located in urban (inner-city) school settings.

6. There is institutional diversity in the types of colleges and universities used (private, public, research, etc.). The institutional diversity can not be revealed because of requested confidentiality; however, there were community colleges and four-year institutions involved in the study.

7. Standardized tests and grade point averages are not available for all subjects over two years.
8. Because the definitions of "Disadvantaged Students," "High Risk Students," and "Low-income Underachieving Students" lack standardization in their meaning, the utility of studies in this area is somewhat restricted.

9. While the Upward Bound programs have the same goals and basically the same program format, the settings are different and may impact the programs accordingly.

**Definition of Terms**

**Advisement**

A process of supplying the student with factual information about the university and its courses, programs, and services.

**"At-risk" students**

Students who have potential and the intellectual ability to succeed but are characterized by low self-esteem, personal insecurity, antisocial behavior, and substance abuse. Consequently in school they have chronic absences and repeated failures and face frequent suspension.

**Bridge Program**

An eight-week enrichment program for Upward Bound graduates prior to their first full semester of college.

**Economically Disadvantaged Students**

Students who meet the economic mean test of the United States Department of Education, and are from deprived backgrounds, with little opportunity, because of pre-college preparation, for success in higher education.
Equal Access
The guarantee that each individual should be able to enroll in some form of postsecondary education appropriate to that person's needs, capabilities, and motivation.

Grade Point Average (GPA)
The conversion of letter grades to a four-point scale:
A=3.50-4.00; B=3.00-3.49; C=2.00-2.99; D=1.00-1.99.

Low Income
A low income individual means an individual who family's taxable income did not exceed 150 percent of the poverty level in the calendar year preceding the year in which the individual participated in Upward Bound projects.
CHAPTER 2. REVIEW OF LITERATURE

Educators continue to underscore verbally the importance of optimizing all learners' idiosyncrasies in student learning and teaching environments. Although educators verbalize that all students, regardless of educational background, sex, economic status, age, race, religion, or academic preparation, have an equal right to effective education, they have not realized the extent to which educational and economic differences influence learning and achievement. Many factors, sociocultural, economic, educational, institutional, and other demographic and personal factors, have been studied widely in relation to secondary school education in general, and specifically in relation to secondary school learning and secondary school learners (Anderson, 1988; Bloomfield, 1989; Maxey, Cargile & Laing; 1987; Schwartz & Tiedeman, 1957).

An abundance of literature provides definitions, frames of reference, approaches, and models about student learning, student achievement, student performance, learning styles, and strategies. Each captures to varying extent one or a combination of the different aspects of the multifaceted phenomenon called learning, based on equally divergent assumptions (implicitly and/or explicitly) about the learner and the context.

As American universities and colleges expand their admission policies to offer higher education to non-traditional and disadvantaged (educationally and economically) students, the development of a rigorous system to measure student achievement and performance and appropriate learning strategies grows in importance. Further development of these achievement and learning strategies is needed to respond to needs of "non-traditional" student populations that lack adequate academic preparation and basic study skills and habits (Weinstein, 1988). These disadvantaged students are inadequately prepared
to compete favorably at many of our universities and colleges due to substandard educational resources, poor attitudes concerning achievement and learning, and the lack of an affirmation of their learning strategy, preferences, or style (Anderson, 1988).

Most disadvantaged and many non-traditional students attend universities and colleges without a valid and substantive cognitive framework (Anderson, 1988; Bloomfield, 1989; Cross, 1988; Nettles, Gosman, Dandridge, & Theony, 1984). They can benefit from the identification of their cognitive assets and learning strategy, preference, and style which are effective for them. A model of learning and achieving provides an important vehicle for learning good study habits and skills, demonstrating success on achievement tests, enhancing ability to demonstrate high academic performance, and motivating optimal achievement within an educational setting. These learning models will generate academic skills and motivation and thus influence positive academic performance.

The literature on the low-income and first-generation college-bound, disadvantaged student is not extensive, but it is unanimous in its critical assessment of traditional institutions (Brewer & Morgan, 1984). The relevant literature concerning the impact is practically non-existent. However, as cited by Bobowski (1984), Upward Bound is one of the few programs available to help these young people stay in school and subsequently enroll in a post-secondary education program with adequate financial aid.

Equal educational opportunity has long been a national goal. It follows from this description that a relevant approach to the measurement of equal opportunity must postulate a statistical psychometric model that estimates the relationship between as many "X-factors" as one can gather data on, and educational outcomes (Bejar, 1983). The need for the psychometric model stems from the belief that achievement tests
are possibly the best quantifiable indicator of the effect of schooling. The power of the psychometric devices as educational indicators has been eloquently demonstrated by the SAT.

The idea of monitoring and evaluating equal educational opportunity programs through determinants of achievement and educational outcome measures appears to be a new one (Bejar, 1983). The inconsistent monitoring and evaluating of such programs have appeared to be based on a descriptive, rather than dynamic, model of achievement. They compare performances, often on a single item, across time and groups, rather than attempting to account for such differences. To the extent that such an accounting is possible, a dynamic model of achievement has a clear advantage over a descriptive model, for it can suggest mechanisms responsible for such differences and thus guide policy actions to minimize the differences.

Most studies on learning style have conceptualized the examination of the many approaches to learning style at four basic levels: 1) personality, 2) information processing, 3) social interaction, and 4) instructional methods (Claxton & Murrell, 1987). Kirby (1979), however, speculates that several models in fact describe correlates of two fundamental orientations in learning: "splitters," who tend to analyze information logically and break it down into smaller parts, and "lumpers," who tend to watch for patterns and relationships. Identifying learning styles as a basis for providing responsive instruction has never been more important than now, as educators meet the needs of a diverse population (Dunn, Beaudry, & Klaus, 1989). "By around the year 2000, America will be a nation in which one of every three of us will be nonwhite" (Hodgkinson, 1985, p. 7). The most pressing need is to learn more about the learning styles of minority students - many of whom will be educationally and economically disadvantaged, academically underprepared, and "at-risk."
Seminal research findings on general achievement and ability have been concerned with comparing standardized tests of general achievement with student proficiency in various tasks (Traxler, Jacobs, Selover, & Townsend, 1953; Tyler, 1985; Archbald & Newmann, 1988). Traxler, Jacobs, Selover, and Townsend (1953) explored the uses of standardized achievement tests, illustrated and clarified some of the contributions of objective testing, and assessed the relationship between test scores and school marks of secondary level youth. One study compared writing proficiency to standardized test scores of verbal ability. In these assessments, a sample of writing was read, evaluated, and given a numerical score. The correlations between verbal standardized test scores and scores on holistic assessments of writing generally fell between .4 and .6. This shows that there is a relationship between performance on the two types of measures, but it would be risky to assume that a person who scored well on a standardized test of verbal ability could also write well (Tyler, 1985). The study indicates that standardized tests of general achievement are poor indicators of student proficiency in tasks that differ markedly from the types of questions on the tests.

Archbald and Newmann (1988) found, however, that standardized tests of general achievement and ability measure test-taking ability well. These tests have a fairly strong relationship to grade point average, a correlation of about .5 (on a scale from 0 to 1.0). However, they emphasized, too, that grades and general achievement scores measure different things. Grades are based on multiple-choice questions, class discussion, writing assignments, projects, attentiveness, and effort in specific subjects. When students' GPA's are compared to their test scores from the previous year, the correlation drops; most studies show the correlation between high school senior-year test scores and first-year college grades to be about .35 (Linn, 1982).
The rapidly expanding interest in academic achievement performance and achievement test performance is the result of several causes. Among them is the increasingly large number of academically underprepared or disadvantaged students entering post-secondary institutions (Weinstein, 1988). Another is the lower average scores on college admissions tests for most minority groups (Nettles, Gosman, Dandridge, & Theony, 1988). Maxey, Cargile, and Laing (1987, p.10) reported that "score differences by ethnic group and income level have been observed on standardized tests of all kinds. These differences in text score performance by group also exist on the ACT Assessment." In response to this influx of students graduating from high school with special needs, many institutions of higher education have created special programs to address academic deficits (Noel & Levitz, 1982).

The research into student learning traditionally has adopted psychometric techniques derived from work on the measurement of attitudes. The scales developed in such studies, however, have often lacked any convincing theoretical rationale. An alternative methodology involves systematic analysis of interviews dealing with the tasks undertaken in everyday studying (Entwistle, 1988). Another theoretical basis can be found in cognitive psychology in relation to models of learning and memory, and concepts such as levels of processing (Craik & Lockhart, 1972). Schmeck (1988) describes research involving the use of scales of learning processes derived from cognitive psychology. While there is yet no single universally accepted, comprehensive theory of student learning and academic achievement testing, there are several which are widely used.

Approaches to research and theory about achievement testing, student performance, and achievement vary greatly. Achievement testing often has the dual purpose of providing information about the individual as well as about aggregates of individuals. In the past, standardized achievement testing has
also been kept at a distance from instruction and its effect upon achievement test performance (Archbald & Newmann, 1988). Although the distinction between behavioral and cognitive facets of achievement testing has been strongly criticized (Travers, 1980), important conceptual and practical linkages can be detected across both traditions. The literature would seem in general to suggest that an individual's test performance circumscribes behavioral, cognitive, social, affective, environmental, physiological, and/or psychological factors (Bandura, 1969; Cornett, 1983; Bejar, 1983).

One of the earliest attempts to place achievement testing within a framework was "Bloom's Taxonomy," by Ralph Tyler and Benjamin Bloom. The general approach taken by this group was to conceive of two facets for classifying items. One facet was behavioral, i.e., based on the content matter; the other facet was cognitive, i.e., what psychological functions are required to answer the item (Bejar, 1983). Travers (1980) has strongly criticized the taxonomy, arguing that it fails to provide a useful scheme for conceiving achievement (although he did not deny that the scheme is probably useful as a means of classifying items).

Archbald and Newmann (1988) studied achievement testing programs of several school districts to determine the effect of their schools on achievement, to assess objectives unique to the schools, to assess the importance of "goals" for specific groups of students, and assess overall student performance. Although no comprehensive standardized indicators and criteria of academic quality exist to assess student achievement, the National Association of Secondary School Principals (NASSP) has provided the NASSP National Advisory List of Contests and Activities, which is used by various schools to assess student achievement. Their results showed that several school districts, such as Detroit, Cincinnati, and Pittsburgh, are using standard student indicators and criteria of academic
performance. For example, Adalai Stevenson High School uses the California Achievement Test (CAT), ACT, College Board Advanced Placement tests, writing assessments, and a curriculum-referenced testing program to provide information about achievement at multiple levels.

One framework for describing achievement testing is to view achievement testing as a system with several interrelated components (Bejar, 1983). The psychometric foundation of an achievement testing system has two major theories. One is based on the assumption that items can be sampled at random from a “universe” of items (random sampling). The second measurement model assumes that the relationship between observed performance and level of achievement is known or can be estimated (latent trait). Another consideration is the test administration procedure (paper-and-pencil group, with computers, and without computer components).

In the past, standardized achievement testing and instruction have been kept at a distance. There is a growing consensus that tests must improve their usefulness for the individual and have an impact on the course of instruction. However, the need to ally testing and instruction closely, indeed to integrate them, is beginning to be recognized (Bejar, 1985). Tyler and White (1979) described four central elements in the integration of assessment and instruction: use of cognitive psychology, use of information-handling technology, involvement of teachers and subject-matter experts, and adaptability of the assessment-instruction package to practical applications. Findings based on studies of systems integrating testing and instruction showed that there is no appropriate psychometric foundation for a system that integrates assessment and instruction (Tyler & White, 1979). This absence, coupled with the emphasis on cognitive psychology, suggests a nonendorsement of criterion-referenced testing as the sole mechanism for achieving the desired integration of instruction
and measurement. An emphasis on cognitive psychology suggests a process-oriented interpretation of achievement. By contrast, criterion-referenced tests, minimum competency tests, and mastery testing emphasize what students can or cannot do, rather than how they do it. There is growing evidence of dissatisfaction with exclusively criterion-referenced interpretation (Bejar, 1983).

Some standardized tests have been studied in relation to measurement of both general achievement and ability. These tests are most widely used in secondary schools to measure students' verbal, numerical, and analytical abilities. Other standardized tests measure knowledge in specific subjects such as science, literature, foreign language, and history (Archbald & Newmann, 1988). Research studies and reports about standardized tests and test scores have also focused on simple comparisons of students, schools, districts, states, and nations. Academic achievement also has been assessed in many ways, but when the public and policymakers seek evidence of school quality, they usually look to standardized tests. Within school districts, standardized tests are often viewed as the only solid measure of school quality, and many school improvement programs use performance on standardized tests as the principal measure of success (Archbald & Newmann, 1988).

When test scores reduce a school's academic quality to a single number, such as an average score on a percentile ranking, they conceal potentially important patterns of variation. Separate student groups within the school, such as college-bound, low-income, or handicapped students may perform quite differently on the tests as well as in college. There are three main concerns with standardized tests of general achievement and ability. First, there is the difficulty of gaining useful information due to the way all standardized tests are constructed and scored. Second, there are the special problems of general achievement and ability tests due
to their insensitivity to curriculum in specific subject areas and their lack of predictive relationship to more authentic forms of achievement. Third, the tendency of items in all standardized tests (even those of specific subject areas) is to neglect the assessment of depth of understanding, integration of knowledge, and production of discourse.

The national interest in improving education has generated several highly important projects attempting to improve curricula, particularly at the secondary level. Many types of decisions are to be made, and many varieties of information are useful. It becomes apparent that evaluation is a diversified activity and that no one set of principles will suffice for all situations. But measurement specialists have so concentrated upon one process - the preparation of pencil-and-paper achievement tests for assigning scores to individual pupils that the principles pertinent to that process have somehow become enshrined as the principles of evaluation (Cronbach, 1969).

Traxler et al. (1953) studied achievement test results and school grades of a single male student who was one of thirty-three pupils entering seventh grade at the Newtonville Junior High School in 1946. All pupils were administered a battery of objective tests in the fall, including the Otis Self-Administering Test of Mental Ability and the Traxler Silent Reading Test. Academic aptitude, home information, and the other personal data were assessed by the teacher to assure that the pupils were capable of doing satisfactory work. At midyear, grades were evaluated to determine academic achievement. In the Spring, the individual took the Stanford Achievement Test to determine if his test scores agreed with his school marks. On the whole, it was expected that his general school achievement would be consistent with his total grade equivalent as determined by academic aptitude, and that,
when profiles for two years were compared, it would be apparent that more growth would be shown in some areas than in others.

