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By

J. Richard Arndt

A THESIS

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ABSTRACT

A STUDY OF SELECTED FACTORS CHARACTERIZING FRESHMEN WHO ENTERED MICHIGAN STATE UNIVERSITY IN FALL 1968 IDENTIFIED AS UNDER-, OVER-, OR NORMAL ACHIEVERS AFTER ONE TERM OF COLLEGE

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Statement of the Problem

It was the purpose of this study to determine whether any differences existed among students separated by sex and identified as under-, over- or normal achievers after completing one term of university study. Differences were investigated among selected factors pertaining to high school demographic characteristics, high school academic preparation, personal academic behavior patterns, selected ability test score averages, first term college grade point average and related variables, and the male:female ratio within achievement levels (when students were placed in levels without regard for sex). The purpose of this research was not to determine how much the factors included for study contributed to predictive efficiency of standardized intelligence test scores.

Procedures

The study sample was composed of 520 male and 573 female freshmen from a population of approximately 7500 new students who matriculated at Michigan State University in fall, 1968. The sample did not include students who resided outside the United States of America, were designated as special part-time students, carried less than six credit hours of class, dropped out of school during the first term of college or did not have complete test scores and other necessary data. During Freshmen

Orientation Week, each student in the sample was administered the following instruments: the College Qualification Tests, Form C, the Michigan State University English Test, the Michigan State University Reading Test, and a specially constructed instrument, the Academic Inventory, Form C.

A regression model selection technique reported in the literature was used to differentiate the three achievement levels. Plus- and-minus one standard error of estimate were used as the dividing points. The Chi-Square analysis and a multivariate analysis of variance were the main statistical techniques used to analyze data. The .05 level of confidence was established to determine statistical significance for the four hypotheses tested.

Major Findings of the Study

Four hypotheses were formulated and tested in this exploratory research study.

The first hypothesis pertained to the investigation of selected non-intellective factors associated with students at the time of matriculation at Michigan State University. Findings indicated the following:

- (1) Few significant differences occurred among the groups regarding selected demographic characteristics about the high school from which each student graduated.
- (2) No meaningful differences were discerned among the groups for either sex regarding the kinds and number of terms of courses students took in high school.
- (3) No differences occurred among the groups for either sex regarding participation in selected high school extra-curricular activities.

- (4) Female overachievers had significantly better study habits than the other groups. No differences occurred for males.
- (5) No differences were noted for either sex regarding sophistication in taking objective examinations.
- (6) No differences were discovered pertaining to major reasons for attending college.
- (7) Underachievers of both sexes had significantly lower self-expectations than normal and overachievers of overall grades for their first year of college.
- (8) No differences occurred among achievement levels regarding students of either sex who declared a major immediately upon entering Michigan State University and those who made no immediate preferential choice.

The second hypothesis was related to exploring differences on average scores of selected intellectual ability tests taken when students in the study sample matriculated at Michigan State University. Results of data analysis indicated the following:

- (1) Underachievers of both sexes scored lower than normal and overachievers on a test of reading comprehension proficiency.
- (2) No differences occurred among achievement levels for either sex on CQT-Total score.

Hypothesis Three pertained to the study of differences at the end of the first term of university study regarding average credit hours carried, average credit hours earned and grade point average. Findings were as follows:

- (1) No differences occurred among the groups of either sex for first term average credit hours carried; however, underachievers of both sexes had a significantly lower average for first term credit hours earned.

(2) Underachievers of both sexes had significantly lower first term grade point averages than normal achievers who in turn had significantly lower grade point averages than overachievers.

The fourth hypothesis regarded the male:female ratio within achievement levels when students were placed in the levels without regard to sex. Results of data analysis indicated that males were significantly overrepresented in the underachiever category.

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Fear thou not; for I am with thee: be not dismayed;
for I am thy God: I will strengthen thee; yea, I
will help thee; yea, I will uphold thee with the
right hand of my righteousness. (Isaiah 41:10)

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CHAPTER ONE

THE PROBLEM

Introduction

Since the end of World War II, total attendance at America's institutions of higher education has increased so tremendously that a college or university education is no longer considered the privilege of a select elite, but rather the right of every able citizen. With the increase in numbers has come a corresponding and necessary increase in research about the college student and his environment.

One major area of concern has been the academic underachiever; i.e., that student who does not perform up to the level of achievement predicted or expected of him. In this research study, the college freshman underachiever was the object of concern. One should remember, however, that many students do better than expected; i.e., they "over-achieve." To understand over- and underachievement, one must further realize that these are terms used in lieu of over- and under-prediction. Since prediction of academic achievement has been heavily researched and discussed from many aspects, cf. Thorndike (1963), Lavin (1965), and Hilton & Myers (1967), another aspect of academic achievement was considered for this study.

Need

It is unnecessary to document the fact that every year thousands of freshmen in the several types of higher educational institutions

underachieve academically. Numerous studies covering many aspects of over- and underachievement have been reported in the literature. Unfortunately, findings have been conflicting. Citing several conflicting results, Peterson (1963) stated that "...the research has proved to be of ... little value." One reason is that sample sizes of studies are too small (Thorndike, 1963). Grading practices also differ among institutions (Hood & Swanson, 1965); i.e., the implication is that a student classified as an underachiever in one college might possibly be a normal achiever in another, easier-grading college. Further, different operational procedures used to identify under- and over-achievers may select different students within the same population (Pippert & Archer, 1963). Population characteristics also differ among and within institution types. In fact, within a given institution over time, succeeding populations of students may change.

Ratchick (1953) studied 52 highly intelligent high school students and concluded that "...no simple element was found to be related to all cases of underachievement." Centi (1959) stated that

An analysis of the published research which has attempted to determine the factors important to college success leads to the conclusion that the factors important to academic success are different from school to school. In view of this, it would seem important for the college counselor to determine what factors influence academic success or failure in the particular institution which he serves.

The need for this study is based on the findings and conclusions presented in the preceding two paragraphs, especially on Centi's statement. It is necessary to ascertain what factors influence student academic underachievement in a given institution, especially in view of conflicting research findings obtained from studying different kinds of student populations.

It was expected that findings from this research would

- (1) contribute to a more complete knowledge and understanding of freshmen who entered Michigan State University in the fall of 1968,
- (2) gain knowledge which might be of value to a counselor or academic adviser in helping specific students find out why they are under-achieving,
- (3) help University College faculty of Michigan State University determine what changes might be appropriate in existing curricular offerings to better meet needs of all incoming students in general and potential underachieving students in particular,
- (4) offer evidence that some factors involved in underachievement extend beyond the bounds of a given type of institution, and
- (5) provide some guidelines or ideas for future research by college and university faculty and administrators to identify potential underachieving freshmen early in their college experience.

Purpose

The purpose of this study was to determine what differences existed, if any, among three groups of students identified as under-, over- and normal achievers using a model reported in the literature. Differences were to be investigated mainly among non-intellective variables; viz., biographical and demographical factors associated with high school characteristics, high school academic preparation and personal academic behavior patterns. The purpose of this research project was not to determine how much non-intellective biographical and demographical factors included for study contributed to the predictive efficiency of selected standardized intellective test scores. Several researchers have already attempted this as Hilton and Myers (1967) reported.

Hypotheses

As stated in the literature review in Chapter II, many results of published studies about over- and underachievement are contradictory or inconclusive; therefore, a comprehensive, unifying theory about the causes of over- and underachievement does not exist. Trends or patterns, however, can be discerned in various aspects of over- and underachievement, although no single pattern or findings has universal application. The hypotheses, then, were not based upon a clearly delineated theoretical framework. This study was generally exploratory in nature. It was expected that results would be useful for drawing tentative conclusions and generating further hypotheses.

The following questions, restated as four testable hypotheses in Chapter III, were formulated to give direction for analyzing data about three groups of students separated by sex and identified as under-, over- or normal achievers after one term of university study:

- (1) Are there differences among the groups associated with selected demographic characteristics of high schools from which they graduated?
- (2) Are there differences associated with high school preparation among the groups in regard to types and number of terms of courses taken in high school?
- (3) Are there differences among groups in selected personal academic behavior patterns?
- (4) Are there differences among groups on selected intellectual variables?
- (5) Are there differences within groups pertaining to the male: female ratio when groups are not identified on the basis of sex?

Definitions

Thorndike (1963) and Lavin (1965) explained that the concepts of over- and underachievement involve discrepancies between predicted and actual performance and that the terms are misleading if not correctly understood. The following definitions, therefore, were offered to clarify the usage of terms in this study. A fuller explanation including methods for operationally identifying the extreme groups is included in Chapter II.

Underachievement. That academic performance which falls below a given distance from some specified level of expected or predicted achievement.¹

Overachievement. That academic performance which falls above a given distance from some specified level of expected or predicted achievement.

Normal achievement. That academic performance which falls on or about a specified level of expected or predicted achievement.

Lavin (1965) discussed the limitations of the first two terms (p. 25):

Studies of over- and underachievement are found very frequently in the literature. However, the choice of terms seems unfortunate. For one reason, such labels tend to raise intelligence and aptitude tests to an almost sacrosanct level. That is, since over- and underachievement are defined as departures from what ability measures would lead us to expect, there is a tendency to think that these departures are somehow mysterious and inexplicable--that somehow the intelligence or aptitude test just cannot be wrong. It would be more accurate to say that for the prediction of academic performance, ability is but one kind of necessary information. From this point of view, what is left after ability has been used as a predictor is not over- and underachievement, but unexplained variation, much of which may be accounted for by other predictive factors. In short, these terms actually refer to the inaccuracy involved in predicting academic performance from ability measures alone. If this is not recognized, we may fail to look for other significant classes of predictors.

¹In this study, the "given distance" was chosen a priori to be plus-and-minus one standard error of estimate from the regression line formed by predicting first term college GPA from CQT-Total score.

A second reason that the choice of terms is unfortunate is that they have acquired negative connotations, arousing in some the idea that the overachiever is a "grind" who lacks such desirable qualities as sociability, "well-roundedness," and the like. On the other hand, the underachiever may be thought of as one who is lazy, undisciplined, and immature. In this volume such connotations are not intended.

In spite of these shortcomings, the terms are currently used in the educational field. For this reason they are used here, with the hope that the reader will keep in mind the limitations described above.

Limitations

Several limitations of this study should be noted.

- (1) There was no assurance that students comprising the study population were representative of succeeding student populations at Michigan State University or similar institutions, although it was assumed that findings of the study based on this population may be useful for generating hypotheses about similar populations.
- (2) The first term college GPA used as the criterion in identifying each of the achievement groups was a heterogeneous criterion subject to the limitations pointed out by Thorndike (1963), p. 17:

Whenever we combine data from different schools, different programs, or even different teachers, we are likely to introduce heterogeneity into the criterion...In any research of "over-" or "underachievement," we must beware lest our criterion measure of achievement itself be heterogeneous, the same score or symbol representing different real levels of performance in different subgroups.

GPA was used because it was the standard by which the University retained or dropped its students.

- (3) Factors found not to be significant for this population might be for another and vice versa.
- (4) The predictor, CQT-Total score, seemed to favor males. This limitation was based upon male/female comparative standings on CQT-Total score for all freshmen who entered Michigan State

University in fall, 1968, published in a report by the Office of Evaluation Services (1968). Female scores were about eleven points lower than males at given percentile intervals.

- (5) The predictor also accounted for only about 19.4% of the variance in GPA for males and 25% for females in the study sample. However, this was not too different from most similar cognitive predictors.
- (6) High ability students had relatively little room to demonstrate overachievement because of the GPA "ceiling" and low ability students had relatively little room to demonstrate underachievement because of the GPA "floor" (cf. Duff and Siegel, 1960).