Bradley, Pock, Caldwell, Harris & Hamrick (1987) studied the quantity of support for behavioral development available to elementary grade children in their home environment using a technique called the HOME Inventory. The investigators examined the relationship between the school behavior and achievement of elementary school black children (n=35) attending Little Rock, Arkansas public schools in the 1984-85 academic year using the new Elementary Home Inventory. They measured the quality and quantity of cognitive, social, and emotional support for development available in the home, on the one hand, and used the Science Research Associates Achievement Series (ACH) battery to measure academic performance. Results for the total group revealed several significant correlations between the home environments of the children and their achievement test scores. The patterns for males and females were quite different. For the group, only one coefficient for correlations between SES and SRA achievement test scores was significant. As with achievement test scores, there were marked sex differences in the pattern of correlations for classroom behavior. In essence, results from this study indicate a substantial relationship between the home environment of black children and their school performance. Overall, the relationship between home environment and achievement was stronger for females than for males.

The role of standardized testing and other forms of testing in schools continues to be a topic of debate (Antes, 1989). Students enter a testing situation with varying levels of test-taking skills. When students learn test-taking skills, their performance on standardized and teacher-made tests should be more in line with their true achievement, thus making test scores more reliable. Today, it is common practice in school systems throughout the country to assess student competency in
basic skills, and indirectly to assess the instructional programs, through the use of standardized tests. If standardized tests are used to measure student achievement and to assess instructional programs, then the content and skills tested should be the content and skills taught (Antes, 1989).

Standardized tests of general achievement and ability have been studied in relation to relative percentile rankings and Grade Equivalents (GEs). Relative percentile rankings show students' standing in the norming population, that is, in the large sample of students used in the test development process. A student's percentile ranking remains relatively constant from year to year, particularly as he or she reaches high school age. The standardized test score is an accurate measure of a student's test-taking ability relative to the norming population. Grade equivalents can make these scores more meaningful than percentiles. They are derived by including in the norming sample of the test taken students from several grades above and several grades below the grade level for which the test is designed (Jurs & Wiersma, 1985; Antes, 1989).

Historically, the major purpose of these tests has been to assess an individual's achievement level compared to some average, such as a national norm. Recently, however, this purpose has expanded to include measuring performance relative to specific instructional objectives. Carefully constructed achievement tests have served this purpose well. However, standardized tests are not without limitations. Some of the most frequently cited limitations are: (1) required testing time and disruptions during test administration; (2) hour which testing is conducted; (3) use of test scores; (4) accurate interpretation of test scores; (5) use of test scores in isolation; (6) item content; (7) norms versus standards (Jurs & Wiersma, 1985).
Carroll's (1964) model of school learning views achievement as being influenced by a number of factors, such as motivation and quality of instruction. His model uses as a pedagogical concept the notion of mastery testing. Not only can mastery testing be used as a pedagogical concept, but it may also separately be used as a psychometric concept. From a psychometric point of view, mastery testing is simply a procedure for determining whether an individual has attained a certain level of performance. Kolb's (1976, 1984) model of experimental learning emphasizes an adult orientation and context. It has been suggested to be more appropriate and relevant to adult learners and to have a relatively sound and well-defined theory base (Bonham, 1988a).

Learning styles have been studied in relation to occupation, age, ethnic background, gender, and work experience (Dorsey & Pierson, 1984). Anderson and Bell-Daquelante (1980) explored the relationships among learning style preferences and communication behaviors and predispositions of a random sample (n=423) of high school students who enrolled in English classes from 10 high schools in Harrison County, West Virginia. Dorsey and Pierson (1984) studied learning styles of adult students enrolled in off-campus classes at Texas State University who were pursuing non-traditional undergraduate degree programs in occupational education (n = 513). Their results show that age has a curvilinear relationship with learning style. They found that preference for the AC-CE dimension tended toward abstractness from ages 18-33 and more toward concrete from ages 34-49. This is consistent with results of Kolb's (1976) study, which also established a curvilinear relationship of learning style with age.
Disadvantaged students, particularly low-income students, have long been underserved by the education system. The problems they face - poverty, neglect, low self-esteem, poor basic academic concepts and poor study habits - put these youngsters on the road to failure at an early age (Bloomfield, 1989). Report after report using family poverty indicators such as low-income, low-skill wage, and limited educational background, show that disadvantaged youth are more likely to have lower academic achievement and lower achievement and standardized test scores than do their advantaged classmates across town (National Center for Educational Statistics, 1988).

Pre-Collegiate Programs

Although many universities host pre-collegiate programs, reports of the achievements of their students are rare (Kammer, Fouad & Williams, 1988). Kammer et al. (1988), evaluated the success of The Pre-College Program (PCP) at the University of Wisconsin - Milwaukee by describing trends and patterns among participants. The program is designed to promote the successful completion of high school and the eventual graduation from college of students from disadvantaged backgrounds who show academic potential in mathematics and natural sciences. The findings indicated that most PCP participants completed high school, entered or planned to enter into post-secondary institutions, and tended to enter math or science careers. In all, 71% of the students enrolled in college majored in math, science, or engineering (including medicine or health), and 64% indicated that they were choosing math, science, or engineering careers. It seems that the additional skills and support obtained in the areas of math and science through the PCP were related to students' abilities to succeed in college and in those curricular areas.

In 1988, Orfield identified four factors that are linked to the declining minority access to higher education: segregation
in schools, increasing college costs that are nearly impossible for many minorities to assume, inadequate assistance to unprepared students; and lack of commitment to equal opportunities. Other problems contributing to the decrease of minority students in post-secondary education include: increased number of high school dropouts, financial aid reduction, inadequate preparation in math and science, and lack of career counseling (Charles, 1989).

Brooks (1990) compared a number of enrichment programs in which members of ethnic minority groups participate, to identify common dimensions associated with success. The number of ethnic minorities in our country is growing, but there is still a problem in attracting minorities into post-secondary education.

One type of effort to address problems such as inadequate student preparation and to increase interest in continuing education has been the establishment of enrichment programs aimed at ethnic minority students. A variety of programs (e.g., Upward Bound) have been designed for the explicit purpose of increasing the number of minorities attending college. These programs differ on a number of dimensions. A mixture of skill-training, counseling, tutoring, and exposure to college life experiences are offered. Some are aimed at attracting students into specific fields of post-secondary education (e.g., engineering), while others are only concerned with bringing minorities into post-secondary education regardless of field. It is unclear what effect these programs have on their participants (Brooks, 1990).

Success of the programs was measured on three dimensions: the percentage of students finishing the program, the percentage of students going into post-secondary education, and the percentage of students graduating from college. Fifty-six program directors reported the percentage of students who finished the program, yielding a mean of 85.4%. Sixty-two directors responded out of the 75 programs contacted. Only 25%
of the 75 programs responding reported on the percentage of students who enrolled in college. These respondents indicated an average of 61.7% of the participants graduated from college (Brooks, 1990).

The results of this survey suggest that enrichment programs designed for ethnic minority students primarily during their high school years retain most of their students for the duration of the program and successfully direct them into higher education with an average of 80.9% enrolling in college. The two factors identified in this study as being associated with students' pursuit of higher education are frequency of contact with the program (with more contact being associated with higher percentages of students going on to college) and participating in a total curricular program as opposed to one which is implemented as a supplement to regular classes.

The results provide a good profile of minority enrichment programs. Programs appear to be addressing the problems of attracting minorities into post-secondary education in that 62.9% of program participants were identified as members of ethnic minority groups.

This review of literature will look at studies designed to evaluate the effectiveness, efficiency, and equity of programs created to deal with the barriers which limit access, achievement, and persistence for academically and economically disadvantaged college students.

One of the first studies of compensatory programs in higher education was done by Gordon and Wilkerson in 1966. Gordon specifically requested information on compensatory efforts that were designed for students whose past educational experiences, environmental conditions, and socioeconomic situations indicated a need for programs of remediation, if they were to survive and succeed in institutions of higher education.

The Coleman, Campbell, Hobson, McPartland, Mood, Weinfield, and York Report (1966) found that 12th-grade blacks, Mexican-
Americans, Puerto Ricans, and native Americans are from 2.0 to 4.1 grade levels behind the average white in the metropolitan northwest in reading comprehension, and from 3.0 to 5.7 grade levels behind the same comparison group in mathematics achievement. The emotionalism attached to this report and the issues it explored may explain in part the lack of scholarly research on the subject. However, some authors have provided findings which attest to the problems created for college-bound students by a lack of basic skills. Gordon (1971) examined compensatory education programs, and found that, for many students completing high school with aspiration for college, the lack of basic skills was a major barrier. The lack of basic skills was seen by Gordon to be a total lack of academic preparation. He further stated that it was not unusual to find college students reading on a fourth-or fifth-grade level. To make college meaningful for these students, he felt that basic courses had to be developed and implemented. Studies by Ferrin (1971), Williams (1969), and Roueche (1968) support the findings of Gordon, but add that the problem of a basic skills is not a local one, but was found to exist in every region across the country.

In 1968, John Egerton conducted a national survey of compensatory programs. He defined "high risk" students as those who lacked money, had low standardized test scores and erratic high school records, and whose race/class/cultural characteristics placed them in a disadvantageous position in competition with the students in the college which the disadvantaged student wished to enter (p. 7). Egerton sent surveys to 215 colleges and universities. One-hundred sixty-two institutions responded to the survey. Eighty-six reported some measure of involvement in what could be high-risk activity. Sixty percent of the responding public institutions reported no high-risk programs of any type, while two-thirds of the private institutions indicated some involvement. Responses from major
public institutions, most of them land grant institutions, showed that almost three-fourths had no high risk activity. Egerton concluded that few institutions showed activity with high-risk students whose past academic performance was poor; nor had those institutions which had admitted high-risk students resolved the dilemma of what to do for them once the student was admitted.

Very little has been done to develop the academic skills which the economically and educationally disadvantaged need to profit from higher education opportunities. Therefore, inadequate pre-college training threatens equal opportunity for persistence and academic achievement for the low-income underachiever. The recognition by institutions of higher education that many potentially able college students are handicapped by inadequate pre-college educational training is in itself a herculean recognition and one of the most dynamic trends in American higher education. However, the task of translating this recognition of equality and educational opportunity into operational terms in order to be more effective, efficient, and equitable remains (Jackson, 1976).

Jackson (1976) also found that UBP participants achieved higher grade-point averages, achieved more credits, earned fewer "incomplete grades," earned higher numbers of quality points, and were less likely to leave college for poor academic performance, when compared to eligible non-UBP students during the six semesters they were enrolled at Oakland University in the Opportunity for Disadvantaged Students Program. The findings from this study clearly indicated that low-income underachieving high school students who participated in a pre-college program, prior to entering Oakland University, performed better academically than did low-income underachievers who had not participated in such a program. This study, too, was limited only to Oakland University Upward Bound
students who had graduated from the program and entered Oakland University.

Archbald and Newmann (1988) stated that, in order to estimate the effects of the school on student performance, longitudinal data are necessary. Unless a school has information about student performance at two or more different times, there is no basis for estimating the effect of the school on student performance. Of course, pre- and post-assessments offer no guarantee that observed changes can be attributed to the school program alone. The influence of other factors (e.g., students' personal background, or a changing student body) may be difficult to distinguish from school effects, but longitudinal data are nevertheless necessary.

Instructional objectives have been closely identified with the programmed instruction movement (Traxler, et al, 1953). First, the instructional objectives specify in observable behavioral terms what the student will be able to do at the end of a lesson. These objectives express terminal behavior - the behavior expected of the student after instruction - explicitly stated in objective behavioral terms. Instructional objectives also contain a statement of the conditions under which the terminal behavior is expected. Similarly, the objectives contain a standard of performance below which student performance is unacceptable.

According to Dunn et al. (1989), the effectiveness of the use of three comprehensive models of learning style has been well documented in the literature (Hill, 1971; Keefe et al., 1986; Dunn et al., 1989; Dunn, 1981, 1989; Annotated Bibliography, 1988). Others address only one to four elements, usually on a bipolar continuum. Most studies conducted on students have focused on the gamut of research on learning styles of various populations, gifted, musically and artistically talented, average, underachieving, at-risk, nontraditional, reading disabled, special education, dropout,
and adolescent psychiatric populations. Few investigations have been conducted on educationally and economically disadvantaged high school students. When research has focused on this population, it has examined all the characteristics that influence student achievement. Therefore, this study will determine whether Upward Bound Programs are effective over time in improving students' academic achievement; examine the long- and short-term effect of Upward Bound on student achievement test scores; and determine if the initial (first-year) academic performance and achievement of Upward Bound students remain constant or improve over time and within programs.

A review of the literature on Upward Bound Programs (UBP) revealed that very few studies have been conducted to determine the impact of these U.S. Department of Education Programs. The Research Triangle Institute, as contracted by the U. S. Office of Education (USOE), conducted an initial study in 1973 (USOE, 1974) based on 1973-74 UBP participants. Also, two follow-up studies were conducted by the Research Triangle Institute for the USOE in 1979 (United States Office of Education, 1979a, 1979b). The two follow-up studies were also based on 1973-74 UBP participants, and were completed by 1979 (United States Office of Education, 1979a, 1979b). No other longitudinal study nor major study has been conducted or published on the effectiveness of Upward Bound Programs. Some research has focused on this educationally and economically disadvantaged high school population in public school districts and other programs. Other research has studied achievement testing programs of school districts, to determine the effect of schools on achievement, overall student performance, and tests, and their achievement testing programs' impact on, achievement and motivation.
Findings from the Friedman, Cartter, and Rivlin studies led Cartter (1971) to the conclusions that poor preparation for college, resulting from a lack of basic academic skills, is the major barrier to higher education, in spite of federal, state, and local financial aid.

While the majority of the studies supported by the federal government have dealt more with access than with the specific achievement and persistence of students, some studies have attempted to speak to these variables. Brody and Schenker (1972), in a study supported by the New York Board of Education, evaluated the College Discovery and Development (CDD) Program, located in five New York borough high schools. The specific objectives were to improve students' motivation for work, to develop their expectations for college entrance, and to improve their chances for success in college (pp. 6-7). Using high school graduation, college entry, and college grade point averages as measures of success, the author concluded that their program had made a difference. The findings, however, were weakened because no comparable group existed in addition to the author's failure to establish clearly that the subjects in the study were students lacking in basic skills and thereby not fit for college work.

Very little has been done to develop the academic skills that economically and educationally disadvantaged students need in order to profit from higher education opportunities. Therefore, inadequate pre-college training threatens equal opportunity for persistence and academic achievement for the low-income underachiever. The recognition by institutions of higher education that many potentially able college students are handicapped by inadequate pre-college educational training is in itself a Herculean recognition and one of the most dynamic trends in American higher education. However, the task remains of translating this recognition of equality and
educational opportunity into operational terms in order to be more effective, efficient, and equitable.

There is little evidence in the literature of scholarly research on the impact of Upward Bound services on GPAs, achievement test scores and college enrollment. No qualitative studies on the relationship between learning styles and academic performance and achievement test have been found in the literature as well. It is imperative that TRIO program directors conduct studies in these areas to determine the extent to which achievement tests predict success, to determine whether particular learning style preferences increase achievement test scores and cumulative grade point averages, to determine the relationship of demographic variables to learning styles and to the propensity for high grade point average achievement and for high achievement test scores. Future studies on the extent to which standardized tests and GPAs predict academic success of Upward Bound program students.
CHAPTER 3. METHODOLOGY

This study will identify, describe, and compare achievement test scores and cumulative grade point averages of disadvantaged high school students across selected demographic variables (ethnicity, economic background, and parents' educational background), and investigate the relationship of the demographic variables to learning styles and to the propensity for high grade point average achievement and for high achievement test scores.

Overview

The literature examined in the preceding chapter provides information about the variability on academic achievement and achievement test performance within all economic backgrounds and cultural groups. It suggests a slight tendency for the Upward Bound subjects to show greater disparity in academic performance and achievement test performance. These implications can only become clearer with adequate understanding of the relationships - if any - among demographic variables and academic and achievement test performance which this study will raise in addressing some questions considered pertinent to this understanding.

Upward Bound Population to be Studied

The Upward Bound students in all of the Upward Bound programs across the United States participated in various programs to receive services year-round for four years. They have participated in the support services, testing and assessment component of the program for the 1987-88 through 1991-92 school years. These participants are recruited for Upward Bound in the Spring of their eighth-grade year, given a battery of achievement and standardized tests, along with
ninth-through twelfth-graders. These students are given an orientation to Upward Bound and an informational brochure from the programs. Students acknowledge their interest by completing and returning the postpaid application. Participation is voluntary only. The participants are first-generation college students (neither parent has received a bachelor's degree) and/or low-income (parents' income must be no more than 150% of the family income levels established by the U. S. Bureau of the Census). Data collection is both "on-going" and periodic. Twice per semester each student is required to submit a grade report card to Upward Bound and the grades are entered in a data base or appropriate record-keeping system. Annually, the participants are administered various achievement tests (i.e., the CAT, SDRT, SSHA, WRAT, etc). The ISU subjects also have Learning Style Profile scores for the 1990-91 school year.

Subjects

The subjects in this study are high school students in grades 9-12 who participated in eight different Upward Bound Programs (UBP). The subjects completed zero to four years of participation in the program. A minimum of one year of achievement test and academic performance data are available on these subjects. High school GPA data on this population are available for evaluation purposes.

Subjects for this study were high school students who participated in the Upward Bound Program at Iowa State University and seven other universities and colleges in the midwest, south, and southwest in Arkansas, Illinois, Iowa, Minnesota, and Texas. Sixty-five percent of the students were females and 35% were males. Most (78%) of the students were both first-generation and low income students and the remaining students were either first-generation (14%) or low-income
students (8%). Forty-nine percent of the students were members of minority ethnic groups and fifty-one percent were white. Secondary data analysis were used (no specific clearance is required) and therefore, clearance was not obtained from the Human Subjects Committee. Each of the schools did go through the normal procedures for clearance of the data and requested that confidentiality of the schools' names be maintained throughout the study.

Population of the Study

The population of this study consisted of all Upward Bound students who participated in a program for a minimum of two consecutive years from 1987-88 through 1991-1992. The eight Upward Bound programs had a total enrollment of approximately 804 students.

At the time of the study, about 98% of all the Upward Bound students in Iowa in the sample were white and 33% of the minority students in the sample were from urban areas. Most of the students had graduated from high schools with enrollments of fewer than 300 students.

Setting of the Study

Iowa State University (ISU) is one of three, four-year state universities in Iowa. Located in Ames, Iowa, ISU is situated in Story County in the central part of the state. ISU's location provides a unique opportunity for a successful program with participants coming from urban and rural populations. The four target area communities surrounding Ames include Native Americans, Asians or Pacific Islanders, Blacks, Hispanic Americans, and poor whites. The potential participants differ from the demographic norm in terms of educational preparation, economic conditions, environmental circumstances, cross-cultural exposure, and family educational history. Most
of the high schools in these areas are rurally isolated and, in 
many respects, culturally unique. The average dropout rates in 
the identified target area schools (Ames, Fort Dodge, Saint 
Edmond, Marshalltown, and South Tama) over the past three years 
rage from 4 percent to 6 percent and are among the highest in 
the state.

These four areas within a 50-mile radius of Des Moines 
contain 4 percent of Iowa's Spanish-speaking students, 13 
percent of the Native American students, 8 percent of the Asian- 
American students, 4 percent of Black students, and under 3 
percent of white students. However, minorities comprise only 
5.5 percent of Iowa's total population. The socioeconomic 
conditions of the various groups from these communities have 
produced a need for the educational upward mobility of students 
who are disadvantaged by poor educational preparation and a lack 
of financial resources.

The opportunity for cultural and social exposure for this 
target area (except Des Moines) is minimal, compared to that 
obtained by people in urban areas in other states. A majority 
of residents are culturally deprived, due, in part, to the lack 
of population centers as well as the long distances between 
cities.

The other school settings are in Arkansas (1), Illinois 
(1), Iowa (3), Minnesota (1), and Texas (1). Also, five are 
rural and three are located in urban (inner-city) school 
settings. In many of these areas, also, the residents are 
culturally deprived due to the lack of population centers, 
educational preparation, economic conditions, environmental 
circumstance, cross cultural exposure, and family educational 
history.
Demographic Items

The final section of the study is devoted to demographic characteristics, among them gender, parental/guardian educational and annual income levels, and ethnicity. There are two main reasons for their use. First, they provide a description of the sample and the population characteristics represented by the sample. Not only is this of interest in itself, but it also allows for a comparison with the larger population. Second, the demographic characteristics are very important when examining the academic achievement and achievement test performance. Often persons of different backgrounds, such as grade, gender, and ethnicity, have different academic achievement and performance. For this study, knowing that children from different educational and economic backgrounds have unique basic skill needs will help to predict students' future academic and achievement test performance.

Instrumentation

The data collection was done through a battery of achievement test instruments, student high school grade reports, and a survey consisting of two instruments - the Learning Style Profile (LSP), the Survey of Study Habits and Attitude (SSHA) Inventory described below, and a subsection consisting of questions that elicit information about the demographic variables of interest to the study (gender, ethnicity, parents' educational background and parents' annual income).

Description of Tests

The California Achievement Tests (CAT) is a series of test batteries that combine the most important and useful characteristics of norm-referenced and criterion-referenced tests. This combination provides information about the relative
ranking of an individual student against a norm group. It also provides specific information about the instructional needs of the student (Bunch, 1985).

The CAT measures the achievement of students from kindergarten through twelfth grade. There are ten levels of CAT, Form C & D, (Levels 10-19) and they are used for this study. The complete battery contains tests in five basic content areas: reading, spelling, language, mathematics, and reference skills. The five content areas are divided into eight separate tests and a total battery score which does not include reference skills (Bunch, 1985).

The CAT used a "try out" group that was reasonably representative of various parts of the nation. It was standardized by using a national probability sample, stratified in terms of public and Catholic schools, geographical regions, school districts size, and socioeconomic status. The CAT was normed using both males and females from the 1976-77 school year. It attempted to achieve proportionate representation of special education students, blacks, Hispanics and Catholic school children. Reliability measures were reported for each subtest at each level. Previous reviewers have criticized the use of "subsection" section scores because of their low reliability, and, therefore, the resulting scores are to be interpreted with considerable caution (Bunch, 1985).

The Learning Style Profile (LSP) is a first-level diagnostic tool consisting of a series of 23 independent scales representing four higher-order factors: cognitive skills, perceptual responses, study preferences, and instructional preferences. Three University Centers developed and piloted 424 items in three domains and three versions of the instruments were administered to 2600 students in more than 55 schools throughout the nation with each subjected to a factor analysis. A final draft of 126 items was administered to a normative sample of 5,000 students (Keefe and Monk, 1986). At each stage
of development, readability checks were made of the instrument (Keefe and Monk, 1986).

Validation and norming of the LSP were undertaken with more than 5,000 students geographically located throughout the United States taking the field version of the instrument. Normative data were generated from this sample and the reliabilities of subscales were determined. Reliability was evaluated by calculating the internal consistency coefficients for each subscale, using data from the entire normative sample, and test-retest reliabilities were calculated for each subscale from a smaller separate sample for 10-day and 30-day periods of time. The national Learning Style Task Force assisted in evaluating the four types of validity (face, content, construct, and concurrent) of the instrument and approved the final content of each scale (Keefe, 1988).

The extensive readability checks, concurrent validity studies, and factor analyses of the instrument, combined with the supervisory efforts of the Learning Style Task Force, assure valid results for the use of the Learning Style Profile with students in the sixth to twelfth grades. The LSP provides the most comprehensive profile of student information processing skills and motivational preferences available today. The LSP furnishes diagnostic information on 23 learner characteristics which offer teachers and students knowledge that achievement and competency tests do not measure. The LSP provides these data about information processing skills and motivational preferences in student and class profiles (Keefe and Monk, 1986).

The Science Research Associates Achievement Series (ACH) is designed to provide information about student achievement through a battery of subtests. The results will be useful in individual school, district, or diocesan testing programs, since objectives common to most school curricula are included. In addition to the achievement scores common to all levels of ACH, Level H, Form 1, which is used in this study, provides an
applied-skills score. This score provides a measure of the students' ability to apply skills and knowledge learned in school to practical, real-life situations, especially those they will encounter as adults. Level H is available in two forms (1 and 2) to allow for use in pre-and posttesting (SRA, 1979).

The ACH is a criterion-referenced battery for grade 9-12 and contains six test levels. The tests are reading, mathematics, language arts, reference materials, social studies, and science. Level H also measures knowledge and understanding of content in four critical areas of everyday adult life - consumer economics, health and safety, employment, and community resources. The new ACH series was standardized in both the spring and the fall of 1978. Norms developed from these standardizations are in compliance with Title I guidelines. To ensure that the norms would be as representative of the national student population as possible, a four-step test development process was conducted within the Achievement Series: content planning, item writing, item pretesting, and item analysis and selection.

The ACH items were pretested to see how well they work and to obtain other information essential for item analysis and selection. The pretest sample consisted of approximately 50,000 students from 979 classes in 226 schools across the nation. Of the 226 schools, 100 were Title I schools. The sample included 190 classes which were composed primarily of minority students (SRA, 1979). The ACH was also analyzed editorially and statistically for cultural, social, and sex-role fairness and for racial-ethnic and sex bias.

The Sequential Tests of Educational Progress (STEP) is a series of test batteries consisting of seven separate tests. STEP is an important battery for assessing the general aspects of educational development. It was not designed to be a conventional achievement test to measure specific course learning, but rather a test to determine the extent to which
individuals had acquired certain skills and understanding which might have been the result of courses and other experiences (Buros, 1965).

STEP measures the achievement of students from grades 4 through the second year of college. There are four levels of STEP (1: grades 13-14; 2: grades 10-12; 3: grades 7-9; and 4: grades 4-6) and two forms (A and B). For this study, levels A and B were used, for they cover six basic content areas: reading, writing, science, mathematics, listening, and social studies. STEP also has an essay test that is not germane to this study (Buros, 1965).

STEP was standardized by using a national sample of students from suburban schools with high socioeconomic status, urban schools, and a normative sample from large cities. STEP was also standardized by conducting a reliability study based on alternate forms of tests; and using a table of estimated spring norms. Norms for many of the grades were interpolated and extrapolated and the actual number of cases is not stated. The reliability and validity of the tests have been questioned, and earlier reviews of the tests have called for more evidence of validity. Reviewers have called for prediction studies and also studies related to other tests. There are no tables of intercorrelations of the STEP tests below the college level - a basic table which users expect for any battery. Such data were hard to come by during the 1956-57 standardizing because each normative case took only part of the battery. The issue here is not one of the quality of the STEP items per se but rather one of how much is lost compared to what is gained by the STEP approach (Buros, 1965).

The Stanford Diagnostic Reading Test (SDRT) is an instrument which measures students' overall reading skills. The test consists of two forms and four levels which span grades 1 year and 6 months - grade 13 and gives six to eight scores depending upon the level. It measures phonetic analysis,
vocabulary, and reading comprehension in all four batteries. The SDRT also groups reading scores into two categories to help teachers identify those students who have demonstrated strengths or deficits in their reading skills. These scores can be grouped according to content-referenced and norm-referenced scores. Content-referenced scores provide information about the students' performance on sets of specific test questions, while norm-referenced scores describe students' performance relative to that of a national or local reference group (Mehrens and Lehmann, 1980).

The SDRT measures students' performance according to grade equivalents, percentile ranks, stanines, and normal curve equivalents. Grade equivalents, which is the score measured in this study, relate students' scores to the typical performance of students in specified grades tested in a given month of the school year. The SDRT grade equivalents range from 1.0 to 12.9, with grade equivalents higher than 12.9 designated as "PHS," and those lower than 1.0 as "K." The SDRT grade equivalents are recommended for comparing students' scores with national samples and are comparable across various test forms (G to H), across levels, and across grades - but only on the same subtest, form, and level (Mehrens and Lehmann, 1980).

The SDRT's content and criterion-related (concurrent) validity were emphasized in the test's construction. K-R 20 reliability is reported using raw scores, and standard errors of measurement are reported for both raw and scaled scores (Mehrens and Lehmann, 1980).

The Survey of Study Habits and Attitudes (SSHA) was developed to aid educators who work with students that have apparently high scholastic aptitude and do very poorly in school, or that have average ability but do well. The purposes of the SSHA are (1) to identify students whose study habits and attitudes are different from those of students who earn high grades, (b) to aid in understanding students with academic
difficulties, and (c) to provide a basis for helping such students improve their study habits and attitudes and thus more fully realize their best potential. The SSHA consists of two forms (Form C and H), two subtotals, a total score, and four basic subscales - Delay Avoidance, Work Methods, Teacher Approval, and Education Acceptance (Brown & Holtzman, 1967).

The SSHA (Form C) is based upon eight years of research beyond that undertaken in the development of the 1953 version. The high school edition (Grades 7-12), Form H, is a logical extension of Form C. All of the items scored for men and women in the original SSHA have been retained in Forms C and H, with minor word changes, and the percentile norms are similar for men and women. Intercorrelations among the scores on all items of the test were computed separately for men and women at various schools. The percentile norms for high school levels (Grade 7-12, Form H) are based upon a total of 11,218 students in 16 different towns and metropolitan areas across the U.S. Both forms of the SSHA have been validated in a large number of junior and senior high schools with subscale correlations ranging from .51 to .75. Several studies undertaken on the reliability of Form H indicate that the four subscale scores are sufficiently stable through time to justify their use in assessing the degree of change in study habits and attitudes after counseling or in predicting future behavior (Brown & Holtzman, 1967).