Overview

An introduction to the research problem, the need for and the purpose of the study were presented in this chapter. Questions used to construct hypotheses were posed, as well as definitions of essential terms. Chapter II contains an extensive literature review in three parts: general overview, brief presentation of findings of factors not studied in this thesis, and results of previous studies of factors related to this thesis. Chapter III presents an account of the thesis design which includes a description of the population and samples, instrumentation, specific hypotheses and procedures utilized in studying the problem. Chapter IV contains the results of the analysis of data. A summary of purpose, procedures, findings, conclusions and implications for future research are presented in the fifth and final chapter. The bibliography, Part I of Form C of the Academic Inventory, and tables showing statistically non-significant results of data analysis of inventory items complete the contents of this thesis.

CHAPTER II

REVIEW OF THE LITERATURE

General Overview

Introduction

Since the end of World War II, an extraordinary amount of research has been conducted on various aspects of student achievement in America's several levels of educational institutions. For example, Raph, Goldberg, and Passow (1966), concerned only with "bright under-achievers," counted 146 investigations, 50 about college students only, reported during the decade 1953-1962, compared to only 37 in the previous thirty years, 1923-1952, 23 about college students only. Since 1962, the number of published studies has increased, as an examination of Dissertation Abstracts and the Education Index demonstrates.

Students identified variously as having "high" or "superior" ability, being "gifted," "bright," or "talented," have received a great deal of attention, especially since the advent of the "space age." This most likely has occurred because the federal government, primarily via the United States Office of Education, has financed numerous projects aimed at identifying and subsequently assisting youngsters with superior ability to realize their maximum potential of academic achievement, for reasons of national defense and internal vitality. The government does not want to waste this extremely valuable and irreplaceable resource, an understandable concern.

The performance of students at all ability-, age- and grade-levels, especially college students, has been and is continuously analyzed. Researchers concerned with college student achievement have studied what seems like almost every conceivable variable and correlation of variables related to the subject: age, sex, major, intelligence, ability, home and college residence, family background--including socio-economic status, educational level and nativity of parents--personality scales, high school grade-point average, previous quarter's grade-point average, high school and college extracurricular activities, and number of hours working part-time, to name some factors most often analyzed.

Definitions

The underachieving youngster is, according to Peterson (1963), "a student who has the ability to achieve a level of academic success significantly above that which he actually attains." Raph, Goldberg and Passow (1966) defined the "more able" underachiever as "one who, for whatever reason, fails to develop his potential maximally." (p. 2). These definitions are deceptive, however, because when put into operational terms, different students can be identified as "underachievers," depending on the method used, with little overlap. Pippert and Archer (1963) demonstrated this phenomenon when they used two major methods--high ability/poor grades and high ability/poor achievement test performance--in a ninth-grade class. The former method identified as underachievers 14 boys and 7 girls and the latter method 7 boys and 12 girls, with only two children included in both groups. Hoed and Swanson (1965) further demonstrated this when they looked at student achievement in different types of Minnesota colleges. The mean grade-point averages (GPA) for freshmen in various colleges ranged from 1.9 to 2.8 (on a 4.0 scale) with little relationship found among the colleges

between ability level of their freshmen classes and the mean GPA earned by the classes. The implication is that a student identified as an underachiever at one college might not be so designated at another. Wellington and Wellington (1961) also warned educators and researchers about the lack of agreement among educators and methods in accurately identifying underachievers (p. 8).

Classification Systems

Major Operational Designs

Thorndike (1963), Farquhar and Payne (1964) and Jackson (1968) have described and classified the main methodological designs used to operationally define, identify and subsequently study, under-, over- and normal-achieving students and their performance. In his small but excellent volume, Thorndike discussed two major designs: (a) the classic dichotomy of experimental and control groups with experimental manipulation and followup, and (b) examination of relationships among variables; i.e., "find out what variables correlate with achievement, and how they are related to each other." (p. 34). The latter design had three variations: (a) prediction over time of the effect of variables under study, (b) consideration of all variables at one point in time (no antecedents), and (c) definition and comparison of two or three contrasting groups, usually "underachievers," "normal-achievers," and "overachievers."

Farquhar and Payne (1964) classified over- and underachievement research into four descriptive categories.

I. Central Tendency Splits. Under- and over-achievement is determined by dichotomizing a distribution of combined aptitude and achievement measures... (Cf. Dowd (1952), Pearlman (1952), Shaw and McCuen (1960)).

II. Arbitrary Partitions--Middle Group Eliminated. Discrepancies are determined by contrasting extreme groups

in achievement-aptitude distributions, and by eliminating a middle group...(Cf. Shaw and Brown (1957), Frankel (1960)).

III. Relative Discrepancy Splits. Grade Point average and aptitude predictors are ranked independently. Under- and over-achievement is determined by the discrepancy between the two ranks...(Cf. Diener (1960), Baymer and Patterson (1960), Duff and Siegel (1960)).

IV. Regression Model Selection. A regression equation is used to predict achievement from aptitude measures. Under- and over-achievement is then determined on the basis of the discrepancy between predicted and actual achievement. (Cf. Gerberich (1941), Krug (1959)).

Jackson (1968) reported that "a review of the literature suggests at least three major approaches to the identification of underachievers," which did not substantively differ from the above classification. Although not citing Farquhar and Payne, his classification combined their first and second categories and duplicated the third and fourth.

The latter two classification systems did not include designs using matched pairs (cf. Wrenn and Humber (1941), Shuey (1956), Pink (1962), Young (1967)) or matched groups (cf. Bruck and Bodwin (1962), De Sena (1964), C.F. Combs (1964)).

Alternative Approaches

Other researchers have offered alternative approaches to viewing either underachievers or underachievement. Harris (1940) saw three factors involved in underachievement: ability (intelligence), effort (motivation) and circumstances (non-intelligence). Shaw (1961) pointed out that there was a great deal of difference between the "chronic" and "situational" underachiever. Kewitz (1965) discerned three dominant approaches to underachievement in the literature: (1) an illness involving the personality ("underachievement is, at best, an inaccurate diagnosis of the problem"), (2) a problem resulting from inadequate motivation, and (3) a problem stemming from poor educational administration or organization. Counselors and psychotherapists, such as

Neugeboren (1958), Goldburgh and Penney (1962), Roth and Meyersberg (1963), Halpern (1965) and Bednar and Weinberg (1970), have studied the underachiever from their particular perspective and have offered suggestions as to how to deal with the problem. Butcher (1967) distinguished between intellectual (GPA, achievement test scores) and non-intellectual (personality, biographical and demographical data) factors.

It is important to realize that researchers have increasingly scrutinized non-intellectual variables in the past decade, 1961-1970, because they believed that such factors held the key to variance unexplained by traditional intellectual variables used to predict academic performance. These researchers hypothesized that non-intellectual variables when added to intellectual variables would give a more accurate prediction formula. Frederiksen and Melville (1954) found that the Strong Vocational Interest Blank could be more predictive of academic success in an engineering school for non-compulsive students than for compulsive. They concluded that

The usefulness of a test may be improved by discovering subgroups of people for which it is especially appropriate as a predictor. Such a method may not only permit more accurate predictions for the members of the subgroups, but for other members of the group may reduce errors in prediction which are due to the use of a less valid predictor.

Binder (1966), Lunneberg and Lunneberg (1966) and Standridge (1968) all indicated that non-intellectual variables could add significantly to prediction of academic performance.

Hilton and Meyers (1967) reached a different conclusion. They investigated the contribution of non-intellectual biographical questionnaire data to academic prediction from seven studies published between 1950 and 1964 and stated that each...

of these studies has reported significant correlation coefficients using a different biographical inventory. None

of them has demonstrated, however, that a comprehensive battery of ability and achievement tests would not be more highly related to academic performance or that biographical data would contribute anything unique beyond such a battery.

It should be noted that the above quotation is an excellent example of the two broad, major categories of research studies that this writer has delineated: (1) Predictive studies in which intellectual and/or non-intellectual variables are analyzed to determine which factors individually or in combination best predict underachievement, or which designs are most efficient, and (2) Descriptive studies, in which over- and underachievers are identified and then compared on various intellectual and/or nonintellectual variables. Some of these studies test hypotheses, others are exploratory, useful only for hypothesis construction.

Research Inadequacies

Much confusion has occurred and findings nullified for general reference because researchers have not adequately and precisely described their research designs, statistical analyses, populations, samples, hypotheses and/or conclusions. (Cf. critiques by Anderson (1961) and Shaw (1961)). In the particular area of underachievement, Peterson (1963) bluntly asserted that much research proved to be of little value because most researchers neglected the individual, looking instead at the phenomenon of underachievement. He stated further that it was difficult to compare results because of different kinds of designs and analyses. Although his criticism has validity, not all researchers have erred in these ways.

Other problems exist as well. Harris (1940) stated that in many studies he reviewed, sex and intelligence were not held constant, statistical significance was not mentioned and heterogeneity of subjects

occurred. These oversights still occurred in more recent studies. In some studies sample sizes seemed too small to warrant anything more than the most tentative of conclusions or possible factors to investigate further. Thorndike (1963) stated that

...the more of achievement that we are already accounting for by known predictors, the larger our experimental groups must become if we are to establish the influence of further, more subtle, influences. Correlational studies of factors related to gain in achievement that are based on 100 cases or less will generally be a waste of effort. (p. 39).

Thorndike also stated that much research had little or no meaning because of (1) errors in measurement, (2) heterogeneity of criterion, (3) limited scope of predictors, and (4) impact of unmeasured intervening variables upon the individual. (pp. 4-5).

Raph, Goldberg and Passow (1966) stated the "burden of proof" lay with the researcher in "designating a student as an underachiever... He must have confidence in his predictors, in what is being predicted, and in the comparability of the samples he identifies to study." (p. 10). This statement is important because the terms "over-" and "under-achievement" really should be "over-" and "underprediction (cf. Chapter I, pp. 1, 5).

Focus: The Individual

Peterson (1963) was not alone in his attitude that the under-achieving student's plight must be considered mainly as an individual problem. Shaw and Brown (1957) hypothesized that scholastic under-achievement on the part of bright college students was not an easily modifiable phenomenon, but instead was related to the basic personality matrix of the individual. Passow and Goldberg (1958) found that under-achievement among gifted high school students appeared to be symptomatic of a deeper, more basic personal-social problem. These comments are especially pertinent to "chronic" underachievers and are amplified in

the next section concerning improvement possibilities in which research studies by counselors and psychotherapists are reviewed.

Findings of some researchers are appropriate for both "situational" and "chronic" underachievers. Ratchick (1953) studied 52 highly intelligent high school students and concluded that "since no simple element was found to be related to all cases of underachievement, an investigation simultaneously includes studies of the various phases of the educational process." Barrett (1957) intensively studied 32 gifted high school students and said that "only by a careful and thorough study of each individual personality can we find the reasons for underachievement." Abe (1966) reinforced this position by stating that results from his study of non-intellective indices of academic achievement indicated that many factors were involved, and that no single measure was adequate for all. C. F. Combs (1964) stated that underachievement cannot be treated in terms of any one facet of the problem, rather, underachievement must be understood to be a completely personal and consistent adaptation of the underachiever to his needs and capacities as he uniquely experiences them. Finally, Kowitz and Armstrong (1961) concluded that many special programs in elementary and secondary schools devised to treat underachieving individuals had not found great success because they were not predicated upon the fact that underachievement is an individual problem, varying in cause(s) from child to child.