Tests of Achievement and Proficiency (TAP), Form T provides efficient and comprehensive appraisal of student progress toward widely accepted academic goals in the basic skill areas. Scores may be used, with other relevant information: (1) to analyze individual student and class strengths and weaknesses; (2) to study a student's progress through high school; (3) to plan instruction; (4) to select remedial and enrichment activities; and (5) to revise course and instructional activities (Scannell, Haugh, Schild, and Ulmer, 1983).
Approximately 19,000 pupils in each grade participated in the 1977 standardization program. In spring 1978 standardization test data were collected on a representative subsample of the fall sample. Criteria used in selecting and weighting the sample were region, size of community, family income and education, and racial/ethnic population. Current national norms were obtained by testing approximately 2,000 students per grade in the fall of 1981. Spring norms were likewise established on a representative subsample. Each test in the battery is constructed according to specifications reflecting currently accepted curricular practices and then is reviewed by curriculum specialists. As part of the national standardization program, empirical studies of difficulty-discrimination differences across racial/ethnic groups were conducted (Scannell et al., 1983).

The Tests of Achievement and Proficiency are prepared in both "Basic Battery" and "Complete Battery" formats. The Basic Battery consists of the Reading Comprehension, the Mathematics, the Written Expression, and the Using Sources and Information tests. The Complete Battery includes, in addition, the Social Studies and the Science tests (Scannell et al, 1983).

Tests of Adult Basic Education (TABE) is an instrument used to measure skill levels in three major content areas: (1) reading; (2) math and, (3) Language. Each content area has a subscore. Reading has a vocabulary and comprehensive subtest; math has a computation subscore; and language has mechanic and expression subscores. TABE has several test forms (A-E) and several levels. For the purpose of this study, TABE 5 and 6 only were used (Conoley & Kramer, 1989).

TABE is available in the Complete Battery Books and the Survey Form. The test construction consisted of an item selection process which involved Item Response Theory and the implementation of a three-parameter statistical model that takes into account item discrimination, difficulty, and guessing. The
statistical data collected in the equating studies represent the various reference groups of adults who participated in the studies.

Two major research studies were conducted to generate norms for selected adult reference groups. Standard procedures in item development and selection were employed to reduce content bias. Also, one of the purposes of the research studies was to obtain information that would eliminate gender and ethnic bias from the final test.

The Wide Range Achievement Test-Revised (WRAT-R) was first standardized in 1936 as a convenient tool for the study of the basic school codes of reading (word recognition and pronunciation). The WRAT has undergone five revisions since its introduction and has been researched extensively on many thousands of persons from pre-school through adulthood. The test measures reading, spelling, and arithmetic. It has been normed using a number of different populations (Jastak and Jastak, 1984).

The WRAT-R was standardized using a sample size of 5,600 persons. The WRAT-R used this stratified group which was reasonably representative of various geographical regions and community residences (metropolitan and non-metropolitan residential communities). It was standardized by age with 28 age-level groups consisting of 200 people in each group. The WRAT-R was normed using both males and females and attempted to achieve proportionate representation of white and non-white groups. Reliability measures were taken for all sub-tests. All median coefficients across sub-tests for person separation (test reliability), test-retest reliability, and item separation (sample testing) were above .91 (Jastak and Wilkinson, 1984).

According to the authors, "content validity of the WRAT-R is apparent;" and the WRAT-R "obviously has face validity." The 1984 WRAT-R reflects many changes even though the concept of a simple academic coding assessment instrument has been unchanged.
The national stratified sampling plan was used, and specifically sampling by age; Rasch item analysis and scaling was done; and white/non-white item difficulty comparisons were made (Jastak and Wilkinson, 1984).

Research Design

The research design utilized the *ex post facto* research design using correlational analysis and other statistical methods. Four statistical methods were used to analyze the longitudinal data regarding Upward Bound participants. These methods were: 1) multiple analysis of variances (General Linear Models procedure), 2) correlational analysis, 3) regression analysis, and 4) t-test. The General Linear Models procedure was used to analyze data regarding grade point average, total semesters of credit, achievement test scores, standardized test scores, and admission status. A regression analysis was used to compare the results of grades nine and ten with grades eleven and twelve. The t-test was used to analyze information regarding gender of the participants.

Variables of the Study

All hypotheses will be tested at the .05 level of significance. The dependent variables of the study were academic achievement and achievement test performance and standardized test scores, as measured by cumulative grade point average, the CAT, SDRT, SRA (ACH), and the SSHA, STEP, TABE, TAP, and the WRAT-R. Additional dependent variables include learning style type and learning preference, as measured by Keefe and Letteri's (1986) Learning Style Profile. The independent variables include demographic variables such as age, gender, ethnicity, educational background, grade level, and economic status.
Because the subjects in this study will be limited to specific homogeneous groups, it may not be possible to determine specifically what factors are responsible for success or failure. The study may also be unable to specify which factors can be associated solely with a "disadvantaged" or ethnic group without testing a more representative sample of that group.

This study is designed to investigate whether there is a relationship between Upward Bound Program students' achievement test performance as demonstrated by scores on the California Achievement Test, Sequential Tests of Educational Progress, Test of Adult Education, Stanford Diagnostic Reading Test, Science Research Associates, Tests of Achievement and Proficiency, and the Wide Range Achievement Test and cumulative grade point average. The statistical analyses used in this study were General Linear Models analysis, correlational studies, and comparative analyses. The study investigated the relationship between achievement test scores and academic preparation of the respondents. The results of the study may indicate that academic preparation and grade level directly influence performance on achievement tests. In conclusion, this investigation will demonstrate what relationship - if any - demographic variables have with success as measured by academic and achievement test performance.

Hypotheses of Study

Hypothesis 1. Is there a significant difference in achievement test performance due to Upward Bound participation, as characterized by test scores?

Hypothesis 2. Is there a significant difference in academic performance due to Upward Bound participation, as characterized by grade point average?
Hypothesis 3. Is there a significant difference in achievement test performance, as characterized by economic status, ethnicity, gender, and grade level?

Research Hypotheses to be Tested

Based upon the review of selected literature, the following null hypotheses will be tested for all eight Upward Bound programs.

1. There is no significant difference in achievement test performance of Upward Bound Program students based upon test scores across achievement tests, i.e., CAT, SDRT, SRA, AP, and WRAT.
2. There is no significant difference in achievement test performance of Upward Bound Program students as a function of economic status and parents' educational background.
3. There is no significant difference in achievement test performance and academic performance due to geographical settings of the various Upward Bound programs.
4. There is no significant difference in achievement test performance of Upward Bound Program students as a function of ethnicity, gender, and grade level.
5. There is no significant difference across programs in the academic performance of Upward Bound Program students as characterized by grade point average and grade level.
6. There is no significant difference in the academic performance of Upward Bound Program students as a function of economic status or parents' educational background.
7. There is no significant difference in academic performance of Upward Bound Program students as a function of ethnicity and gender.
8. There is no significant difference in student academic achievement due to learning style preference, as characterized by scores on achievement tests and grade point average.

9. There is no significant relationship between achievement test performance across eight Upward Bound Programs, using six different achievement tests, and a combination of independent variables.

10. There is no significant difference in academic performance and achievement test performance of Upward Bound Programs with large numbers of ethnic minorities and those that have smaller numbers of ethnic minorities.

This chapter describes the procedures and methods employed in this study to address the research questions and hypotheses presented in chapter one and further reviewed by the selection of literature examined in the preceding chapter. The research design, instrumentation, sampling techniques, data collection, and analysis procedures are described. The population and sample characteristics are also reported.

**Sampling Plan**

The sampling plan was based on requiring a cluster sample of more than 420 students in order to assess the findings with a 95% confidence level, with a sampling error range of ± 5%. A cluster sampling strategy was used to sample individual programs and not individual students. The sampling strategy samples a cluster of students within individual programs and is not a simple random sample of students. The cluster sampling creates several problems. First, the standard errors will not be exact; this clouds the interpretation of what differences are significant. Second, the sampling plan will not have exactly the right measures of variability across samples. The strategy will not have the right variability and will limit the generalizability of results. Third, the sampling plan will be
limited in the generalizability of results because of the failure to conduct a simple random sample of programs nationally. Because various Upward Bound programs have different kinds of population compositions which are purely a function of population and where they draw their students from, several alternative categorization schemes will be utilized to analyze the data.

The eight schools were selected for accessibility of data, availability, easibility, and familiarity. Some schools were selected for comparability; i.e., the urban schools. A cluster sampling plan was used to select program students.

**Data Gathering**

Prior to receiving a roster of all Upward Bound Program participants with two years of achievement test scores, and grades in the various academic subjects, approval was obtained from the Upward Bound directors. The directors submitted data with the understanding that none of the individual student names or school names would be disclosed in any manner. The directors requested that the data be held in the strictes of confidence. A majority of the students had complete data sets for both years, some had incomplete data for both years, and others had data for only one year. From the rosters, 804 students were included in the study for data analysis.

Data pertinent to the focus of the research were collected from high school students who participated in the Upward Bound Program at Iowa State University and seven other universities and colleges in the midwest, south, and southwest in Arkansas, Illinois, Iowa, Minnesota, and Texas. Sixty-five percent of the students were females and 35% were males. Most (78%) of the students were both first-generation and low-income students and the remainder were either first-generation (14%) or low-income students only (8%). Forty nine percent of the students were
members of minority ethnic groups and fifty-one percent were white.

The population of this study consisted of all Upward Bound students who participated in a program for a minimum of two consecutive years between 1987-88 through 1991-92. The eight Upward Bound programs had a total enrollment of approximately 804 students. About 98% of all the Upward Bound students in Iowa in our sample were white and 33% of the minority students in the sample were from urban areas. Most students had graduated from schools with enrollments of fewer than 300 students.

The sampling plan was based on the statistical fact that a cluster sample requires a sample size of more than 420 students in order to assess the findings of our hypothesis tests with a sampling error range of + and - 5%. A cluster sampling strategy was used to sample individual programs and not individual students. The sampling strategy sampled a cluster of students within individual programs and was not a simple random sample of students.

The eight schools were selected for accessibility of data, availability, ease of access, and familiarity. Some schools were selected for comparability; i.e., the urban schools. The study used various standardized achievement tests and the Learning Style Profile (LSP) presented in Chapter 3. The achievement tests instruments provided information about the students' abilities to apply knowledge learned in school to test content designed to measure analytic, numerical and verbal abilities. The LSP developed by NASSP was used to examine student information processing skills and motivational preferences and learned characteristics that achievement and competency tests do not measure.
Statistical Analysis of Findings

The techniques used in the analysis of the data consisted of (1) General Linear Models procedure (GLM), (2) correlational studies, (3) regression analysis, (4) t-test, (5) cross tabs, and (6) frequencies.

The General Linear Models procedure, used to test hypothesis 1, examined differences in achievement test performance across schools.

The General Linear Models procedure, used to test hypothesis 2, examined differences in achievement test performance characterized by students' program and eligibility.

The General Linear Models procedure, used to test hypothesis 3, examined differences in achievement test performance and academic achievement characterized by geographical locations of programs.

The General Linear Models procedure used to test hypothesis 5, examined differences in achievement test performance and academic achievement characterized by grade-point average.

The t-test for paired observations, used to test hypothesis 7, evaluates observed differences in academic performance as characterized by grade point average and ethnicity.

The t-test for paired observations, used to test hypothesis 4, evaluates observed differences in achievement test performance as characterized by ethnicity, gender and grade level.

The t-test for paired observations used to test hypothesis 6 observed differences in academic performance due to economic status or parents' educational background.

To test hypothesis 8, the Pearson Correlation Coefficients was used to examine the differences in academic achievement by ISU's Upward Bound Program as characterized by the LSP and academic performance.
To test hypothesis 8, the General Linear Models procedure was used to examine the differences in achievement test performance across programs using six different achievement tests.

To test hypothesis 9, the analysis of covariance was used to examine the differences in achievement test performance across programs using six different achievement tests.

To test hypothesis 10, the analysis of covariance was used to examine the relationship between achievement test performance and academic achievement and ethnicity.

**Treatment of the Data**

The data for this study will be analyzed using the Statistical Analysis System (SAS). The preliminary analyses of the data include frequency counts.

The General Linear Models procedure, in SAS or in other formats, has proven to be valuable in the interpretation of data resulting from a wide variety of problems in the social sciences. Multivariate techniques are an integral part of any scientific inquiry, and, consequently, have been used for making inferences for educational data.

General Linear Models results have been computed, in other research studies, for questions pertaining to achievement test performance and high school achievement as predictors of college performance. High school academic performance and Scholastic Aptitude Test (SAT) scores are often used as indicators of academic success. Measurements on five pre-college predictor variables (high school grade-point averages for junior and senior years, SAT verbal and quantitative scores, and number of extracurricular activities) and four college performance criterion variables (grades in courses in four different subject matter areas) were used (Bejar, 1983; Archbald, 1988) to determine the association between the predictor and criterion
scores. The study was concerned with substantiating the usefulness of test scores and high school achievement as predictors of college performance. In the present study, objective was prediction of the college performance variables based on the set of predictor variables. This may also be extended to a rule for classifying students as apt to succeed or not to succeed in college.

The participants' academic achievement and achievement test performance were measured in several different ways. As indicated previously, seven different potential measures of students' abilities were used. These six achievement tests, as well as one study survey and one learning profile measured different skills and abilities. The CAT measured several different types of student abilities for three different UB programs two midwestern four-year public universities and one midwestern private four-year college. Therefore, the CAT will be comparing the performance of schools that have comparable achievement. Achievement test performance was also measured in other ways. The SDRT, STEP, TABE, WRAT-R, SRA, and TAP measured several different types of student abilities for the remaining two schools. The data analysis shows the relationship between achievement test performance across eight UBPs and a combination of independent variables. The participants' academic achievement was measured by grade-point average. The data analysis shows the relationship between academic achievement across eight UBPs and a combination of independent variables as well.

ISU has several achievement test performance measures (standardized tests) of differences in students' abilities. Differences in students' abilities may be attributed to being a member of a majority or minority ethnic group, male or female, living in rural or urban setting, being a first-generation or low-income student and/or being in a specific grade. There will be different ways of categorizing data for the various programs.
Due to differences in the make up of the eight programs, the data were categorized accordingly; for example, several programs have different minority group compositions. Because different programs have different kinds of population mixes, which is purely a function of population and of where and how UB programs draw their students, the study cannot use the same categories for ethnicity and other variables as well for all programs. The model allows for different categorization schemes for different programs. There will be different categorization schemes for different predictor variables which means the interpretation of data will vary. The point of consistency would be comparing minority versus non-minority groups across all groups. There is a disproportion in opposite directions for different programs, i.e. at ISU, the disproportion is in favor of non-minority groups, while at a southwestern school the disproportion is in favor of minority groups. Separate analyses will be conducted because of different characteristic mixes in the programs. Interpretation of results for each model will differ as a function of the characteristics being compared within each model.

Achievement Testing

This study will focus on achievement testing which encompasses the variables deemed important to understanding factors related to the academic success and performance and achievement test performance of Upward Bound students (Bejar, 1983; Archbald and Newmann, 1988). The variables that will be examined in this study include ethnicity, gender, economic background, parents' educational background, high school grade-point average, and achievement test scores. Bejar (1983) views achievement testing as a system with several interrelated components. Archbald and Newmann (1988) describes achievement testing as the measurement of both general achievement and
ability. Testing is conducted to measure students' verbal, numerical, and analytical abilities.

Several research studies have presented theoretical frameworks aimed at explaining achievement test performance and academic achievement of high school students (Traxler et al. 1953; Cronbach, 1969; Tyler and White, 1979; Bejar, 1983; and Archbald and Newmann, 1988).

Procedures

During the spring and summer semesters of 1992, the ISU Upward Bound Program collected achievement test scores, academic performance data (grade reports), grade-point averages, and demographic data from eight Upward Bound programs in the south, southwest, and midwest. The data gathering was designed to obtain information to investigate the relationship - if any - demographic variables have with success as measured by academic grades and achievement test performance.

Data were requested from a total of thirteen programs. These programs were selected because of familiarity, accessibility of data, ease of getting data, and availability of most data sets; some were chosen because of achievement test comparability. However, only eight of the programs responded to the request and thus provided most of the data. Participation in this study was voluntary.

Data pertaining to students' academic ability were obtained from permanent personal records and test results. The following information pertaining to academic performance and achievement test performance were used in this study (1) grade reports; (2) ethnicity; (3) gender; and (4) standardized test scores.

Limitations

1. The data analysis for this study will be limited to cases having complete and usable data sets. CAT data sets were
available for three programs and certain other variables were available for only two programs. The LSP, SDRT, SSHA data sets were available only for ISU, and the SRA, STEP, TABE, WRAT-R, and TAP each were available for only one program. Although a comprehensive study with comparisons of CATs across programs and school types would provide more utility of studies in this area, data do not exist for all programs. Limited data for all programs prevents generalization, and the study is limited in terms of what can be generalized.

2. The study will be limited in making comparisons of any kind using empirical data because all similar data does not exist for all programs. There is a limitation of what data were available and what were unavailable in the form of test and academic reports that measure performance. This is not a question of instrumentation. There are comparable data across programs, but the study does not have similar data or measurements across institutions. There is a multitude of different kinds of data. Comparisons across all schools with all tests can be made, but the lack of identical data is a delimitation. Comparisons across three schools using the CAT and two schools using the WRAT can be made, but there can be no generalizations across all programs without the comparable data from each program. There are no comparable achievement test or academic achievement data across programs.

3. Academic achievement performance data across programs may be a delimitation as well. Grade-point averages are comparable and are all based on a 4-point grading scale, but there may be an inherent problem with the manner in which schools grade. For instance, one school may not have the same grading scales on tests or quizzes. Similarly, low grades in Iowa schools may be comparable to high grades in other schools because of the generally high quality of public schools in Iowa. Unknown
factors include grade inflation, quality of school districts, content of school curricula or the strength of curricula. Also, overall, how school systems compare across regions is unknown. Iowa's public reputation for quality education systems is highly regarded, but this does not mean that all of Iowa's schools are necessarily better than all schools in other regions where the population resides.

4. The use of high schools' rank would give better comparability of students' grade performance than the use of grade-point averages. However, high school class rank applies primarily to high school seniors.

5. Class size, particularly Iowa's large number of small rural school districts, sometimes may provide students with weaker or poor college preparation due to limited funding and fewer resources.

6. Teacher quality for students in kindergarten through twelfth grade, particularly in small school districts, may affect academic performance. The above unknown and background factors can't be measured and are confounding variables. These variables are naturally confounding factors that we do not have control of, simply are not measured, and are questions for future study.

7. The cluster sampling strategy limits the generalizability of the results for programs nationally. Failure to use the simple random sample of programs limits generalizability of the results.

8. Certain differences which are statistically important are strictly limited to the set of programs I examined.
9. Standardized test cultural bias due to differences in cultural background and language differences will limit the generalization of the results.
CHAPTER 4. ANALYSIS OF DATA

The methods and results of statistical analysis will be presented in this chapter. Hypothesis testing will be utilized to determine whether background student characteristics and institutional variables contribute significantly to the prediction of Upward Bound students' performance on their high school grade-point averages. The hypothesis testing will also be utilized to determine to what extent standardized tests predict success in high school courses and to what extent high school grade-point averages predict success on achievement tests. Finally, this analysis will demonstrate what relationship, if any, demographic variables have with success as measured by academic achievement and achievement test performance.

The data used in this study were compiled from schools selected primarily for accessibility of student data. In addition some were selected for comparability, i.e., the urban schools which have large numbers of ethnic minorities. The total sample consisted of 825 students who participated in an Upward Bound program for two consecutive years between 1987 and 1992. Twenty-one of the students were lost due to missing information. The final sample, upon which the following analyses are based, consists of 804 students who had the pertinent information needed for analysis. Statistical test outcomes yielding a significance level of .05 or less will be considered significant in this study. The confidence level for such tests thus is at least 0.95.

Indicators of success in academic performance and achievement test performance are important variables to be examined in this study. Therefore, each school will have different but comparable measures to denote academic achievement and achievement test performance. Grade-point average, as indicated by information contained in the students' Upward Bound
record file, will be an index of academic achievement for each school. The achievement test performance index for all Upward Bound students comprises six achievement tests, which measure several different kinds of skills and abilities. The sample for each hypothesis consists of Upward Bound students in grades eight through twelve.

Hypothesis 1 states that there is no significant difference in achievement test performance of Upward Bound program students based upon achievement test scores, i.e., CAT, SDRT, SRA, STEP, TABE, TAP, and WHAT-R, across schools.

The results of a one-way Analysis of Variance (ANOVA) for all eight Upward Bound Programs revealed that students at school number eight performed at a significantly higher grade equivalent in math and language on their achievement tests than did students at the other seven schools. Students at school number two performed at a significantly higher grade equivalent in reading on their achievement tests than did students at the other schools. The students at school number two had a mean grade equivalent of 11 years 8 months (n=141) on the composite reading skill. Students at school eight had mean grade equivalents of 12 years 7 months (N=89) in year two and 13 years (n=87) on the math and language composite skills in year two respectively.

Table 1 reveals a Pr>F (P-value) of 0.0001 for each school and R-square scores of 0.15 to 0.22 for achievement test performance compared across all schools for seven separate tests. Although there were differences in separate achievement test performances across schools, the differences were not significant on any composite score. The P-value score shows that there are statistically significant differences among schools on achievement test performance, but the amount of variation accounted at maximum for not much over 20 percent. Hypothesis 1 is, therefore, rejected.
Table 1. Summary of R-squares and P-values for test performance across schools

<table>
<thead>
<tr>
<th>Subject</th>
<th>R-Square</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Math</td>
<td>0.22</td>
<td>0.0001</td>
</tr>
<tr>
<td>Language</td>
<td>0.15</td>
<td>0.0001</td>
</tr>
<tr>
<td>Reading</td>
<td>0.12</td>
<td>0.0001</td>
</tr>
</tbody>
</table>

Hypothesis 2 states that there is no significant difference in achievement test performance of Upward Bound Program students as a function of economic status and parents' educational background. A one-way ANOVA was used to test this hypothesis. The results of this analysis are presented in Table 2.

The results of a one-way ANOVA for achievement test performance in reading, math, and language of students who are from various economic and family educational backgrounds revealed that there is no significant difference in achievement test performance as characterized by students' program eligibility (criteria used to select students for program participation). Since the calculated P-values for each dependent variable (reading, math, and language) were each greater than the .05 level of significance, the null hypothesis that there is no significant difference in mean levels of the students' test performance based on eligibility background is not rejected. This means that the achievement test performance in reading, math, and language of first-generation potential college students is no different than that for the low-income or first-generation/low-income student.
Hypothesis 3 states there is no significant difference in achievement test performance and academic performance due to geographical settings of the various Upward Bound programs. The results of this analysis are presented in Table 3.

The results of the one-way ANOVA for geographic differences in achievement test performance in reading, math, and language, and for academic performance in high school courses revealed that there were some significant differences in both achievement test performance and academic performance. There were three significant differences in achievement test performance in year one, and four significant differences in year two. There were two significant differences in academic performance in year one, and two significant differences in year two.

An overall ANOVA and Scheffe test for pairwise group differences were performed for all six achievement tests and grade-point averages for two years. In year one there was a difference at the .05 level of significance in GPA between rural and urban programs (P-value=0.0080, R-square=0.01) and among programs in different regions (P-value=0.0041, R-square=0.02). The mean score for rural programs is 2.62; the mean score for urban programs is 2.40. The mean score for the midwest is 2.62;
the mean score for the southwest is 2.3. In year two, there was a difference at the .05 level of significance in GPA between rural and urban programs (P-value=0.0012, R-square=0.02) and among programs in different regions (P-value=0.0001, R-square=0.03). The mean score for rural programs is 2.70; the mean score for urban programs is 2.43. The mean score for students in rural midwest programs is 2.70; the mean score for the urban southwest program is 2.17.

The results of a one-way ANOVA revealed that students in rural midwest program had higher mean grade point averages than did students in urban programs and schools located in the south and southwest in both years. An overall ANOVA and Scheffe test for pairwise group differences were performed for all six tests by geographical settings for two years. In year one there was a difference at the .05 level of significance in achievement test performance between rural and urban programs (P-value=0.0001, R-square=0.06) and among programs in different regions (P-value=0.0003, R-square=0.03). Students in the rural midwest performed at a significantly higher grade equivalent in math on their achievement tests than did students in urban programs and in the south and southwest regions. Students in the rural midwest had a mean grade equivalent of 11 years, six months (n=388) on the composite math skill. In year two, there was a significant difference at the .05 level of significance in achievement test performance between rural and urban programs (P-value=0.0001, R-square=0.08) and among programs in different regions (P-value=0.0006, R-square=0.03). Students in urban programs had a mean grade equivalent of 13 years (n=87) on the language composite skill. Students in the urban southwest program had a mean grade equivalent of 12 years (n=89) in reading composite skills; a mean grade equivalent of 12 years 8 months in math composite skills; and a mean grade equivalent of 13 years in language composite skills. Hypothesis 3 is rejected.
Table 3. Summary of R-square and P-values for test performance and G.P.A., geographical setting (urban, rural) and region (midwest, south, and southwest)

<table>
<thead>
<tr>
<th>Subject</th>
<th>R-square</th>
<th>P-value</th>
<th>Geographical Setting</th>
<th>P-value</th>
<th>Region</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reading One</td>
<td>0.06</td>
<td>0.0001</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Math</td>
<td>0.03</td>
<td>0.0003</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Language</td>
<td>0.02</td>
<td>0.0041</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GPA One</td>
<td>0.01</td>
<td>0.0080</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reading Two</td>
<td>0.08</td>
<td>0.0001</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Math</td>
<td>0.03</td>
<td>0.0006</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Language</td>
<td>0.03</td>
<td>0.0001</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GPA Two</td>
<td>0.02</td>
<td>0.0012</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Hypothesis 4 states that there is no significant difference in achievement test performance of Upward Bound Program students as a function of ethnicity, gender, and grade level.

The results of a one-way ANOVA for ethnicity, gender, and grade level differences in achievement test performance in reading, math, and language revealed that there were some significant differences in achievement test performance. There were two significant differences in achievement test performance in year one, and two significant differences in year two.

An overall ANOVA and Scheffe test for pairwise group differences were performed for all six achievement tests by ethnicity, gender, and grade level for two years. In year one there was a difference at the .05 level of significance in
achievement test performance between minority groups (P-value=0.0001, R-square=0.08) and among students in different grade levels (P-value=0.0001, R-square=0.07). In year two, there was a difference at the .05 level of significance in achievement test performance between minority groups and non-minority groups (P-value=.0001, R-square=0.08 and among students in different grade levels (P-value=0.0001, R-square=0.08). White students performed at a significantly higher grade equivalent in reading and language on their achievement tests in year one than did students in other ethnic groups. International students performed at a significantly higher grade equivalent in math than did other students. White students had a mean grade equivalent of 11 years two months (n=295) and 11 years (n=294) on each of the composite reading, language, and math skills. International students had a mean grade equivalent of 12 months (n=27) on the math composite skill. In year one and two there was a significant difference at the .05 level of significance in achievement test performance between minority groups and non-minority groups (P-value=0.0001, R-square=0.06) and among students in different grade levels (P-value=0.0001, R-square=0.14). Students in grade nine had a mean grade equivalent of 11 years seven months (n=219) on the reading, math, and language composite skills. Students in grade 11 had a mean grade equivalent of 14 years (n=45) in reading composite skills; students in grade 11 had a mean grade equivalent of 11 years 7 months in math composite skills; students in grade 11 had a mean grade equivalent of 14 years in language composite skills. Hypothesis 4 is therefore rejected.

The results of this analysis are presented in Table 4.

Hypothesis 5 states that there is no significant difference in academic performance of Upward Bound program students as characterized by grade-point average and grade level.

The results of a one-way ANOVA for differences in academic performance revealed that the students in grade 11 had
Table 4. Summary of R-square and P-values for test performance by ethnicity, gender and grade level

<table>
<thead>
<tr>
<th>Subject</th>
<th>R-square</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year One</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ethnicity</td>
<td>0.08</td>
<td>0.0001</td>
</tr>
<tr>
<td>Grade Level</td>
<td>0.07</td>
<td>0.0001</td>
</tr>
<tr>
<td>Gender</td>
<td>0.06</td>
<td>0.0001</td>
</tr>
<tr>
<td>Year Two</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ethnicity</td>
<td>0.08</td>
<td>0.0001</td>
</tr>
<tr>
<td>Grade Level</td>
<td>0.08</td>
<td>0.0001</td>
</tr>
<tr>
<td>Gender</td>
<td>0.14</td>
<td>0.0001</td>
</tr>
</tbody>
</table>

significantly higher mean grade point averages in their courses in year one than did eighth-grade students.

Students in grade 10 had significantly higher grade point averages in their high school courses in year two than did students in the other grades. The students in grade 11 had a mean grade point average of 2.90 (n=215). Students in grade 10 had a mean grade point average of 2.83 (n=125) in year two.