Improvement Possibilities

Underachievers can be helped to improve their performance. The situation is not as bleak as some educators would have one believe. Appropriate counseling or psychotherapy can be instrumental in helping the individual perform better academically and in other behavior patterns

(Baymur and Patterson, 1960, Halpern, 1965). If a student is performing poorly in academics, he often is performing poorly in other behaviors as well. If he is helped to do better in one area, he may concurrently do better in other areas. Roth and Meyersberg (1963) also concluded that "...the counseling relationship can serve as the impetus to change the achievement patterns." Their conclusion was based on extensive clinical experience in the Psychological Services counseling program at Hampton Institute.

Dragow (1957) formulated three postulates after counseling with at least twelve "gross" college underachievers who evidently were recent high school graduates:

1. A role of the counselor may be to help the underachieving client divorce himself from an alien curriculum and discover an appropriate one.
2. The actual feeling of failure may be prerequisite to this type of client's becoming "ready" for counseling.
3. ...insight is (not) necessary for the progress of counseling (i.e., for counseling this kind of client).

Motto (1959) recognized Dragow's contribution, but offered conflicting conclusions based on a much different population of underachievers--31 "gifted" veterans. The addage of only generalizing to the study population is again validated by these studies.

Neugeboren (1958), a psychiatric social worker, explored problems of 48 Yale University men who entered the school between 1948-1954 and who were seen at the Division of Student Mental Hygiene. He summarized that (1) many possible explanations existed for under- and overachievement, (2) "...similarities in patterns of academic functioning occurred for students given the same diagnosis...." and (3) that the severity of emotional disturbances cannot be used as the sole criterion for predicting college success. Point two is especially significant as are two other statements made in the report: (1) problems of unadjusted

underachievers often result from conflicts with parents regarding the choice of major (cf. point one of Drasgow above), and (2) "Only students whose academic underachievement is seen as a symptom of inner problems would be expected to improve their grades after therapy."

Goldburgh and Penney (1962) developed and offered an approach to help underachievers improve their performance. Their "primary focus" was on "...speedy rehabilitation rather than long-term therapy." They called their technique "sector counseling" representing a form of "minimum change therapy" (Tyler, 1960).

Bednar and Weinberg (1970) contributed a significant study to the literature when they investigated the ingredients of successful treatment programs for underachieving students. They investigated 23 treatment programs for underachievers which used various counseling techniques. They were seeking to answer the question, "What dimensions of counseling treatment programs are associated with improved academic performance?" rather than merely asking, "Does counseling contribute to improved academic performance?" They concluded that:

The most potent variables that emerge from a survey of the research literature are duration and structure of the treatment method. Not only are highly structured and lengthy programs the most effective in improving academic performance, as measured by GPA, but the effects are lasting. Though structured programs are generally more viable than unstructured programs, consideration must be given to the population under study. For example, independent students seem to profit most by an unstructured situation, which is, however, lengthy.

When the treatment consists of some form of counseling, the higher the therapeutic conditions (empathy, warmth, genuineness), the more effective the treatment. From the standpoint of economy as well as effectiveness, group counseling appears to hold more promise as a treatment method than individual counseling methods or academic study courses. However, counseling, either individual or group, aimed at the dynamics of underachievement and used in conjunction with an academic studies course seems the most potent of all treatment methods.

Wrenn and Humber (1941) indicated that improving the study habits of some underachievers might help them improve scholastically. De Sena (1966) found that underachieving college students in science curricula revealed a greater willingness to discuss their problems with college personnel than normal- and overachievers, and that the Mooney Problem Check List was helpful in determining problems troubling them. Stebens (1968) found that for some students, taking a reading skills improvement program might prove beneficial. Finally, O'Donnell (1968) observed that male freshmen underachievers at California State Polytechnic College often significantly improved their performance after changing majors.

Bibliographies

Several researchers have reviewed the literature and compiled bibliographies regarding various aspects of underachievement among students at different grade and ability levels. Harris (1940) listed 320 references after his review of the literature from 1930-1937 for factors affecting college grades. Garrett (1949) listed 194 references when he reviewed and interpreted investigations related to scholastic success in colleges of arts and sciences and teachers colleges. Travers (1949) cited 272 studies after discussing significant research on the prediction of academic success. Bristow (1959) discussed low achievement and added an annotated bibliography. Reviewing the measurement of achievement motivation, Krumboltz (1957) compiled 44 references. Since then, Farguhar et al (1965) compiled a bibliography of over 230 references concerning motivation and academic performance. Gowan (1960) summarized the findings of many studies concerning the factors of achievement in high school and college. Anderson (1961) edited a book about research on academically talented

students. Miller (1961) edited a United States Office of Education bulletin on guidance for underachievers with superior ability which included an excellent chapter by Shaw (1961) reviewing articles defining and identifying underachievers of superior ability. Gowan (1961) compiled an annotated bibliography on academically talented students. Lavin (1965) comprehensively reviewed both intellectual and non-intellectual factors influencing academic achievement. Goldberg (1965) compiled a lengthy bibliography while reviewing research on talented youngsters. Raph, Goldberg and Passow (1966) also published a bibliography regarding bright underachievers. In his doctoral thesis, Butcher (1967) extensively reviewed theory and research about student self-concept and academic achievement.

Factors Unrelated To This Study

Many researchers have investigated personality, biographical and demographical variables, primarily in an attempt to increase predictive efficiency of students' college achievement. Research findings concerning non-intellectual factors not analyzed in the present study are briefly reviewed in this section to give a broader view and understanding of under- and overachievement. Some studies reviewed were of students below college age.

Personality Factors

Many facets of personality structure have been analyzed. Lavin (1965) included an excellent review of personality factors in his book. Investigators have often used standardized inventories, such as the Minnesota Multi-Phase Inventory (MMPI), Strong Vocational Interest Blank (SVIB), Thematic Apperception Test (TAT), and Edwards Personal Preference Schedule (EPPS), to determine if significant differences

could be detected between over- and underachievers. Perhaps the original published investigation using the MMPI was that of Altus (1948). He equated two groups of 25 college students studying elementary psychology and administered the MMPI to them. He concluded that "... data appear to justify that adjustment items can be found which will be associated with academic achievement and have no relation whatever to intelligence as is currently measured."

Morgan (1952) studied University of Minnesota male sophomores and noticed that achievers and non-achievers did not differ significantly in variety of well-developed interests, but did in types of interests. Morgan administered the MMPI, TAT and SVIB to his sample and from their responses concluded that several personality variables appeared to relate positively to the academic achievement of high-ability college students: (1) maturity and seriousness of interests, (2) awareness of and concern for other persons, (3) a sense of responsibility, (4) dominance, persuasiveness and self-confidence, and (5) motivation to achieve or need for achievement.

Burgess (1956) studied a group of male college freshmen engineers and concluded that the TAT had possibilities for usefulness for differentiating groups of academic achievers. He did not find evidence that the MMPI, SVIB and Rorschach would be useful in this regard, although he stated the latter two tests ought to be researched further, as well as the Berow College Inventory of Academic Adjustment. Burgess found that overachievers in his sample seemed to (1) have a greater need for achievement and improvement of self or status, (2) be more motivated for college study, (3) enjoy college study more, (4) expect more from college study, (5) be more efficient in planning and use of time, (6) be better adjusted and (7) have more needs to be aggressive.

Underachievers seemed to be (1) less intellectually adaptive, (2) over-reactive to environmental circumstances, (3) more dependent, (4) of weak academic motivation and (5) unable to see the value of a college education.

Ryan (1951) used the SVIB to study Yale over-, under- and normal-achievers and noticed some differences, but indicated that the instrument did not seem to have much usefulness in differentiating the groups. However, in a later, similar study of Yale upperclassmen, Rust and Ryan (1954) found some significant differences. They seemed to be favorable toward using the instrument for diagnostic purposes. Hummel and Sprinthall (1965) studied a group of male college preparatory students and found results similar to Morgan and Burgess. They administered the SVIB and three other personality tests and found that overachievers were more mature, thoughtful, planful, independent and purposeful than underachievers. Kish (1968) studied sophomore male underachievers in the College of Literature, Science and Arts at the University of Michigan and concluded that underachievers did not utilize their abilities as did overachievers (cf. C.F. Combs, 1964). Rather than lumping them all together, Kish differentiated four sub-groups of underachievers: (1) overcompensating for feelings of social inadequacy by adopting an extroverted stance, (2) highly motivated but socially isolated, angry and alienated, (3) well adjusted socially, but having weak academic interests, and (4) authoritarian, conformist, non-intellectual and, therefore, poorly fitted for majoring in this particular liberal arts program.

Gebhart and Hoyt (1958) used the EPPS to study personality needs of over- and underachieving freshmen. They found that overachievers scored significantly higher in Achievement, Order and Intraception, and underachievers scored significantly lower in these areas.

Change. From these findings, they hypothesized that overachievement resulted from a drive to (1) compete (Achievement), (2) organize and plan (Order), and (3) be intellectually curious (Intracception). They further hypothesized that underachievement was associated with (1) a need for variety (Change) in which studies may appear boring or routine, and (2) social motives (Affiliation and Nurturance) in which friendship may be placed above scholarship. In other words, they demonstrated that several patterns or causes existed for under- and overachievement.

Krug (1959) replicated the Gebhart-Hoyt study in a college of engineering and concluded that his results "clearly supported" their findings.

Motivation has been extensively studied because "one of the basic assumptions in education is that motivation is a prime requisite for scholastic success" (McBee and Duke (1960)--cf. Travers, 1949). Motivation is very difficult to study because its effect must be inferred from observable (measurable) behavior; i.e., it is an intervening or "moderator" variable (cf. Saunders, 1956, and Flaughter and Rock, 1969).

Krumboltz (1957) defined achievement motivation as "...that internal state of affairs which impels an individual to compete with some standard of excellence." He hypothesized that since individuals differ in their level of achievement motivation, they achieve different levels of performance.

Taylor and Farquhar (1966) investigated the interaction of personality, achievement and motivation by using an original 94-item research scale, the Human Traits Inventory (HTI). The scale contained personality items previous investigators found positively related to academic

achievement. After cross-validation, the NTI was administered to high and low motivated high school students, defined operationally as over- and underachievers. Significant differences at the .01 level were noted for 32 items for males, 31 for females, with 14 common to both sexes.

In the area of personality adjustment, Dowd (1952) and Pearlman (1952) both noted no difference among "high capacity" or "superior" over- and underachieving college students. Conflicting results were reported by Berger and Suther (1956) and Pierce (1962). Berger and Suther studied 199 males and 154 females in two different colleges and concluded "...the study seems to bear out the general assumption that students with high intellectual capacity and an adequate personality adjustment achieve higher academic performance." Pierce stated that it appeared from his study that the bright high school low achiever was less well adjusted than his high achieving peer.

Goldman (1961) summarized his review of the literature by stating "Especially noteworthy is the fact that maladjustment can lead either to underachievement or to overachievement." His comment lends weight to Levin's (1965) criticism that many researchers examine extreme groups and ignore the middle group on the faulty assumption that only a linear relationship exists between the extreme groups. Levin stated that the middle group of achievers also must be studied in case a situation would arise in which a relationship was not linear; i.e., the extremes seem to be identical but different from the central group, but if the middle group were deleted from the study, one would not know this.