Table 5 reveals a P-value of 0.0096 and R-square score of 0.03 for year one GPA and a P-value of 0.0303 and R-square of 0.03 for year two GPA. The P-values show that there are statistically significant differences among grade levels on academic performance, but the amount of variation accounted for at maximum is not much over three percent. Hypothesis 5 is, therefore, rejected. The results of the analysis are presented in Table 5.

Hypothesis 6 states that there is no significant difference in academic performance of Upward Bound program students as a function of economic status or parents' educational background.
The results of the one-way ANOVA for academic performance in high school courses of students who are from various economic and family educational backgrounds revealed that there is no significant difference in academic performance as characterized by students' program eligibility (criteria used to select students for program participation). Since the calculated P-values for each dependent variable (GPA year one and GPA year two) were each greater than the .05 level of significance, the null hypothesis that there is no significant difference between means of the students' eligibility background is accepted. This means that the academic performance in high school courses of first-generation potential college students is no different than low income or first generation/low-income students. Hypothesis 6, then, cannot be rejected. The results of this analysis are presented in Table 6.

Hypothesis 7 states that there is no significant difference in academic performance of Upward Bound program students as a function of ethnicity and gender. Relevant test results are reported in Table 7.

The results of the one-way ANOVA for ethnicity and gender differences in academic performance in high school courses revealed that there were some significant differences in academic performance by race. There was one significant

Table 5. Summary of effect of grade level on grade point average (R-squares and P-values for academic performance across grade levels)

<table>
<thead>
<tr>
<th>Grade-Point Average</th>
<th>R-square</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade-Point Average 1</td>
<td>0.03</td>
<td>0.0096</td>
</tr>
<tr>
<td>Grade-Point Average 2</td>
<td>0.03</td>
<td>0.0303</td>
</tr>
</tbody>
</table>
Table 6. Summary of R-square and P-values for academic performance by eligibility (first-generation, low income, both)

<table>
<thead>
<tr>
<th>Grade-Point Average Year 1</th>
<th>R-square</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.003</td>
<td>0.4238</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Grade-Point Average Year 2</th>
<th>R-square</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.008</td>
<td>0.3126</td>
<td></td>
</tr>
</tbody>
</table>

difference in academic performance in year one, and one significant difference in year two by race. There were no significant differences in academic performance in year one, and no significant differences in year two by gender.

An overall ANOVA and Scheffe test for pairwise group differences were performed for grade point averages for each of the two years. In year one there was a difference at the .05 level of significance in GPA between Asian-American students and students of other ethnic backgrounds (P-value=0.0001, R-square=0.08). The mean score for Asian-American students is 2.90 (N=44); the mean score for white students is 2.69 (N=305). The mean score for Hispanic students is 2.28 (N=60). The mean score for African-American students is 2.19 (N=73). In year two, there was a difference at the .05 level of significance in GPA between Asian-American students and students of other ethnic backgrounds (P-value=0.0001, R-square=0.09). The mean score for Asian Americans is 2.90 (N=33); the mean score for white students is 2.43 (N=205); the mean score for Hispanic students is 2.31 (N=15); the mean score for African American students is 2.17 (N=88). Hypothesis 7, therefore, is rejected as regards the effect of ethnicity.
An overall ANOVA and Scheffe test for pairwise group differences were performed for academic performance gender for two years. In year one there was no difference at the .05 level of significance in academic performance between female students (P-value=0.0648, R-square=0.007) and among male students (P-value=0.2511, R-square=0.004).

The results of a one-way ANOVA for academic performance in high school courses by gender revealed that there is no significant difference in academic performance. Since the calculated P-values for each dependent variable (GPA 1 and GPA 2) were each greater than the .05 level of significance, the null hypothesis that there is no significant difference between means of the students' gender is accepted. This means that the academic performance in high school courses of females is no different than the male student.

Table 7. Summary of R-square and P-values for academic performance, ethnicity, and gender

<table>
<thead>
<tr>
<th>Race</th>
<th>R-square</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caucasian</td>
<td>0.08</td>
<td>0.0001</td>
</tr>
<tr>
<td>Hispanic</td>
<td>0.09</td>
<td>0.0001</td>
</tr>
<tr>
<td>African American</td>
<td>0.007</td>
<td>0.0001</td>
</tr>
</tbody>
</table>

Hypothesis 8 states that there is no significant difference in student academic achievement due to learning style preference, as characterized by scores on achievement tests and grade-point average.
The results of the Pearson correlation coefficients show a moderately weak negative correlation of learning style preference and academic performance with student test performance. To determine further the relationship of the academic performance (GPA) scores and learning style preference scores with achievement test grade equivalents, the skills related to information processing were grouped in terms of cognitive skills (analytic, spatial, discrimination, categorization, sequential processing, simultaneous processing, memory, and verbal-spatial). These various skills are consistent with the composite skills for reading, math, and language in each achievement test.

A Pearson correlation coefficient was completed between the Learning Style Profile, grade-point averages, and each of the achievement test scores (reading, math, and language) for two years. There was a statistically significant correlation between each of the three learning style preferences and achievement test performance score in year one. In year one there was one statistically significant correlation at the .05 level of significance between analytic skills (important in math and science) and reading (P-value=.58); and between analytic skills and math (P-value = .47). There was a significant correlation between spatial skills (important in some aspects of math) and all three of the achievement test scores (P-value= .48, .56, and .51, respectively. There was also a significant correlation between auditory perceptual responses (bias for learning from auditory stimuli) and math (P-value = -.45). Similarly, there was a significant correlation between emotive perceptual responses (feelings, emotional tone of experience) and reading (P-value=.40). There to was one significant correlation, although strongly negative, between academic performance and learning style preference. Specifically, manipulative instructional preferences (learner likes "hands-on"
learning activities) correlated highly with academic performance (P-value= .41).

There was a statistically significant correlation between four of the eight learning style preferences and academic performances and each achievement test performance score in year two. In year two there was a statistically significant correlation at the .05 level of significance between analytic skills, GPA, and language (P-value=.41 and .39 respectively). There was a significant correlation between spatial skills and GPA (P-value=.43); and significant correlation between visual perceptual responses (learning from visual stimuli) and GPA (P-value=.43). Also, auditory perceptual response correlated highly with GPA and language (P-value=.52 and .37 respectively). The null hypothesis that academic performance and learning style preference scores will not be significantly correlated is not supported. Hypothesis 8 is, therefore, rejected. However, given the small amount of variance accounted for by learning style preference, the practical significance of this result is minimal. The results of this analysis are presented in Table 8.

Hypothesis 9 states that there is no significant relationship between achievement test performance across eight Upward Bound programs, using six different achievement tests, and a combination of independent variables.

The results of the analysis of covariance for school, eligibility, geographical setting, region, ethnicity, gender, and grade-level differences in achievement test performance in reading, math, and language revealed that there were some significant differences in achievement test performance. There were three significant differences in achievement test performance in year one, and three significant differences in year two.
Table 8. Significant Pearson correlation coefficients for test performance, academic performance and learning style preference

<table>
<thead>
<tr>
<th></th>
<th>GPA</th>
<th>LANGUAGE</th>
<th>READING</th>
<th>MATH</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Year 1</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ANALY1</td>
<td>.58</td>
<td>.47</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SPAT1</td>
<td>.48</td>
<td>.56</td>
<td>.51</td>
<td></td>
</tr>
<tr>
<td>AUD1</td>
<td></td>
<td>-.45</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EMOT1</td>
<td>.40</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MANIP1</td>
<td>-.41</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Year 2</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ANALY2</td>
<td>.41</td>
<td>.39</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SPAT2</td>
<td>.43</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VIS2</td>
<td>.43</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AUD2</td>
<td>-.52</td>
<td>-.37</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

An overall ANOVA and Scheffe tests for pairwise group differences were performed for all six achievement tests by school, eligibility, geographical setting, region, ethnicity, gender and grade level for each of two years. In year one there was a difference at the .05 level of significance in achievement test performance between schools (P-value=0.0001, R-square=0.31) and among students in different grade levels and ethnic groups (P-value=0.0001, R-square=0.31). In year two, there was a difference at the .05 level of significance in achievement test performance between schools (P-value=.0001, R-square=0.02) and among students in different grade levels and ethnic groups (P-value=0.0001, R-square = 0.28). White students performed at a significantly higher grade equivalent in reading and language on their achievement tests in year one than did students in other
ethnic groups. Hispanic students performed at a significantly higher grade equivalent in reading and language on their achievement tests in year two than did students in other ethnic groups. International students performed at a significantly higher grade equivalent in math on their achievement tests in year one and year two, respectively, than did other students. White students had a mean grade equivalent of 11 years two months (N=295) and 11 years (N=294) on the composite reading and language skills, respectively. Hispanic students had a mean grade equivalent of 13 years, 1 month (N=46) and 13 years, 4 months (N=46) on reading and language skills, respectively. International students had a mean grade equivalent of 12 years (N=27) on the math composite skill. In year one and two there was a significant difference at the .05 level of significance in achievement test performance between schools (P-value=0.0001, R-square=0.27) and among students in different grade and ethnic groups levels (P-value=0.0046, R-square=0.24). Students in grade nine had a composite mean grade equivalent of 11 years, seven months (N=219) on the reading, math, and language composite skills for grade level differences in year one. School number three's eleventh grade had significantly higher scores in reading, language, and math than did students on other grade levels at other schools. Hypothesis 9 is therefore rejected. The results of this analysis are presented in Table 9.

Hypothesis 10 states that there is no significant difference in academic performance and Upward Bound programs with large numbers of ethnic minorities and those that have smaller numbers.

The results of the Analysis of Covariance for ethnic differences in achievement test performance in reading, math, and language, and for academic performance in high school courses revealed that there were some significant differences in both achievement test performance and academic performance.
There were three significant differences in achievement test performance in year one, and three significant differences in year two. There was one significant difference in academic performance in year one, and one significant difference in year two.

An overall ANOVA and Scheffe tests for pairwise group differences were performed for all six achievement tests and Table 9. Summary of R-square and P-values for test performance by school, geographical setting, region, ethnicity, gender, and grade level

<table>
<thead>
<tr>
<th>Subject</th>
<th>R-square</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year One</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reading</td>
<td>0.31</td>
<td>0.0001</td>
</tr>
<tr>
<td>Math</td>
<td>0.31</td>
<td>0.0001</td>
</tr>
<tr>
<td>Language</td>
<td>0.17</td>
<td>0.0001</td>
</tr>
<tr>
<td>Year Two</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reading</td>
<td>0.28</td>
<td>0.0001</td>
</tr>
<tr>
<td>Math</td>
<td>0.27</td>
<td>0.0001</td>
</tr>
<tr>
<td>Language</td>
<td>0.24</td>
<td>0.0046</td>
</tr>
</tbody>
</table>

grade point averages for each of two years. In year one there was a difference at the .05 level of significance in GPA between ethnic minority group one (P-value=0.0104, R-square=0.02 and ethnic minority group two (P-value=0.0012, R-square=0.02. The mean score for group one is 2.62; the mean score for group two is 2.40. In year two, there was a difference at the .05 level of significance in GPA between group one (P-value=0.0135, R-square=0.02) and group two (P-value= 0.0408, R-square=0.01). The mean score for group one is 2.70; the mean score for group two is 2.43.
The results of a one-way ANOVA revealed that students in ethnic minority group one (African-Americans) had higher mean grade point averages than did students in ethnic minority group two (International students) in both years. An overall ANOVA and Scheffe's test for pairwise group differences were performed for all six tests by ethnicity for each of two years. In year one there was a difference at the .05 level of significance in achievement test performance between group one (P-value=0.0001, R-square=0.07) and group two (P-value=0.4088, R-square=0.003). Students in group one performed at a significantly higher grade equivalent in reading on their achievement tests than did students in group two. Students in group one had a mean grade equivalent of 10 years, 9 months (N=363) on the composite reading test. Students in group one had a mean grade equivalent of 11 years, 7 months (N=361) on the composite math skills test. Students in group two had a mean grade equivalent of 10 years, 7 months (N=364) on the composite language skills test. In year two, there was a significant difference at the .05 level of significance in achievement test performance between group one (P-value=0.1191, R-square=0.01) and group two (P-value=0.0001, R-square=0.08). Students in group two had a mean grade equivalent of 13 years (N=87) on the language composite skills test. Students in group one had a mean grade equivalent of 11 years, 5 months (N=143) in reading composite skills and a mean grade equivalent of 11 years, 6 months (N=332) in math composite skills. Hypothesis 10 is, therefore, rejected.

Additional information on the general characteristics of the subjects and further description of the data sample can be found in appendix A. The table summaries give an overview to help explain in context the difference across variables.
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CHAPTER 5. SUMMARY, DISCUSSION, CONCLUSIONS, IMPLICATIONS AND RECOMMENDATIONS

This chapter summarizes and concludes the study. It concludes with recommendations for future research in this area of study. Practical implications based on the results and conclusions are identified, and suggestions for further research are put forward. The chapter is organized into five sections. The first part provides a synoptic review of the purposes and procedures of the study while the second part summarizes the major findings of the study. The third section further discusses the results of hypotheses. In the fourth section, conclusions are drawn from the findings. The final section offers some recommendations for further research.

Summary of the Study

The purpose of this study was to identify, describe, and compare achievement test scores and cumulative grade-point averages of disadvantaged high school students across selected demographic variables (ethnicity, economic background, and parents' educational background), and to investigate the relationship of the demographic variables to grade-point average and achievement test scores. The study basically examined the extent to which achievement tests predicted academic success and determined whether particular learning style preferences increase achievement test scores and cumulative grade-point averages. In addition, the study examined whether learning style preference is associated with increased student academic achievement and with more favorable attitudes towards learning and performing as a function of aptitude. The study was guided by three main research questions and conjectures (see Chapter 1) about the relatedness of these variables.
Three main research questions were presented in Chapter 1, and restated in Chapter 3 were used to address the research questions.

In general, it was conjectured that demographic variables influence an individual's academic performance and achievement test performance which in turn influence his/her level of preparedness for postsecondary education opportunities.

Data pertinent to the focus of the research were collected from high school students who participated in the Upward Bound Program at Iowa State University and seven other universities and colleges in the midwest, south, and southwest in Arkansas, Illinois, Iowa, Minnesota, and Texas. Sixty-five percent of the students were females and 35% were males. Most (78%) of the students were both first-generation and low income students and the remainder were either first generation (14%) or low-income students (8%) only. Forty-nine percent of the students were members of minority ethnic groups, and fifty-one percent were white.

The population of this study consisted of all Upward Bound students who participated in a program for a minimum of two consecutive years between 1987-88 through 1991-92. The eight Upward Bound programs had a total enrollment of approximately 804 students. About 98% of all the Upward Bound students in Iowa in our sample were white and 33% of the minority students in the sample were from urban areas. Most students had graduated from schools with enrollments of fewer than 300 students.