It seems a consensus that underachievers are more hostile than achievers. Kirk (1952), who generalized from intensive, therapeutic

counseling cases, and cited one as an example, definitely believed the underachiever was acting out his hostility toward a member of his family who demanded success by performing poorly in school. Shaw (1961), citing several articles besides his own research, stated that the underachiever generally showed hostility by an attitude or feeling of distrust toward others. Smith (1965), studied achieving and non-achieving college freshmen who scored in the top 5% of the College Qualification Tests and concluded that the latter were more negative and hostile toward authority. Halpern (1965) concluded that the student exhibits hostility, often subconsciously toward parents and other authority figures by passive resistance; i.e., the student just does not perform. (cf. Sutton, 1961). He stated that appropriate psychotherapy could effect positive changes in behavior in the areas of resolving hostility and improving performance in the classroom and elsewhere.

Biographical Factors

Biographical data have been intensively studied, usually with the intent to add efficiency to intellectual test scores in predicting college success or failure. Malloy (1954) developed a Life Experience Inventory (LEI) for females at the University of Nebraska. The instrument sampled from school experiences, self-appraisal, family relationships and choice and type of friendships. Malloy and Ivanoff (1964) subjected the LEI to further validation for both sexes and reported the instrument "...significantly increases the prediction of college marks over that of commonly used intellectual measures and previous achievement in high school...It seems quite apparent that the LEI explores unique criterion variance over and above that presently accounted for by the more traditional intellectual tests and measures."

Duff and Siegel (1960) developed a ten-area Biographical Inventory for college students, and Anastasi (1960) also developed a Biographical Inventory for the College Entrance Examination Board. Hilton and Myers (1967) reviewed several such inventories and concluded that

...Each of these studies has reported significant correlation coefficients using a different biographical inventory. None of them has demonstrated, however, that a comprehensive battery of ability and achievement tests would not be more highly related to academic performance or that biographical data would contribute anything unique beyond such a battery.

Although numerous factors have been found to be involved in over-achievement, none was found to be a universal cause or intervening variable. Probably the main reason was that different kinds of populations have been studied and/or different research models have been used. For example, Myers (1952) studied an eastern women's college and found associated with academic success such factors as Jewish religion, urban living and foreign-born parents; however, these had no correlation with academic success at the University of Washington as reported by Lunneborg and Lunneborg (1966), who cited Myer's study specifically.

Factors Related To This Study

In this portion of the chapter, research findings of factors investigated in this thesis are reviewed, including some studies concerning students below college level.

Sex Differences

Lavin (1965) stated that the failure of many studies to analyze data separately for males and females hindered comparisons of findings, and that more research was needed in which sex differences were assessed and reasons for differences were examined (p. 58). Farquhar and Payne (1964) included separation by sex as a necessary criterion for effective

selection of over- and underachievers (cf. Clark, 1953).

The weight of research findings from studies in which the sexes were not separated indicates that underachievers are predominantly male while the majority of overachievers tend to be female. Dowd (1952) studied high ability college students and found that more males underachieved and more females achieved up to expectation. For superior or gifted students below the college level, Gowan (1955), Read (1955) and Shaw (1961) indicated that underachievers were predominately males. The first two researchers gave a ratio of two males to one female for underachievement and two females to one male in the overachiever category.

Shaw and McCuen (1960) found that underachievement for males started in the first grade in school, became significantly different from achievers at the third grade and increased each year through the tenth grade. The pattern was different for girls. Female underachievers actually exceeded achievers in grades one to five, though not significantly statistically. They dropped from grade six to grade eleven, with the difference becoming significant in grade nine. In the eleventh grade, grades of achievers of both sexes dropped slightly.

Bowman (1960) and Raph, Goldberg and Passow (1966) stated that sex differences were more pronounced below the upper senior high grades (eleventh and twelfth) because adult sex roles became more pronounced starting at about the eleventh grade. They theorized that many older high school girls did not want to compete with and overshadow boys who were seen to become family breadwinners. The girls' attitude was reflected by lower achievement. The researchers hypothesized that when males entered college, they started realizing they must do well if they expect to graduate and to obtain adequate employment.

Todd, Terrell and Frank (1962) demonstrated that sex differences can occur when several variables are studied. They studied non-intellective differences between college normal- and underachievers of superior ability and found significant differences between male and female groups.

Self-Concept of Ability

Self-concept of ability (SCA) seems to have been studied most intensively during the decade of the 1960's. Goldberg (1965) stated SCA was an important factor in achievement. A. W. Combs (1962) stated that "much of a person's behavior is the result of his conception of himself." Sutton (1961) inferred from his study of 85 children in grades 3-5 in an elementary school in Athens, Georgia, that

Achievement implies a self-reference and is not understandable unless a concept of self is adopted. The achieving self will display an integrative organization of personal traits... Educational achievement results in personality growth, integrative behavior, and a more harmonious self.

Lucas (1968) defined SCA as "the aggregate of knowledge, feeling, attitude, belief and value held in relation to one's self," and used a score on the Bills Index of Adjustment and Values to operationally measure it. With definitions of six researchers in mind, Peters (1968) formulated the following definition: "Self-concept is a psychological construct used to describe a person's perception of himself and...of his relationship to others in the environment." She included three components: (1) "perceptual"--the way in which one sees himself and the idea he has of the impression he makes on others; (2) "conceptual"--one's idea of his "own peculiarly distinctive characteristics, abilities, limitations"; and (3) "attitudinal"--one's sense of identity within his environment, his attitude regarding the present and future, and his degree of self-esteem. She administered the Tennessee Self-Concept Scale to 164 high

high school seniors and found no differences between over- and under-achievers in self-concept of ability; however, she stated that not controlling for sex and the small sample size limited the results of her study.

Fink (1962) studied 20 pairs of male and 24 pairs of female rural California high school students matched for sex and IQ. He found that underachieving boys definitely had a lower SCA, but not underachieving girls. Brookover (1962) studied ninth grade, urban, Michigan school children. He reported that underachievers of both sexes with low SCA could improve their achievement by SCA enhancement on the part of parents acting as "significant others." Counselors and outside discussion leaders from a nearby university did not effect any improvement.

Borislow (1962) studied 186 freshmen students in the College of Arts and Science of a state university who completed a pre- and post-semester questionnaire designed to yield indices of the student's personal self-evaluation in general terms and specifically as a student. He formed four groups of students: 84 achievers and 21 underachievers oriented toward academic attainment, and 55 achievers and 26 under-achievers not so oriented. Borislow concluded that:

1. Regardless of an intention to strive for scholastic achievement as a prime goal, students who underachieve scholastically cannot be distinguished from those who achieve scholastically on the basis of general self-evaluation prior to or subsequent to their first semester in college.

2. Students who underachieve scholastically have a poorer conception of themselves as students than do achievers subsequent to their scholastic performance, regardless of initial intention to strive for scholastic achievement as a goal.

3. Where students exhibit an intention to strive for scholastic achievement as a prime goal, underachievers have a more pessimistic conception of themselves as students than do achievers prior to their actual scholastic performance. This does not hold true where scholastic achievement is not a prime goal.

4. Where scholastic achievement is a prime goal, where the student has a good concept of himself as a student, and where he does achieve scholastically, his general self-evaluation becomes more favorable from pre- to post-semester assessments. This does not hold true where scholastic achievement is not a prime goal.

Borislew apparently established that poor achievement was antecedent to poor SCA and good performance enhanced one's SCA. Conversely, Halpern (1965), a psychotherapist, proposed that in early childhood normal development of a separate identity went wrong for the underachiever. He hypothesized the phenomenon was caused by an inadequate parent-child relationship and the lack of normal development of a separate identity manifested itself in poor performance.

Brookover (1962) showed that improving SCA can, in turn, improve achievement. Shaw and Alves (1963) found that a negative self attitude was associated with lower academic achievement of bright, underachieving male high school students compared to normally achieving male students. They were unable to determine a cause-effect relationship, however, and stated the subject needed further research.

In short, the long-standing "Which causes which?" question does not appear to be solved. An important fact, however, is that once the "low SCA--low achievement" syndrome is started, focussing on improving one's SCA can help to counteract it.

A few researchers have added a variation to studies of SCA by investigating students' self-prediction of future academic performance. F. C. Young (1954) studied a sample of 100 students who made self-predictions of future academic performance and self-estimates of academic ability after the first six weeks of college to the same counselor under the same conditions. Young concluded that there was a significant positive correlation between self-prediction of college scholastic achievement and actual achievement.

Gaier (1961) asked 132 undergraduates to estimate their final grade in an Adolescent Psychology class, and their reasons. He found that high-ranking students appeared to be most capable in estimating their final course grade. Middle-ranking students seemed to be least accurate in their predictions. Todd, Terrell and Frank (1962) investigated college male and female normal and underachievers of superior ability on certain non-intellective factors. They found that both male and female achievers had higher expectancies for success in academic pursuits than underachievers.

Deleys and Rezaglia (1963) asked a sample of 183 freshmen at Southern Illinois University to predict their GPA for their first two quarters of college. They analyzed the students' self-estimated GPA, actual GPA and School and College Aptitude Test (SCAT) scores. They concluded (1) the self-estimated GPA, though significant, correlated less with actual GPA than did the SCAT scores, .41 to .63, (2) the self-estimate did not account for criterion variance when combined with SCAT scores in multiple correlation, (3) students in the sample over-estimated their actual GPA, 3.45 (estimate) to 3.08 (actual), and (4) higher ability students tended to under- or accurately estimate future grades; whereas, lower ability students tended to over-estimate future grades.

Keefer (1965) studied the entire student body of 195 students of Bryan College, Tennessee. His main finding appeared to be that self-confident students of superior intellect were more accurate in self-prediction of future grades.

It seems that this aspect of student achievement has been neglected and could be a fruitful area of investigation.

Selected Extra-Curricular Activities

Holland and Richards (1966) and Baird (1968) of the American College Testing Program (ACT) demonstrated that interest was a better predictor of non-academic (extra-curricular) achievement than aptitude or high school grades, and that academic and non-academic achievements were largely independent of each other. Holland and Richards selected a 3% sample from 612,000 high school seniors who took the ACT program test battery during a one-year period ending October, 1965. Replies to nonacademic achievement scales were examined to learn whether students had won prizes or achievement awards in leadership, music, drama and speech, art, writing or science. No relation was found between receipt of awards in these areas to ACT aptitude scores or high school grades in English, mathematics, social studies or natural science.

In his article, Baird reported two studies of nonacademic achievements of "bright" and "average" college students. In one study, non-academic achievements of 5700 students attending 35 diverse colleges who scored in the average range on the ACT (mean score, 20) were compared with the achievements of 525 National Merit Finalists. Only slight differences were found between the groups: "bright" students achieved more frequently in literary areas and "average" students in artistic areas. In the second study, Baird compared high school achievements of about 14,400 Michigan high school students who had ACT scores in the scholarship range--22 or above--with about 10,700 students scoring under 22. Analyzing achievements in science, art, leadership, music, writing and drama, he found slight, but statistically significant differences favoring bright students in leadership, science and writing, and average students in art.

In light of these results, Baird, Holland and Richards stated that college admissions officers ought to be more concerned with, and take into account, non-academic achievement when selecting students. Holland, Richards and Baird also took into account research findings which showed that success in life after college was not necessarily related to academic achievement in college, and that eminent people began achieving early in life. In other words, they advocated that college should place more emphasis upon non-academic achievement by positively rewarding such behavior, especially in the admissions process.

Pavek (1968) studied the relationship of several non-academic high school variables to college achievement and participation in selected extra-curricular activities for male freshmen at the University of North Dakota. He concluded that college GPA and ACT scores correlated poorly with non-academic achievement in areas such as science, art and writing.