The sampling plan was based on the statistical fact that a cluster sample requires a sample size of more than 420 students in order to assess the findings of our hypothesis tests with a sampling error range of + and - 5%. A cluster sampling strategy was used to sample individual programs and not individual students. The sampling strategy sampled a cluster of students
within individual programs and was not a simple random sample of students.

The eight schools were selected for accessibility of data, availability, ease of access, and familiarity. Some schools were selected for comparability; i.e., the urban schools. The study used various standardized achievement tests and the Learning Style Profile (LSP) presented in Chapter 3. The achievement tests instruments provided information about the students' abilities to apply knowledge learned in school to test content designed to measure analytic, numerical, and verbal abilities. The LSP developed by NASSP was used to examine student information-processing skills and motivational preferences, as well as, learned characteristics that achievement and competency tests do not measure.

This study was conducted because disadvantaged students, particularly low-income students, have long been underserved by the education system. Various reports, using family poverty indicators such as low income, lower achievement, and limited educational background, show that disadvantaged youth have lower academic achievement and lower achievement and standardized test scores than do their advantaged classmates across town (National Center for Educational Statistics, 1988).

While research in the general area of academic achievement and achievement test performance has been extensive, research on the achievement of disadvantaged students - particularly Upward Bound program students - revealed fewer such studies. Studies on the longitudinal effects of pre-collegiate programs are even fewer. Likewise, studies on learning styles of disadvantaged students, particularly low-income and first-generation students, who participate in pre-collegiate programs are non-existent.

Although academic achievement and learning style competencies required for success and effectiveness in the classroom environment have been explored by many scholars (Dunn and Griggs, 1988; Dunn, 1981; Griggs, 1981; and Claxton and
Murrell, 1987), no study has investigated directly the learning style of educationally and economically disadvantaged high school students with little propensity for high test scores and high academic achievement in their coursework.

The impetus for this study was generated from the lack of research on the impact of Upward Bound programs, as revealed in the review of literature. Similarly, there is a fundamental need to assess the impact of Upward Bound, to determine the degree to which the participants are benefiting from program services. The need for such evaluation is further supported by Mitchem (1986), who emphasized the evaluation of such discretionary programs as a means of addressing accountability.

The review of literature revealed a lack of research for studying dynamic models of achievement and learning for educationally and economically disadvantaged students' learning. Studies related to student achievement have applied traditional descriptive models of achievement and learning with this "disadvantaged" population whose past experiences, educational, environmental, and socioeconomic situations are different from their peers. In particular, the studies were lacking in an explanation and understanding of students from disadvantaged backgrounds. Linking the educationally and economically disadvantaged students with pre-collegiate programs can provide these students with pre-college programs that will enhance academic performance and achievement.

The results of this investigation do not entirely support the ten specific hypotheses tested for the eight Upward Bound programs. The major findings related to the three basic research hypotheses of the study supported few of the null hypotheses that were tested, as described below.

The basic objectives of this study were to determine whether students' background characteristics and institutional variables contributed significantly to their high school grade-point averages; whether standardized tests predict success in
high school courses; whether high school grade-point averages predict success on achievement tests; and to demonstrate what relationship, if any, demographic variables have with success as measured by academic achievement and achievement test performance.

A summary of the findings revealed the following:

1. There are statistically significant differences among schools on achievement test performance, but the amount of variation accounted for at maximum was not much over 20 percent.

2. There is no significant difference in achievement test performance as characterized by students' program eligibility (criteria used to select students for program participation).

3. There are geographic differences in achievement test performance and for academic performance in high school courses.

4. There were some significant differences in achievement test performance by ethnicity, gender, and grade level.

5. There are statistically significant differences among grade levels on academic performance, but the amount of variation accounted for at maximum was slightly over 3 percent.

6. There is no significant difference in academic performance attributable to students' program eligibility (criteria used to select students for program participation).

7. There was a significant difference in academic performance by race; but, there was no significant difference by gender.
8. There was a statistically significant correlation between each of the three learning style preference mean scores and achievement test performance.

9. There were some significant differences in achievement test performance for school, eligibility, geographical setting, region, ethnicity, gender, and grade level.

10. There were some significant differences among ethnic minority groups in both achievement test performance and academic performance.

Discussion of Findings

Hypothesis 1
The hypothesis that there is no significant difference in achievement test performance of Upward Bound program students across schools was not supported. This is consistent with earlier findings (Antes, 1989). The hypothesis was advanced under the premise that achievement test performance for the educationally and economically disadvantaged groups across schools would be similar due to their homogeneity since all Upward Bound programs select students with similar demographic characteristics and poor academic preparation.

Students at school number eight, a private four-year institution located in the southwest, performed at a significantly higher grade equivalent in math and language on the TAP than did students on their tests at the other seven schools. Students at school number eight had higher mean grade equivalents on the math and language composite skills than at the other two private four-year schools. Student at school number two, a private four-year institution located in the midwest, performed at a significantly higher grade equivalent in reading on the SRA (ACH) than did students at the other seven
schools. The only mean differences found to be highly significant were those on math and language for school number eight compared to other schools, and between school two and the other seven schools on reading. The findings, however, revealed the reverse of that which was projected. Students' achievement test performance across schools were different.

Given the nature of achievement testing, it seems reasonable to expect students' test performance to vary. It raises the question, however, of why such homogeneous groups differ. Their performance may vary due to differences in test administration procedures, test conditions, cognitive assets, and learning strategies. Similarly, the students' test performance is affected by an individual's behavioral, social, affective, and physiological factors (Bandura, 1969). If this is true, Upward Bound program students will benefit from understanding their cognitive assets and learning strategies. Upward Bound programs will, likewise, benefit from identifying a model of learning and achieving which provides an important vehicle for students to learn good study habits and skills and to demonstrate success on achievement tests.

A similar question is, why do students from particular schools perform quite differently on the tests than do students from other schools? First, there is the difficulty of getting accurate scores due to how tests are scored, differences in how scores are interpreted, and the difficulty of gaining useful information due to how standardized tests are constructed. Second, there are the special problems of general achievement tests' insensitivity to curriculum in specific subject areas. In spite of the tests limitations, it would appear that test scores across school would not differ much since Upward Bound programs assist only those students whose past educational experiences and socioeconomic situations are similar.
Hypothesis 2

It was hypothesized that there is no significant difference in achievement test performance of Upward Bound program students as a function of economic status and parents' educational background. This is consistent with Gordon's (1964) study. Gordon stated that students who had the same past educational experiences (first-generation students) and/or had the same socioeconomic status, indicated a similar need for programs of remediation. The hypothesis was advanced under the premise that achievement test performance for the educationally and/or economically disadvantaged students would be similar as a function of economic status, parents' educational, background or both. The findings support the notion that we do not know the extent to which parents' educational and economic differences influence learning and achievement of Upward Bound students.

The literature on the low-income and first-generation college bound disadvantaged student is not extensive and, furthermore, isn't unanimous in its assessment of the critical factors affecting learning and achievement of disadvantaged students. The relevant literature concerning the impact of these eligibility variables is practically non-existent. Essentially, there appears to be no difference in the achievement test performance of Upward Bound students who are from homes where parents have no bachelor's degrees or who are of low socioeconomic status.

Hypothesis 3

The hypothesis that there is no significant difference in achievement test performance and academic performance due to geographical settings of the various Upward Bound programs was not supported. This is consistent with findings by Coleman et al. (1966). The hypothesis was advanced under the premise that achievement test performance and academic performance are a
function of the level of urbanization or the region where the
Upward Bound students reside.

Students in rural settings (schools number 2 through 6) had
significantly higher grade-point averages than did students in
urban schools (schools number 1, 7, and 8). Likewise, students
in the midwest (school number 3) had significantly higher GPAs
than did students in the south (school number 1) or southwest
(school number 8). The mean score for rural midwest programs
was higher than that for students in urban midwest, urban
southwest (school number 1), and rural south settings. Students
in the rural midwest performed at a significantly higher grade
equivalent in math than did students in urban programs and than
students in the south and southwest regions. Students in urban
programs had a significantly higher mean grade equivalent in
language than did students in rural programs. Students in the
urban southwest programs had a higher grade equivalent in math
than did students in other programs.

These findings revealed the performance pattern that had
been projected in the hypothesis. Students' performance does
vary according to specific instructional objectives and factors
which influence test performance. Grade level comparisons can
make standardized test scores quite meaningful, for grade
equivalents do not remain constant. Grade-equivalent scores can
show student performance to be several grades above or several
grades below the grade for which the test is designed (Jurs and
Williams, 1985). These student grade equivalent ratings show,
on the other hand that students' academic performance and
achievement test performance do vary as a function of the
geographic settings of schools. An individual's test
performance and academic performance generally are expected to
be circumscribed by sociocultural and environmental factors.
Hypothesis 4

The hypothesis that there are no differences in achievement test performance by ethnicity, gender, and grade level was not entirely supported. This is not consistent with findings by Bradley et al. (1987), who found marked sex differences in a pattern of correlations between the SRA and classroom achievement. Bradley's results are not, however, consistent with this study's finding. The hypothesis was advanced that achievement test performance is not influenced by variables such as gender, race, and grade level. The premise is that male and female students do not come to Upward Bound equally prepared for high school work, and thus perform differently on achievement test by gender. Analysis of the present data found no significant differences in performance on achievement tests by gender, thus supporting the hypothesis.

On the other hand, the findings did not reveal generally what was projected in the hypothesis regarding the effects of race and grade level. Students' achievement performance varies according to race and grade levels. Achievement test performance as measured by reading, math, and language skill scores, increased over the first two years of program participation. Students regardless of race who participated in Upward Bound as freshmen increased their probability of being successful in their achievement tests by their sophomore and junior year. Essentially, white students showed a significantly higher performance on language and reading than other ethnic groups, and international students showed a significantly higher performance in math. Students performed at a mean grade equivalent of 1.0 to 2.7 grade levels above their current grade while in grade 9 and 11. The eleventh-grade students had a higher mean grade equivalent than all other grade levels across all three tests. Such academic performance magnifies the meaningfulness of achievement tests scores and the usefulness of grade equivalents when evaluating instructional objectives.
Hypothesis 5

The hypothesis that there are no differences in academic performance as measured by GPA and grade level was not supported. This is consistent with findings by Bradley et.al. (1987), Jackson (1976) and Coleman et al. (1966), whose studies showed differences in GPAs by grade level. Jackson (1976) showed that low-income underachievers who were pre-college program participants had higher mean GPAs than did students in other grade levels, particularly, low-income, low-achieving, non-pre-college program freshmen. The hypothesis was advanced under the premise that GPAs are a function of students' grade levels.

It is the researcher's notion that all three basic skill subject areas would be more problematic for freshmen and sophomores than for juniors and seniors, since they basically enter the programs less ready academically for college-preparatory programs. Upward Bound freshmen enter the programs by design with low to moderate academic deficiencies, less maturity, lower motivation and poorer study skills, habits, and attitudes than do their higher-class peers. Given the nature of the reading, math, and language skills required for college-preparatory programs it, seems reasonable to expect the subjects to be more problematic and thus more difficult for freshmen. On the other hand, it is pure conjecture that, as students mature, they are more likely to have developed skills and maturity that allow them to adapt to the learning environment. Coleman (1965) found that 12th-grade students who lacked basic skills and/or had not mastered the basic courses were 2.0 to 4.1 grade levels behind 12th-grade students who had developed and sharpened their basic skills.

Students with dominant learning styles, regardless of grade level, are likely to encounter educational situations which are congruent with their specific learning skills.
The findings did not reveal the performance that was projected in the hypothesis. Students' performance did vary by grade level. There were statistically significant differences among grade levels on academic performance. Students increased the probability of being successful in their coursework as juniors, as their learning experiences have broadened, academic skills have crystalized, and dominant learning styles have conceptualized within four specific learning modes.

Hypothesis 6
The hypothesis that there is no significant difference in academic performance of Upward Bound program students as a function of program eligibility is supported. This finding is not consistent with any other study examining students' program eligibility. Likewise, there is no other study that is consistent with this finding. The literature on the effects of family environments, parental educational background, life situations and learning experiences on disadvantaged Upward Bound students' educational performance is practically non-existent or inconclusive.

The researcher assumes that students with parents who have college degrees would be exposed to a more stable home life, and to a variety of life situations and learning experiences that provide skills to draw upon and thus to adapt to the potential barriers in their educational pursuits. Likewise, the researcher believes that students from homes where family income exceeds income-eligibility guidelines, but, with parents who do not have college degrees, perhaps would have access to a variety of educational resources which might enhance their educational opportunities. However, if such parents have not experienced the opportunity of earning a college degree, it would be very difficult to inspire their children to seek a college degree or to have the aspiration to attain a degree.
As reported earlier, there is no significant difference in academic performance as characterized by students' program eligibility (criteria used to select students for program participation). The findings of this study support the hypothesis that the Upward Bound students' parents educational and economic background do not influence GPAs or contribute more to one group's academic performance than another.

**Hypothesis 7**

The hypothesis that there is no significant difference in academic performance of Upward Bound program students as a function of race and gender is partly supported. The finding is consistent with a study by Bradley et al. (1976) but not with Coleman et al., (1966). Bradley (1976) examined school behavior and achievement of black elementary school children in Arkansas and found different patterns for males and females. Coleman et al. (1966) found that 12th-grade blacks, Mexican-Americans, Puerto Ricans, and Native Americans scored 2.0 to 4.1 levels below whites in reading, and from 3.0 to 5.7 grade levels behind white students in math.

This hypothesis was advanced under the notion that academic performance is not influenced by gender, but may be influenced by race. The premise here is that males and females perform similarly in academic course work and come to Upward Bound equally prepared (and in this study equally underprepared), whereas students differ by race in academic performance. In this study males performed no differently than females in their course work. However, academic performance, as measured by GPA, varied in this study by ethnic group. There was a wide range of academic abilities both within and between minority and non-minority groups even within this homogeneous Upward Bound group. Various minority groups demonstrated higher mean scores across tests and across years.
Hypothesis 8

The hypothesis that there is no significant difference in academic achievement by learning style preference is not supported. There are no conclusive or definitive studies examining how learning style preferences of Upward Bound students differ and impact upon academic achievement. The literature in the area of disadvantaged students is practically non-existent; however, Dunn and Griggs (1988) and Dunn (1988) have identified learning styles that contribute to success in the classroom that can be useful for examining Upward Bound students' learning styles. The hypothesis was advanced by the notion that there would be a relationship between student learning style and academic performance and achievement test performance. The finding supports the hypothesis.