Study Habits

Wrenn and Humber (1941) stated that Wrenn's Study Habits Inventory (SHI) had possibilities for differentiating between male and female underachievers. Dowd (1952) administered the SHI to first semester freshmen at the University of New Hampshire. He distinguished high capacity achievers and underachievers on several items in favor of achievers, but found no sex differences.

The Brown-Holtzman Survey of Study Habits and Attitudes (SSHA) developed in the early 1950's, has been frequently used in research studies. Holtzman and Brown (1953) stated that the SSHA could contribute to prediction of academic success and guidance of college students. Studying college male sophomores, juniors and seniors at the University

of Arkansas, Diener (1960) found that overachievers had better study habits on the basis of SSNA items. Lum (1960) studied under-, normal and overachieving college females at the University of Hawaii and detected no difference in professed study habits. She used an experimental form of the SSNA. De Sena (1964) attempted to identify non-intellectual characteristics of consistent over-, under- and normal achievers enrolled in science curricula at the Pennsylvania State University. He concluded that non-intellective factors could be useful in predicting academic performance, and stated that the most effective discriminating and predictive instrument he used was the SSNA. Smith (1965) analyzed 154 male, University of Kentucky freshmen on several variables. He found that achievers had better study habits than under-achievers. Gallant (1966) found that high school staff ratings of students' study habits correlated positively with their academic achievement in college.

Test-Wiseness

Boersma and Wahlstrom (1968) stated that "test-wiseness"--the knowledge of techniques concerning how to take objective tests and how to take advantage of various "cues" within them to maximize one's test score--could be taught and would help improve one's achievement. In their paper, they cited Ebel's (1965) pertinent warning that "... more error in measurement is likely to originate from students who have too little, rather than too much, skill in taking tests." In other words, a student with poor skills in taking objective tests might receive a lower score ("inaccurate measure") than he "ought" to receive. Later, if he received higher grades based on other criteria, he might possibly be falsely identified as an overachiever. Or, in a prediction study, he might be classified as a potential low achiever but turn out

to be identified as a normal or high achiever. In short, an inaccurate measurement on the low side could easily cause a prediction error which in turn might falsely identify a student as an overachiever after a period of time elapses.

Juola (1969) analyzed responses to items about objective test-taking practices included on the Academic Inventory, a specially constructed instrument administered to about 85% of all freshmen matriculating at Michigan State University in fall, 1968. He discovered that responses indicating test-wiseness were generally favored more often by high achieving and high ability groups. He also found the reverse true for some procedures. Juola hypothesized that the latter finding might have been due to low achievers taking remedial courses in high school.

Choice of Major

McQuary (1954) studied first semester freshmen males at the University of Wisconsin and found that significantly more underachievers than overachievers were "very uncertain" about their vocational choices. Stoner (1956) studied 19 matched pairs of high ability high school students to determine factors related to underachievement. One finding was that underachievers were not as certain of their future educational plans as were achievers. Todd, Terrell and Frank (1962) studied non-intellective differences between normal and underachieving college students of superior ability. They analyzed data for each sex separately and found that normal achieving males had decided on specific vocational goals more often than underachievers. No differences existed between the female groups.

Taylor (1964) reviewed 39 studies concerning personality traits and discrepant achievement published between 1933-1963. He discerned

several factors which had been found to positively relate to achievement level. One factor was the realism of a student's goals. Tayler cited seven studies which indicated the underachiever either had no stated goals or had unrealistic goals.

Pavek (1969) studied first semester male freshmen at the University of North Dakota and found that "undecided" majors graduated from high school classes of less than 25 students, had the lowest GPA and participated in less selected extra-curricular activities than other students.

Baird (1969) reviewed several studies which compared a student's curriculum choice and his academic achievement. He found that evidence, though sparse, suggested undecided students differed little from decided students. Baird attempted to study this area as a primary concern in two ways by studying (1) college students near the end of their first year, and (2) college-bound high school students. He concluded from study one that no real difference existed between a student who had decided upon a vocation (near the end of his first year in college) and the student who has not. In study two, Baird found that undecided college-bound high school students more often emphasized the goal of developing their mind than decided students, and chose the goal of vocational or professional training less frequently. Baird further stated that no evidence existed to show that most undecided students are maladjusted or abnormal, as many people seem to think.

Reading Ability

Wedemeyer (1963) studied 18 male and 5 female college students who scored in the top 2% of an IQ measure, and found the achievers had a better reading level than non-achievers. Stoner (1957) administered

a diagnostic reading test to 19 matched pairs of high ability high school students. He found that the underachieving group had a lower mean score than the achievers. He further stated the underachievers had more reading handicaps than the achievers and comprehended less well the type of reading material measured by the test. Gowan and Scheibel (1960) demonstrated that a high positive correlation existed between reading ability and achievement among college students of equivalent intellectual ability. Stebens (1968) evaluated the effects of a reading improvement program on low achieving college students and concluded that a reading skills class could help some college students improve their academic achievement.

High School Curriculum

Staton (1962) studied new freshmen from Oklahoma high schools who enrolled in the University of Oklahoma. One of the variables he selected for study was students' high school curriculum. He concluded that the curriculum taken in high school did not influence college grades. R. W. Young (1967) analyzed the high school curriculum patterns of closely matched pairs of college students. He found no significant difference in college achievement between students who took 7.9 business and industrial courses in high school and students who took 0.9 such courses. Ashcraft (1969) investigated the effect of the high school curriculum upon college achievement. He concluded that for college students of both sexes, high school curriculum seemed to be most influential on achievement in the first year of college. He found no significant difference between students who took 73% or more college preparatory courses compared to those who took 59% or less college preparatory courses when ability was equalized.

High School Graduating Class Size

Several researchers have attempted to determine if the size of a student's high school graduating class had any influence on his college performance. Hoyt (1959) stated that results of 20 previous studies were conflicting due to inadequate methods of analysis. In his study, he found no significant differences when he compared five subgroups of students according to size of graduating class and sex using three measures--first year college GPA, American Council on Education Psychological Examination test score and high school rank (NSR).

Dowd (1952) studied 19 achieving and 16 non-achieving college freshmen at the University of New Hampshire and found the size of one's graduating class did not differentiate among them.

Size of Community

Smith (1965) studied 154 University of Kentucky male freshmen to determine differences between high-ability achieving and non-achieving students. Students in his sample scored in the upper fifth percentile on the College Qualification Tests. He found that achievers (B average and higher) came mainly from communities of 50,000 - 100,000 population and non-achievers (C average and lower) came from cities with 600,000 or more inhabitants. He tentatively concluded that students who came from larger metropolitan areas possessed a set of values and attitudes concerning education which seemed to make them more prone to underachievement.

Per-Pupil Expenditure of High School District

Gallant (1966) found no pattern of relationship evident between college achievement on per-pupil expenditure of high school districts when he studied selected aspects of 663 students' backgrounds from Ashland College and Kent State University.

Type of High School

Shuey (1956) analyzed the academic success of 189 matched pairs of freshmen who attended public and private schools, and who entered Randolph-Macon Woman's College. Shuey found that public school students earned significantly higher grades than students from private schools. Students were matched for age, intelligence, academic load, section of country and home-town size. Shuey also cited several studies, the results of which favored public school graduates over parochial or private school graduates.

Hill (1961) investigated the scholastic success of 103 matched pairs of college freshmen at Ball State Teachers College who attended public and parochial secondary schools. He found students from public schools earned superior grades when scholastic aptitude was controlled.

Summary

The review of the literature was presented in three phases: general overview of the subject of over- and underachievement, factors unrelated to this study, and factors related to this study.

An underachiever was defined as "a student who has the ability to achieve a level of academic success significantly above that which he actually attains" (Peterson, 1963); however, it was shown that this definition is deceptive since different operational procedures often identify different students as over- and underachievers. It was further pointed out that under- and overachievement actually might be more accurately called under- and overprediction. Major operational designs were reviewed, after which other approaches from the literature were cited and research inadequacies briefly discussed. Attention was then focussed on the individual and possible techniques and procedures which might help him escape his problem of poor achievement. Several

bibliographies and reviews of the literature regarding over- and under-achievement were cited to end the first section of the chapter.

The second portion of the chapter was directed toward a brief review of factors not analyzed in this thesis, but deemed necessary to provide a better understanding of the manifold facets of under- and over-achievement. Personality and biographical variables constituted divisions of this section. Although no single personality factor universally applies to all types of student populations, in general it seems that achievers and/or overachievers have the following characteristics compared to underachievers: (1) better adjustment, (2) higher motivation, (3) more maturity, (4) better organization, (5) more efficiency, and (6) less hostility toward parents and other authority figures.

Biographical inventories were found to be generally used in an attempt to find non-intellective factors which would significantly add to prediction of criterion variance above and beyond that accounted for by intellective test measures. Hilton and Myers (1967) demonstrated that such efforts seemed to have been in vain. Individual factors seemed to vary greatly from population to population.

The third and final section of this chapter dealt with eleven of the non-intellective factors and one intellective factor (reading ability) investigated in the study.

Findings are summarized as follows:

(1) Farquhar and Payne (1964) and Lavin (1965) stated that the sexes should be studied separately. Several studies reviewed seemed to demonstrate that differences actually do occur among various factors analyzed. When a sample of students not separated by sex are identified as under- and overachievers, more boys usually are in the underachiever group and more girls in the overachiever bracket.

(2) It seems that research results indicate that underachievers have a lower self-concept of ability than normal and overachievers; however, many underachievers can be helped to improve their self-concept and hence their poor academic performance through appropriate counseling focussed on their poor self-concept. Further, underachievers seem to under-predict their future grades moreso than normal and overachievers.

(3) It seems that no significant correlation exists between academic and nonacademic (extra-curricular) achievement.

(4) In general, underachievers have poorer study habits than normal and overachievers.

(5) Tentatively, higher achievers seem to have more test-wiseness than lower achievers.

(6) Evidence seems to conflict concerning whether or not early college underachievers significantly differ from normal and overachievers with regard to certainty of choice of academic major.

(7) It seems normal and overachievers have a higher level of reading ability or performance than underachievers.

(8) - (10) No pattern of relationship seems to exist between over- and underachievement and the influence of high school curriculum taken by a student, size of his high school graduating class or the per-pupil expenditure of his high school district.

(11) Very tentatively, students who come from metropolitan areas (600,000 or more inhabitants) may underachieve more often than students from small population concentrations.

(12) It seems more underachievers come from parochial high schools than from public high schools.

Finally, it must be remembered that no variable has been found to have universal application to all under-, normal- or overachievers in all types of populations or in any single population.

In the next chapter, the research design is described, including a description of the study population and sample, instrumentation, hypotheses and data analysis.

CHAPTER THREE

THE DESIGN

Introduction

This chapter consists of descriptions of the population and samples, instrumentation, research design, hypotheses, method of data collection and preparation and statistical procedures used to analyze data.

Population

The population for this study consists of all freshmen who entered Michigan State University (MSU) in the fall term of 1968. The Registrar's Office recorded 7474 new students who registered for credit courses at that time, not counting transfer students. New students excluded from the study population met one or more of the following criteria:

- 1. Resided outside the United States of America,**
- 2. Were designated as special part-time students,**
- 3. Carried less than six credit hours of classes,**
- 4. Dropped out of MSU before completing fall term,**
- 5. Had incomplete test scores,**
- 6. Had unintelligibly coded test scores,**
- 7. Had incomplete data cards.**

Sample

During Orientation Week all entering students were instructed to go to a certain location to take the Academic Inventory (AI). At each location, six forms of the AI, A through F, were laid out on arm-chair-desks in alphabetical order. About 6355 freshmen completed one of the instruments. Sample size for each form was approximately 1100, except for Form F which numbered about 650. Only Sample C, consisting of 1093 students, was chosen for this study.