There was a statistically significant, although weak, correlation between learning style and academic performance for all ISU students. There also was a positive correlation between learning style and achievement test performance. Students showed the higher-order factors of analytic and spatial skills in relationship to the math mean score, which is consistent with the learning style cognitive skill subscales. Similarly, analytic and spatial skills and memory skills were consistent with the math and reading and language composite skills scores, respectively.

The study indicates that these learning style cognitive skills may influence directly an individual's level of information processing, academic readiness, and achievement test readiness. Results from this study have provided information about the multiple indications of achievement among Upward Bound students. There was a high correlation between students' score in memory skills and achievement test performance. Also, students high in analytical skills tend to have high academic performance mean scores.
Hypothesis 9

The hypothesis that there is no significant difference in achievement test performance across eight Upward Bound programs, using six different achievement tests and a combination of independent variables, is not supported. This is consistent with earlier findings by Antes (1989). The hypothesis was advanced under the premise that achievement test performance for the educationally and economically disadvantaged groups across schools would be similar due to their homogeneity; as a function of economic status, parents' educational background, or both; and as a function of the geographical setting or region in which the Upward Bound students reside.

The results revealed that there were three significant differences in achievement test performance. There were significant differences in achievement test performance for school, student grade level, and ethnic minority groups. The premise is that test scores across school would not differ much, since Upward Bound programs assist only those students whose past educational experiences and socioeconomic situations are similar. Another premise is that students' achievement would not vary according to grade level and by ethnic groups.

The findings did not reveal generally what was projected in the hypothesis. Students' achievement test performance across schools showed a difference in the level of success shown on achievement tests. Their performance may vary due to differences in test administration procedures, test conditions, cognitive skills, and learning styles. Also, students' test performance is attributed to differences in cognitive or information processing elements (analytic, verbal, spatial, etc.), perceptual responses (visual, auditory, emotive), etc.

Students' achievement test performance, varied according to race and grade level. Achievement test performance as measured by reading, math, and language skill scores, tended to vary by ethnic groups and increased by grade level over the first two
years of program participation. Students, regardless of ethnic background, increased their probability of being successful. Non-minority students showed a significant difference in reading and language, areas which require using the various cognitive and information processing elements such as sequential processing, discrimination, etc. International students showed a significant difference in math, an area which students are high in analytic skills. Ninth-and 11th-grade students also performed at a grade level higher than their current grade and higher than their 10th and 12th grade peers.

**Hypothesis 10**

The hypothesis that there is no significant difference in achievement test performance between Upward Bound programs with larger and smaller proportions of minority students was not supported. This is consistent with earlier findings by Coleman et al. (1966). The hypothesis is advanced by the notion that academic performance and achievement test performance are not influenced by race. The premise here is that students do not differ in academic performance and achievement test performance by race. The notion is that minority and non-minority students enroll in Upward Bound programs equally prepared academically and with the same cognitive skills.

The findings did not reveal generally what was projected in the hypothesis. There was a wide range of academic abilities among the minority groups. Various minority groups demonstrated higher mean scores than others did in their course work and achievement tests. Hispanic students performed at a significantly higher grade equivalent in reading and language on their achievement tests than did other minority students in year two. African-American students performed at a significantly higher grade equivalent in reading and language on their achievement tests than did other minority students in year one. Native American and Pacific Islanders had significantly higher
grade equivalents in math than did other minority students in year one and year two, respectively.

Again, ten research hypotheses related to the three major conjectures of the study were evaluated. This section has discussed the findings related to each of the hypotheses.

The results of the study indicated that academic preparation and grade level directly influence performance on achievement tests. Also, preference for learning styles and levels of education directly influence an individual's level of preparation for successful academic achievement. Although considerable variability on academic achievement and achievement test performance was found within all economic backgrounds and cultural groups, there was a slight tendency for the subjects to show greater disparity in academic performance than in achievement. Similarly, academic achievement in high school courses predicted success for high-achieving Upward Bound students enrolling in post-secondary institutions. In conclusion, this investigation demonstrated a relationship between demographic variables and success as measured by academic and achievement test performance.

This study provided an exploratory assessment of several Upward Bound programs and their long- and short-term effect on the academic performance and on the achievement test performance of economically and educationally disadvantaged students. Students' academic performance gave an indication of the academic ability and learning style - cognitive skills required for success on achievement tests and in academic coursework. Grade-point averages and test scores aided in determining academic performance ability, and learning style. These findings give some validity to the existence of Upward Bound programs. However, the findings were weakened because no comparison group existed.

The most important conclusion that was drawn from these data is that children from different educational and economic
backgrounds have unique basic skill needs, and therefore benefit from pre-collegiate programs. The study demonstrated that Upward Bound provides the resources and support services which prepare students for successful achievement and performance, and, thus, that the students who participate in them perform better academically over time than those who do not participate.

**Implications**

These findings give validity to the effectiveness of Upward Bound; however, there need to be some changes in the student assessment and evaluation components. The programs need to redesign their instructional components to be consistent with the assessment or testing component, and thus improve the students' academic performance and achievement test performance.

Additional studies would contribute more knowledge towards effective implementation and evaluation of Upward Bound programs designed to improve the academic performance of disadvantaged students. Studies in this area are needed because of the continual changes with non-traditional and disadvantaged students in higher education and the increasing demands of society for the successful achievement of college degrees by non-traditional students, especially minorities. Upward Bound programs targeted for ethnic minorities and women in Upward Bound Math and Science Centers is one area of interest, but further longitudinal research would provide a summary of how and to what extent disadvantaged students are impacted by participating in Upward Bound programs.

Using high school GPAs and achievement test scores as measures of success, Upward Bound appears to make a difference in the lives of disadvantaged students. Upward Bound provides services which develop academic skills that economically and educationally disadvantaged students need in order to profit from higher education opportunities. Upward Bound strives to
raise students' motivation level and to improve their chances for success in college. Therefore, inadequate instructional and testing programs threaten equal opportunity for academic achievement and persistence of the low-income underachiever. Similarly, the findings regarding the achievement tests may be misleading since we used tests from different publishers and the tests used different norm groups.

Using a variety of tests with different achievement batteries for different grade levels may cause difficulty in measuring the apparent improvement over two years. Consequently, we need to interpret the results in light of the dual purpose of achievement testing to provide information about the individual as well as about aggregates of individuals. Also, achievement testing may take on the role of integrating instruction and assessment; thus, the results must be viewed in light of the cognitive processes involved. Likewise, the Learning Style Profile measures the cognitive processes that are involved in learning and achievement. The LSP revealed a wide range of academic abilities in spite of the homogeneous backgrounds of Upward Bound students. The implication is that the results are interpreted in terms of cognitive processes and how learning style is related to academic performance.

The TRIO programs need to improve their assessment plan of operation, redesign the plan to be consistent with the training background of their administrators, and thus, improve the students' academic performance and achievement test performance. TRIO programs need an internal training component with programs that enhance administrators' ability to systematically train professional, para-professional, and support staff. Such training components would enable staff to conduct comprehensive and effective staff training activities.

There is a need for TRIO directors or coordinators to have a training background, specific "training skills" development, or education in training and development. TRIO administrators
must be able to conduct scholarly and qualitative research and qualitative staff, student and program evaluations. A national meeting for TRIO administrators needs to be developed to train directors and coordinators to be trainers and to do development and training. TRIO administrators need to learn training techniques, and skills which enable them to become an invaluable resource for para-professionals and support staff. A training and development design for program assessment and evaluation will enhance Upward Bound programs' ability to more carefully assess their impact on student academic performance and achievement test performance via qualitative research.

TRIO administrators who lack assessment and evaluation skills have negatively affected Upward Bound programs. This has implications for training and preparation. TRIO administrators have a need for training at the state, regional, and national level that will increase their effectiveness. There is a tremendous need for administrators to measure the impact that Upward Bound has on students, and Upward Bound staff need sufficient preparation, training, and skill development in the training and development area. Academic performance and achievement test performance of Upward Bound students are very important areas and this study will make a significant contribution to the fund of knowledge.

**Recommendations**

In view of the findings of this study, several recommendations seem appropriate. They are:

1. Further studies should be conducted on the long-term effectiveness of Upward Bound programs on achievement test performance and academic performance of economically and educationally disadvantaged students. Research would indicate
whether the programs are making the impact they should on the disadvantaged student.

2. Additional studies should be conducted to compare Upward Bound programs designed for disadvantaged students with enrichment programs designed for the general student body, to identify whether any differences exist in terms of the effectiveness of academic performance and achievement test performance.

3. A study should be conducted to compare goals, objectives, and outcomes of instructional and assessment components of Upward Bound programs, to determine to what extent achievement testing matches instructional goals.

4. Further research is needed that will explore internal variables (e.g., motivation, attitude, self-esteem) and their impact on the academic performance and achievement test performance of disadvantaged students.

5. There should be an on-going national assessment and evaluation process that will enable the U.S. Department of Education to collect academic performance and achievement test performance scores of Upward Bound program students.

6. Further studies should be conducted to compare the academic performance and achievement test performance of Upward Bound students and "advantaged" students (high-achieving academically prepared students).

7. Studies should be conducted to compare the learning styles and preferences of Upward Bound students with "advantaged" students' learning styles and preferences.

8. Additional studies should be conducted to compare Upward Bound programs designed for disadvantaged students with pre-collegiate programs designed for talented and gifted students to identify whether any differences exist in their effectiveness for enhancing academic performance and achievement test performance.
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Thank you to my committee, Dr. Daniel C. Robinson, Dr. George Kizer, and Dr. Richard Warren, for their assistance and support.

Thank you to my immediate family for their patience, understanding, perseverance, sacrifices, and support over these several years. To my wife Marlena, who supported and encouraged me to seek the degree. Marlena, along with God, has provided the inner strength I needed to complete this study. Her listening, critiquing, typing, and editing of the study have been of immeasurable value through the study. Marlena has continued to demonstrate her love to our family and to me during the most critical of times. Thank you to my daughters, Aliya and Aminah, who showed understanding and patience during my absences and for their appreciation for the necessary steps to achieving such a high goal.

Finally, a special remembrance to the late Mr. Tilmer Beavers, who did not complete high school, but worked to insure that I got my bachelor's degree. To Mrs. Annie C. Beavers, my
mother, who provided our family with a Christian foundation that has enabled me to attain this degree. Last, but foremost, thank you God for this achievement in your honor.
APPENDIX A.

DEMOGRAPHIC DATA OF SUBJECTS
Table 11. Frequency of gender

<table>
<thead>
<tr>
<th>Sex</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>428</td>
<td>64.8</td>
</tr>
<tr>
<td>Male</td>
<td>232</td>
<td>35.2</td>
</tr>
</tbody>
</table>

Table 12. Frequency of eligibility

<table>
<thead>
<tr>
<th>Eligibility</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>First-generation</td>
<td>132</td>
<td>20.2</td>
</tr>
<tr>
<td>Low-income</td>
<td>49</td>
<td>7.5</td>
</tr>
</tbody>
</table>

Table 13. Mean scores by race

<table>
<thead>
<tr>
<th>Race</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>White</td>
<td>55.0</td>
<td>37.0</td>
<td>0</td>
<td>96.0</td>
</tr>
<tr>
<td>Non-white</td>
<td>45.0</td>
<td>37.0</td>
<td>4.3</td>
<td>100.0</td>
</tr>
</tbody>
</table>
Table 14. Frequency of minorities

<table>
<thead>
<tr>
<th>Race</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asian-American</td>
<td>152</td>
<td>30.0</td>
</tr>
<tr>
<td>African-American</td>
<td>144</td>
<td>25.0</td>
</tr>
<tr>
<td>Hispanic</td>
<td>168</td>
<td>34.0</td>
</tr>
<tr>
<td>Mexican</td>
<td>1</td>
<td>0.2</td>
</tr>
<tr>
<td>Mexican-American</td>
<td>3</td>
<td>0.3</td>
</tr>
<tr>
<td>Native-American</td>
<td>2</td>
<td>0.2</td>
</tr>
<tr>
<td>Pacific Islander</td>
<td>4</td>
<td>0.3</td>
</tr>
<tr>
<td>International</td>
<td>73</td>
<td>10.0</td>
</tr>
</tbody>
</table>

Table 15. Frequency by region

<table>
<thead>
<tr>
<th>Region</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>South</td>
<td>27</td>
<td>3.4</td>
</tr>
<tr>
<td>Southwest</td>
<td>130</td>
<td>16.2</td>
</tr>
<tr>
<td>Midwest</td>
<td>647</td>
<td>80.5</td>
</tr>
</tbody>
</table>

Table 16. Frequency by setting

<table>
<thead>
<tr>
<th>Location</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rural</td>
<td>543</td>
<td>67.5</td>
</tr>
<tr>
<td>Urban</td>
<td>261</td>
<td>32.5</td>
</tr>
</tbody>
</table>
Table 17. Frequency of subjects by school

<table>
<thead>
<tr>
<th>School</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number 1</td>
<td>54</td>
<td>6.7</td>
</tr>
<tr>
<td>Number 2</td>
<td>27</td>
<td>3.4</td>
</tr>
<tr>
<td>Number 3</td>
<td>216</td>
<td>26.9</td>
</tr>
<tr>
<td>Number 4</td>
<td>73</td>
<td>9.1</td>
</tr>
<tr>
<td>Number 5</td>
<td>57</td>
<td>7.1</td>
</tr>
<tr>
<td>Number 6</td>
<td>77</td>
<td>9.6</td>
</tr>
<tr>
<td>Number 7</td>
<td>170</td>
<td>21.1</td>
</tr>
<tr>
<td>Number 8</td>
<td>130</td>
<td>16.2</td>
</tr>
</tbody>
</table>
APPENDIX B.

LETTERS REQUESTING HUMAN SUBJECTS CONFIDENTIALITY
September 24, 1990

Bobby J. Beavers, Director
Upward Bound & Talent Search
Iowa State University
N002 Lagomarcino
Ames, IA 50011

Dear Bobby:

Enclosed is the information you requested. These are the SRA results for 1987 and 1988.

Please remember to keep the information confidential by not using the student names. Return the information when you are finished with it.

Good luck!

Sincerely,

Director

TRIO Programs

Enclosures
March 2, 1992

Mr. Bobby J. Beavers
Upward Bound Program
N002 Lagomarcino Hall
Iowa State University
Ames, Iowa 50011-3190

Dear Bobby:

We are pleased to submit the attached database information for your use in compiling research statistics to support your dissertation. As we discussed on the phone, Upward Bound submits this data with the understanding that none of the individual student names or school names will be disclosed in any manner. This information is provided to you in the strictest confidence.

The ‘holes’ in our statistics are a result of first-year students who dropped from the program during the first program year. There are, however, several names that have complete formation.

We wish you the best in your efforts, and we look forward to reading the final product.

Kindest regards,

Upward Bound Program