Instrumentation

Instruments administered to all or most new freshmen were Form C of the College Qualification Tests, MSU Reading Test, and MSU English Test. Each student in the samples completed one of the six forms of the Academic Inventory.

College Qualification Tests

The College Qualification Tests (CQT) (Bennett et al, 1957) consist of three ability tests: Verbal (75 items), Numerical (50 items) and Informational (75 items). Half the Information test items deal with science; the other half with social studies. Separate scores may be derived for each half. Scores for each test are given separately and then combined into a total score. All six CQT scores were used in this study.

The CQT-Total score seems to have better predictive power for early college achievement than do individual test scores when used separately. Appleton (1965, p. 41) indicated that correlations from .50 to .70 "seem to be the usual findings" when relating total-score to early college performance. In one longitudinal study, Juola (1963) determined that the CQT-Total score was especially useful for predicting a student's first quarter grade-point average (GPA). First quarter GPA was the

criterion of achievement used in this study. Correlation between the CQT-Total score and first quarter GPA for the study sample was .44 for males and .50 for females.

In the CQT manual (Bennett, et al, 1957, p. 27) total-score reliability coefficients of .97 and .96 were reported for groups of freshmen men and women, respectively, from two state universities. These coefficients were obtained by using the split-half method, in which differences between scores of odd and even test items are compared. Individual test score reliability coefficients for the groups ranged from .81 to .75 for men and .78 to .94 for women. Science and Social Science scores had the lowest coefficients.

Michigan State University Reading Test

The MSU Reading Test was developed by the Office of Evaluation Services. The test was designed to measure a student's ability to comprehend ideas expressed in paragraphs representative of those found in textual materials of various academic areas at MSU. The test consists of 50 items and is used on a supplementary basis for selecting students for the Preparatory English Program as well as for selection into honors programs.

Reliability of the test has been estimated on several occasions by the Office of Evaluation Services to be approximately .80. Correlation between the reading test and first quarter GPA for the study sample was .45 for males and .49 for females.

Michigan State University English Test

The MSU English Test was developed by the Office of Evaluation Services. The test was designed to measure a student's proficiency in grammar and expression. It consists of 38 objective items representing several aspects of English usage and is primarily used to select students requiring assistance in the Preparatory English Program.

Reliability of the test has been estimated on several occasions by the Office of Evaluation Services to be approximately .80. Correlation between the test and first quarter GPA for the study sample was .39 for males and .44 for females.

Academic Inventory¹

The Academic Inventory (AI) was developed by the Office of Evaluation Services to assess high school background, preparation and academic skills of incoming freshmen and transfer students. It was expected that University College faculty could determine if the college was adequately and appropriately meeting the needs of entering students by evaluating student responses to items in the inventory.

Each of the six AI forms consisted of two sections. Depending upon the form, the first section contained from 80 to 89 items of a non-intellective nature. Items 1 to 23 were identical on all six forms. These items concerned such things as size of the student's high school graduating class, size of the community in which his high school was located, type of high school he attended--public, parochial, private--and its administrative arrangement; i.e., three-year senior high with a three-year junior high school, and information about courses he took in grades 9 through 12.

Remaining items in part one were grouped according to content, although not all subjects were the same on each form. Each student was asked questions about the following subjects:

- 1) Books he was required to read for class,
- 2) Innovations in his high school's curricula and instructional methods,
- 3) His personal study and objective test-taking habits,
- 4) Extra-curricular activities available in his high school,

¹Appendix A.

- 5) His out-of-class accomplishments,
- 6) A prediction of his first year's academic performance in college.

The second part of Forms A to E consisted of 86 four-alternative items of a cognitive nature. Each item was designed as an entity or "task" in itself to determine degrees of proficiency of skills in various academic areas of students at the time of their matriculation into NSU. Major areas were mathematics, physical, natural and social sciences, and the fine arts. Forms A to E each contained a different set of items, although their content was similar. As an added measure, each student was asked to indicate the level of certainty or confidence with which he answered each item according to a five-point scale:

1) very certain, 95% sure; 2) almost certain, 75% sure; 3) educated guess, 50% sure; 4) remote chance, 35% sure; 5) pure guess, 25% sure.

Form F differed from this procedure by duplicating items from Form A but offering a fifth alternative, "I Don't Know", and eliminating the indication of confidence level.

No total score on either part was expected or computed. Data from part two were not analyzed in this study.

Research Design

The primary objective of this study was to determine non-intellective factors characteristic of each of three groups of students, for each sex, identified as under-, over- or normal achievers. The procedure chosen to identify these groups for this study was the "Regression Model Selection," described by Farquhar and Payne (1964), in which "a regression equation is used to predict achievement from aptitude measures. Under- and over-achievement is then determined on the basis of the discrepancy between predicted and actual achievement."

Thorndike (1963) also discussed the regression model in a chapter entitled "Design II-C: Concurrent Comparison of Contrasting Groups." He stated (pp. 59-61) that the advantage of this method is that it

...can provide a more sensitive test of the existence of a relationship per case completely tested than does a correlational analysis of a complete, intact group. By taking cases at the extremes (assuming a linear relationship), we get cases in which any influence will have the maximum opportunity to show itself, we are, in effect, putting a magnifying glass upon the relationship that we are trying to discover...

If we can safely think of "degree of achievement in relation to expected achievement" as a single continuous variable, differing in degree but not in kind, the use of the "overachiever" group may be expected to provide the maximum amount of information for the amount of data gathered. The sharp difference in achievement between the contrasting groups will make them more sensitive, case for case, to any genuine differences in related variables. Thus, this becomes an efficient experimental design.

However, for the results from such a contrast of extreme groups to be interpretable, we must assume that the "overachiever" differs only quantitatively--not qualitatively--from the "under-achievers"...Insofar as "over-" and "underachievement" are qualitatively different phenomena, with different causes and correlates, the comparison of extreme groups may be ambiguous and confusing.

The comparison of "underachievers" with a group of average or normal achievers may be less efficient in bringing out differences between the two groups, but the differences that are established will be more clearly associated with "underachievement" per se. Insofar as our interest focuses upon the "underachiever," the strategy of using a group of average achievers as the contrasting group will be the safer one and the one leading to more clear-cut interpretations.

Lavin (1965) has offered cautions to be used in interpreting results obtained in studying extreme groups. He stated that the middle group ought not to be dropped out because more information would be obtained from studying all three groups. Further, he questioned the assumption that a linear relationship exists between variables of extreme groups.

Therefore, with the cautions of Thorndike and Lavin in mind, it was decided to study all three groups and not just the extremes. It was expected that more information would be provided about the sample;

i.e., a more accurate estimate of a simple linear relationship among the groups for a given variable or evidence of the presence of a non-linear relationship (cf. Feldman and Newcomb, 1969, pp. 285-6).

The regression line required by the regression model technique was determined by predicting first term college GPA from CQT-Total score. Plus-and-minus one standard error of estimate¹ was selected a priori as the best level to differentiate the three groups. A program written by Ruble and Pafter (1969) was used to obtain the predicted GPA, the difference between the actual GPA and predicted GPA, and the standard error of estimate. Students one standard error of estimate below the regression line were designated underachievers, students one standard error of estimate above the regression line were designated overachievers, and the remaining students within one standard error of estimate of the regression line were designated as normal achievers. Three sets of three groups were identified in this manner: (1) and (2) males and females separately--to test Hypotheses I, II and III, and (3) net on the basis of sex--to test Hypothesis IV.

Hypotheses

The following null hypotheses were formulated from previously stated purposes and investigative questions. The groups referred to in the hypotheses were underachievers, normal achievers and overachievers.

Hypothesis I

No differences existed at the time of university matriculation among the groups on the following non-intellective characteristics:

- (1) Selected high school demographic characteristics.
- (2) High school curricula taken.

¹Male group = 0.677; female group = 0.619; group net chosen by sex = 0.650.

- (3) Participation in selected extra curricular activities in high school,
- (4) Study habits,
- (5) Objective test-taking habits ("test-wiseness"),
- (6) Reasons for attending college,
- (7) Self-concept of ability as indicated by self-expectation (prediction) of academic achievement in the first year of college,
- (8) Declared/undeclared major.

Hypothesis II

No differences existed at the time of university matriculation among the groups on selected tests of academic aptitude.

Hypothesis III

No differences existed at the end of the first term of university study among the groups on:

- (1) First term average credit hours carried,
- (2) First term average credit hours earned,
- (3) First term grade point average.

Hypothesis IV

There was no difference in the ratio of males to females within each group (when the groups were not chosen on the basis of sex).

Data Preparation

Data for each student were put on three data processing cards. Two cards contained all responses to items on the first half of the Academic Inventory and one card contained all test score data and other necessary information. Data made available for this study from the Registrar's Office were each student's credit hours carried,

credit hours earned, and GPA for the 1968 fall term. Remaining data were obtained from the Office of Evaluation Services.

Statistical Analysis

All computations of data analysis were performed using either the CDC 3600 or CDC 6500 computer.¹ The Calculation of Least Squares program (Ruble and Fafter, 1969) was used to compute the statistics necessary to identify the three groups studied in this research project. This procedure was discussed in greater detail in the previous section concerning research design.

Chi-Square analysis, using the ACT program (Lesgold, Zerby and Foster, 1969), was performed to analyze data for testing Hypotheses I and IV. A multivariate analysis of variance program (Finn, 1968) was used to analyze data for testing Hypotheses II and III.

Summary

The population of the study consisted of all new freshmen who entered Michigan State University in fall, 1968. Students were deleted from this population who were classified as special students, who resided in a foreign country, who dropped out during the quarter, who carried less than six credit hours of classes, or who had incomplete or unintelligible test score data. Each student in the study population completed Form C of the College Qualification Tests, the Michigan State University Reading Test and the Michigan State University English Test.

From this population, six random samples of students completed one of six forms, A through F, of a specially constructed instrument, the Academic Inventory. The instrument was designed to ascertain the levels

¹Use of the Michigan State University computing facilities was made possible through support, in part, from the National Science

of academic proficiency new students were bringing with them to Michigan State University as well as selected characteristics of their high schools and personal academic habit patterns and experiences. The sample which completed Form C was chosen for this study.

Hypotheses were developed to test differences among three groups identified as under-, over- and normal achievers. Differences were based on intellectual test scores, GPA, and responses to non-intellectual items of a demographical and biographical nature on the first half of Form C of the Academic Inventory.

Student data were put on data processing cards and analyzed on either the CDC 3600 or 6500 computer. Various statistical analyses, including linear regression, a multivariate analysis of variance, and Chi-Square analysis were performed using programs available for Michigan State University researchers.

The following chapter is concerned with results of data analysis.

CHAPTER FOUR

ANALYSIS OF DATA

Introduction

The purpose of this chapter is to present the analysis of data as described in Chapter Three. Data were analyzed in several ways depending upon their nature. Tables of statistically significant results are included in the body of the chapter. Tables of statistically non-significant results may be found in Appendix B.

The data analysis is presented in four parts: (1) Hypothesis I, (2) Hypothesis II, (3) Hypothesis III, and (4) Hypothesis IV. Groups mentioned are underachievers, normal achievers, and overachievers. The number of students in each achievement level, when the levels were identified separately by sex are given below (Table 4.1).

TABLE 4.1
NUMBER OF STUDENTS IN EACH ACHIEVEMENT
LEVEL BY SEX

Level of Achievement	Sex	
	Male	Female
Under	78	81
Normal	356	414
Over	86	78
Total	520	573

Hypothesis I

No differences existed at the time of matriculation among the groups on the following non-intellective characteristics: (1) Selected high school demographic characteristics, (2) High school curricula taken, (3) Participation in selected extra-curricular activities in high school, (4) Study habits, (5) Objective test-taking habits ("test-wiseness"), (6) Reasons for attending college, (7) Self-concept of ability as indicated by self-expectation (prediction) of academic achievement in the first year of college, (8) Declared/un-declared major.

The Chi-Square analysis technique was used to test Hypothesis I. Results of the analysis are included in the following subsections. Statements of rejection or non-rejection of each part of the hypothesis are included at the end of the discussion in each sub-section. The .05 level of confidence was established as the critical level in testing all hypotheses. In some cases, cells had to be collapsed because not enough expected frequencies occurred in two or more cells to provide an accurate analysis (Walker and Lev, 1953).

Selected High School Demographic Characteristics

The first eleven questions in Part I of the Academic Inventory¹ were concerned with various demographic characteristics of and personal opinions held by each student about the high school from which he graduated. Questions dealt specifically with number of students in one's high school graduating class, type and administrative arrangement of the high school, percentage of fellow graduates definitely planning to go on to college immediately, description of the community in which one's high school was located, one's mode of transportation to school, and age of the school building.

Each student was also asked his personal opinion regarding his high school's financial support, instructional procedures and success in preparing its graduates for college work.

¹Appendix A

It was hypothesized from the literature review that no differences among sizes of high school graduating classes or the financial support of the high school would be discerned among the groups. No differences were found to occur upon analysis of items 1 and 2 (Appendices B.1 and B.2).

In item 4, each student was asked to identify the type of high school from which he graduated--public, parochial (church related) or private. It was anticipated from the literature review that a greater percentage of public high school graduates would be normal and over-achievers than parochial school graduates. Contrary to expectation, no significant differences occurred among achievement levels among the three types of graduates for females, and a larger percentage of parochial than public high school graduates were normal and overachievers for males (Table 4.2). Further, one might expect private school graduates to perform better than the public or parochial school graduates. Results of data analysis indicated that no significant differences occurred for females among the types of graduates among achievement levels. For males, a much larger percentage of private school graduates than public and parochial school graduates were classified as underachievers.

Results of analyses of item 7, pertaining to the size of the community in which each student's high school was located (Table 4.3), were significant only for females, but were difficult to interpret meaningfully. Normal achievers came more often than the other groups from high schools in suburbs of large cities (200,000+) and small city or rural schools than from other-sized communities. Underachievers came most often from small city or rural schools and about the same percentage of under- and overachievers came from high schools in large cities.

TABLE 4.2
PERCENTAGE OF STUDENTS BY ACHIEVEMENT LEVEL AND SEX
GRADUATING FROM PUBLIC, PAROCHIAL, OR PRIVATE HIGH SCHOOLS

Level of Achievement	Public	Parochial	Private	χ^2
Under	14* (15)	9 (7)	40 (9)	17.681** (5.233)
Normal	68 (72)	82 (72)	48 (78)	
Over	18 (13)	9 (22)	12 (13)	
Total	100 (100)	100 (100)	100 (100)	

*First set of figures for males: figures in parentheses for females.

**Significant at the .05 level or beyond.

TABLE 4.3
PERCENTAGE OF STUDENTS BY ACHIEVEMENT LEVEL AND SEX
ATTENDING HIGH SCHOOLS FROM VARIOUS SIZED COMMUNITIES

Level of Achievement	200,000+	Suburb of 1	50,000- 199,000	Suburb of 3	Small City, Town, Rural	χ^2
Under	18* (20)	19 (20)	14 (14)	6 (9)	42 (38)	9.178 (19.067)**
Normal	16 (10)	30 (35)	13 (13)	8 (9)	33 (34)	
Over	12 (18)	35 (24)	16 (21)	3 (12)	34 (26)	

*First set of figures for males; figures in parentheses for females.

**Significant at the .05 level or beyond.

No directions were found in the literature reviewed which would have given tentative expectations for results of analyzing items pertaining to instructional procedures in one's high school (item 3), approximate percentage of fellow-graduates definitely planning on immediately going to college (item 5), one's evaluation of high school preparation for college (item 6), degree of industrialization of the high school

community (item 8), the administrative arrangement of the high school (item 9), one's mode of transportation to high school in his senior year (item 10), and approximate age of the high school physical plant (item 11).

Results of data analysis for the above items indicated no significant differences occurred among achievement levels for either sex, except for females on item 6, pertaining to the student's evaluation of his high school preparation for college (Table 4.4). Almost three-quarters of female students who expressed a "very poor" evaluation of high school preparation for college work were underachievers; whereas, the vast majority of students expressing a "very adequate" evaluation of high school preparation were normal and overachievers.

TABLE 4.4
PERCENTAGE OF STUDENTS BY ACHIEVEMENT LEVEL AND SEX
EVALUATING THEIR HIGH SCHOOL PREPARATION FOR COLLEGE
ACCORDING TO FIVE CRITERIA

Level of Achievement	Very Adeq	Above Ave	Ave	Below Ave	Very Poor	χ^2
Under	14* (9)	15 (15)	16 (12)	17 (18)	0 (73)	
Normal	74 (74)	66 (75)	68 (74)	68 (63)	88 (18)	4.319 (38.345)**
Over	13 (17)	19 (11)	16 (14)	15 (18)	13 (9)	
Total	100 (100)	100 (100)	100 (100)	100 (100)	100 (100)	

*First set of figures for males; figures in parentheses for females.

**Significant at the .05 level or beyond.

In conclusion, this section of Hypothesis I, which pertained to selected demographic characteristics of the high schools from which students in the study sample graduated, was rejected for both sexes. Differences were found to occur on some of the characteristics investigated.

High School Curricula Taken

It was hypothesized from the literature review that few if any significant differences would be found among the achievement levels regarding the kinds and number of terms of courses they took in high school. For males, only three items in twenty-seven indicated statistically significant differences--pertaining to number of art (item 12), physical science (item 15) and political science (item 25) courses taken (Tables 4.5 and 4.6). Underachievers took less terms of art courses and more of physical and political science courses than normal and overachievers. Another question (item 28) pertaining to art was not significant for males. Only three items were significant for females--number of courses taken in physical science (item 15), mathematics (item 22) and vocational agriculture (item 30) (Tables 4.5 and 4.6). Underachievers took more terms of mathematics and physical science than the other groups. Item 30 was not held to be meaningful, however, because of the subject and the numbers of females not even taking one course.

This section of Hypothesis I was not rejected for either sex.

TABLE 4.5
PERCENTAGE OF STUDENTS BY ACHIEVEMENT LEVEL AND SEX
TAKING VARIOUS NUMBERS OF TERMS OF COURSES IN SELECTED AREAS
IN GRADES 9 - 12

Item Number & Course Area	Underachievers					Normal Achievers					Overachievers					x ²
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	
12. Art	88*	12	0	-	-	75	16	9	-	-	72	20	8	-	-	9.764*** (8.703)
	(68)	(25)	(4)	(11)	(3)	(63)	(23)	(8)	(4)	(2)	(66)	(19)	(8)	(1)	(6)	
13. Music	68	9	6	5	12	57	17	7	6	12	60	13	3	3	20	9.611 (12.150)
	(41)	(25)	(6)	(11)	(17)	(37)	(25)	(10)	(6)	(22)	(40)	(23)	(18)	(5)	(14)	
14. Biological Sciences	4	69	23	3	1	6	71	21	2	1	5	64	29	1	1	3.972 (12.210)++
	(5)	(61)	(28)	(6)	(-)	(3)	(73)	(20)	(3)	(-)	(4)	(83)	(12)	(1)	(-)	
15. Physical Sciences	1	18	53	21	8	6	28	48	13	4	1	21	60	16	1	18.020** (13.498)**++
	(20)	(36)	(31)	(14)	(-)	(20)	(46)	(28)	(5)	(-)	(21)	(55)	(19)	(5)	(-)	
16. Commercial Arts	37	53	8	3	0	37	54	7	1	1	40	53	6	0	1	3.369 (11.222)
	(21)	(54)	(17)	(2)	(5)	(18)	(59)	(16)	(6)	(2)	(17)	(61)	(12)	(3)	(6)	
17. English	4	21	17	10	49	6	13	22	13	46	6	16	17	14	47	4.991 (13.291)
	(5)	(11)	(10)	(15)	(59)	(8)	(13)	(19)	(10)	(50)	(4)	(10)	(28)	(6)	(51)	
18. Literature	1	10	29	18	41	2	11	32	16	39	1	6	30	23	40	4.551 (4.448)
	(4)	(15)	(20)	(15)	(46)	(2)	(9)	(23)	(18)	(48)	(1)	(12)	(23)	(15)	(49)	
19. Foreign Language	13	9	49	15	14	13	13	42	15	16	7	22	34	21	16	11.541 (10.440)
	(7)	(6)	(46)	(19)	(22)	(3)	(8)	(36)	(24)	(29)	(5)	(8)	(33)	(17)	(37)	
20. History	1	26	50	13	10	2	16	44	27	11	1	15	43	27	14	11.064 (7.296)
	(0)	(20)	(49)	(17)	(14)	(0)	(20)	(45)	(26)	(8)	(0)	(26)	(41)	(27)	(6)	
21. Social Sciences	5	50	31	10	4	6	45	38	8	3	8	51	30	6	5	4.806 (6.845)++
	(0)	(54)	(36)	(10)	(-)	(5)	(50)	(37)	(10)	(-)	(8)	(54)	(31)	(8)	(-)	
22. Mathe- matics	-	-	9	17	74	-	-	13	21	65	-	-	6	16	78	7.101+++ (18.918)**
	(1)	(6)	(20)	(27)	(45)	(0)	(6)	(25)	(37)	(32)	(0)	(12)	(35)	(21)	(33)	
23. Vocational Education	72	18	4	0	6	67	20	6	3	3	67	22	6	3	1	7.082 (3.670)
	(53)	(30)	(10)	(6)	(1)	(58)	(29)	(8)	(4)	(1)	(54)	(32)	(9)	(3)	(3)	

Key: 1. Did not take courses in this area 3. Took three or four terms in this area
2. Took one or two terms in this area 4. Took five or six terms in this area
5. Took seven or more terms in this area

*First set of figures for males, figures in parentheses for females; **Significant at the .05 level or beyond; +Computed with 4 D.F. because cells 3, 4 and 5 were collapsed; ++Computed with 6 D.F.

TABLE 4.6
PERCENTAGE OF STUDENTS BY ACHIEVEMENT LEVEL AND SEX
TAKING VARIOUS NUMBERS OF TERMS OF SELECTED COURSES
IN GRADES 9 - 12

Item Number & Course Area	Underachievers					Normal Achievers					Overachievers					x ²
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	
24. Statistics	85* (86)	14 (14)	1 (0)	0 (0)	0 (0)	87 (97)	10 (7)	2 (1)	0 (0)	0 (1)	84 (96)	12 (4)	3 (0)	0 (0)	0 (0)	4.154 (7.766)
25. Political Science	44 (44)	31 (30)	19 (19)	3 (4)	3 (4)	46 (49)	39 (33)	12 (14)	2 (2)	2 (2)	45 (44)	29 (36)	24 (18)	1 (0)	0 (3)	13.671**+ (6.387)
26. American Literat.	3 (4)	21 (21)	54 (47)	5 (9)	18 (20)	3 (3)	22 (17)	52 (54)	8 (9)	15 (17)	1 (1)	16 (18)	59 (58)	6 (12)	17 (12)	4.542 (5.037)
27. English Literat.	5 (7)	29 (22)	53 (54)	2 (2)	14 (14)	7 (7)	24 (24)	50 (50)	8 (8)	11 (11)	8 (10)	17 (18)	56 (55)	1 (9)	17 (8)	11.835 (7.068)
28. Art	91 (70)	3 (12)	6 (9)	- (2)	- (6)	78 (64)	10 (10)	1 (13)	- (2)	- (11)	80 (68)	9 (9)	10 (8)	- (3)	- (13)	7.059++ (5.024)
29. Music	73 (40)	1 (11)	6 (16)	1 (2)	18 (31)	60 (39)	9 (13)	8 (14)	2 (4)	21 (30)	63 (44)	9 (12)	3 (10)	0 (1)	24 (33)	11.486 (2.928)
30. Vocational Agricul.	94 (99)	1 (1)	0 (0)	0 (0)	5 (-)	95 (100)	1 (0)	1 (0)	0 (0)	3 (-)	97 (97)	1 (0)	0 (3)	0 (0)	2 (-)	2.760 (15.335)**
31. Home Econ.	100 (53)	0 (11)	0 (21)	0 (4)	0 (11)	96 (59)	4 (14)	0 (17)	0 (1)	0 (8)	92 (55)	8 (18)	0 (15)	0 (1)	0 (10)	8.361 (6.021)
32. Industrial Arts	74 (95)	6 (2)	15 (1)	3 (1)	1 (0)	67 (98)	10 (2)	15 (1)	1 (0)	6 (0)	65 (95)	9 (3)	17 (0)	2 (1)	6 (1)	6.333 (12.929)
33. European History	55 (44)	26 (21)	17 (28)	1 (5)	1 (1)	44 (49)	24 (24)	26 (24)	3 (1)	2 (1)	44 (55)	27 (18)	24 (22)	2 (3)	2 (3)	5.270 (10.184)
34. World History	29 (15)	14 (25)	54 (57)	1 (0)	1 (4)	17 (20)	23 (19)	54 (57)	3 (2)	3 (2)	21 (25)	14 (12)	59 (60)	2 (0)	3 (4)	11.687 (9.920)
35. Geography	73 (65)	12 (23)	14 (10)	0 (1)	1 (0)	62 (67)	22 (19)	14 (13)	1 (0)	1 (1)	66 (74)	23 (15)	9 (10)	1 (0)	0 (0)	8.032 (9.871)

TABLE 4.6--Continued

Item Number & Course Area	Underachievers					Normal Achievers					Overachievers					x ²
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	
36. Aeronautics	99 (100)	1 (0)	0 (0)	0 (-)	0 (-)	98 (99)	1 (1)	0 (0)	0 (-)	0 (-)	98 (97)	1 (3)	1 (0)	0 (-)	0 (-)	2.252 (2.999)
37. Philosophy or Logic	74 (73)	19 (20)	5 (4)	1 (0)	- (4)	81 (71)	17 (16)	2 (5)	0 (1)	- (1)	86 (71)	12 (19)	2 (8)	0 (0)	- (3)	7.671+ (9.762)
38. General or Consumer Math.	74 (67)	8 (7)	6 (1)	0 (12)	12 (73)	77 (7)	8 (8)	7 (2)	1 (10)	6 (69)	65 (9)	10 (6)	8 (1)	1 (14)	15 (14)	10.431 (5.483)

Key: 1. Never studied this subject
2. One term or semester

3. Two terms or semesters
4. Three terms or semesters

5. Four or more terms
or semesters

*First set of figures for males; figures in parentheses for females.

**Significant at the .05 level of confidence or beyond.

+Computed with 6 D.F. because cells 4 and 5 were collapsed.

++Computed with 4 D.F. because cells 3, 4 and 5 were collapsed.

Participation in Selected Extra-Curricular Activities

In eleven items in the Academic Inventory (56 through 66), each student was asked whether selected extra-curricular organizations and activities were available in the student's high school, and, if so, the degree to which he actively participated in them. In nine items, 67 through 75, each student was requested to indicate the number of "out-of-class" experiences or accomplishments he had in the area of social science in high school (Appendix B.9). Based on the literature review, it was hypothesized that no differences would be noted among the twenty items devoted to this subject. For males, only item 62 (Science Club) was significant (Table 4.7). For females, only item 64 (Debating Club) was significant (Table 4.8). In both cases, a greater percentage of underachievers indicated the club did not exist in their high school as far as they knew. No significant differences were found among the groups for either sex regarding accomplishments or experiences of a social science nature (Appendix B.10).

TABLE 4.7
PERCENTAGE OF MALES BY ACHIEVEMENT LEVEL INDICATING
THEIR PARTICIPATION IN A HIGH SCHOOL SCIENCE CLUB

Level of Achievement	Not Available	Actively Participated	Did Not Participate	χ^2
Under	49	17	35	12.339*
Normal	32	13	55	
Over	37	17	45	

*Significant at the .05 level of confidence or beyond.

TABLE 4.8
PERCENTAGE OF FEMALES BY ACHIEVEMENT LEVEL INDICATING
THEIR PARTICIPATION IN A HIGH SCHOOL DEBATING CLUB

Level of Achievement	Not Available	Actively Participated	Did Not Participate	X ²
Under	37	13	50	27.047*
Normal	16	19	65	
Over	17	8	76	

*Significant at the .05 level of confidence or beyond.

Since analysis of data for only one item for each sex showed significant differences among the groups, it seemed results occurred due to chance. Therefore, this section of Hypothesis I was not rejected for either sex.

Study Habits

In nine items, 42 through 50, each student was requested to indicate his general study habits. No differences were noted for males, but significant differences occurred in two items for females--items 43 and 44 (Table 4.9).

It was expected from the literature reviewed for this study that some trends or differences in study habits and attitudes might be discovered indicating that underachievers would have poorer study habits and attitudes than the other groups. In the first item, each student was asked if he tried to ask himself questions and to answer them as he studied. In the second item, each student was asked if he regularly reviewed his class notes from lectures and assigned readings. Overachievers had better study habits than the others.

TABLE 4.9
PERCENTAGE OF STUDENTS BY ACHIEVEMENT LEVEL AND SEX INDICATING THEIR
GENERAL STUDY HABITS USING A FIVE-POINT SCALE

42. In taking notes on required library readings, do you try to record the exact sentences as written rather than rewriting the thoughts in your own words?
43. Do you try to ask yourself questions and to answer them as you study?
44. Do you regularly review your class notes from lectures and assigned readings?
45. Is the final copy of your lecture notes organized in some kind of an outline form?
46. When you listen to a lecture, do you try to copy down as much as you can, rather than relying on key words to help you recall general ideas?
47. When you study history, do you try to look for the relationships among various events?
48. In first reading an assignment, do you try to read each paragraph thoroughly?
49. Do you pause during your study to think about the material?
50. After you learn a general principle or rule, do you try to think of examples which illustrate it?

Item	Underachievers					Normal Achievers					Overachievers					X ²
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	
42.	1*	12	15	36	36	7	13	16	31	33	5	17	10	34	34	7.151
	(4)	(13)	(15)	(41)	(28)	(5)	(15)	(17)	(35)	(28)	(5)	(13)	(5)	(37)	(29)	(1.550)
43.	6	21	32	31	9	15	21	23	28	14	17	22	27	24	9	8.720
	(12)	(23)	(30)	(27)	(7)	(14)	(24)	(22)	(28)	(11)	(32)	(28)	(17)	(17)	(16)	(21.753)**
44.	9	22	23	37	9	12	18	25	30	15	22	23	24	23	7	15.354
	(20)	(19)	(36)	(21)	(5)	(16)	(26)	(25)	(25)	(8)	(32)	(22)	(21)	(17)	(9)	(18.830)**
45.	12	13	18	31	27	13	19	15	24	28	14	27	13	24	22	7.229
	(12)	(23)	(15)	(28)	(21)	(19)	(23)	(20)	(21)	(17)	(21)	(29)	(18)	(15)	(17)	(7.717)
46.	5	5	13	27	50	5	12	14	25	44	7	13	14	30	36	6.153
	(6)	(12)	(17)	(30)	(35)	(10)	(13)	(16)	(28)	(33)	(15)	(12)	(18)	(21)	(35)	(5.302)
47.	22	24	26	22	4	22	26	26	16	10	23	28	27	20	2	6.643
	(17)	(28)	(21)	(26)	(9)	(19)	(26)	(22)	(25)	(7)	(23)	(35)	(23)	(15)	(4)	(6.802)
48.	21	22	22	18	18	22	26	15	21	16	26	24	23	20	7	8.815
	(20)	(22)	(14)	(23)	(21)	(23)	(26)	(16)	(21)	(14)	(26)	(31)	(9)	(21)	(14)	(6.190)

TABLE 4.9--Continued

Item	Underachievers					Normal Achievers					Overachievers					x ²
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	
49.	13	33	35	15	4	16	29	30	19	6	23	28	28	20	1	7.949
	(16)	(40)	(35)	(4)	(6)	(17)	(31)	(33)	(16)	(3)	(26)	(29)	(28)	(15)	(1)	(15.190)
50.	15	27	28	25	4	17	30	22	23	8	19	20	29	27	6	7.542
	(17)	(31)	(26)	(21)	(5)	(17)	(27)	(26)	(24)	(6)	(12)	(38)	(19)	(31)	(0)	(12.383)

Key: 1. Almost always (over 90% of the time) 3. Often (26% - 74% of the time)
 2. Usually (75% - 90% of the time) 4. Sometimes (10% - 25% of the time)
 5. Rarely (less than 10% of the time)

*First set of figures for males; figures in parentheses for females.

**Significant at the .05 level of confidence or beyond.

Since the analysis for males showed no statistically significant differences and since female overachievers had better study habits than normal and underachievers, this section of Hypothesis I was not rejected for males, but was rejected for females.

Test-wiseness

In nine items, 76 through 84, each student was asked about the procedures he used in answering questions on objective examinations (Appendix B.11). No significant differences occurred among the females achievement levels. For males, significant differences occurred only in item 79, in which each student was asked if he tended to choose one of two very similar possible answers on a multiple choice question. The meaning was unclear, however, and the results were considered of doubtful value.

This section of Hypothesis I was not rejected for either sex.

Reasons for Attending College

In items 39 through 41, each student was requested to select his first, second and least important reasons for attending college from a list of five suggestions (Table 4.10). Only item 41, concerning the least important reason, indicated significant differences among male achievement levels; however, the results were not possible to interpret meaningfully because the items regarding the two most important reasons showed no significant differences. No significant differences were noted in the items among the female achievement levels.

This section of Hypothesis I was not rejected for either sex.

TABLE 4.10
PERCENTAGE OF STUDENTS BY ACHIEVEMENT LEVEL AND SEX
INDICATING THEIR REASONS FOR ATTENDING COLLEGE

39. Which of these reasons seems to be most important to you personally?
 40. Which appears to be next in importance?
 41. Which of these reasons seems to be the least important to you personally?

Item No.	Level of Achievement	1	2	3	4	5	χ^2
39.	Under	29* (26)	3 (7)	51 (32)	0 (1)	17 (33)	12.203 (9.215)
	Normal	15 (19)	5 (2)	62 (25)	2 (2)	16 (45)	
	Over	20 (13)	4 (11)	60 (32)	1 (4)	14 (40)	
40.	Under	33 (23)	13 (15)	28 (35)	4 (7)	22 (20)	7.494 (7.007)
	Normal	38 (20)	18 (21)	20 (28)	6 (7)	18 (23)	
	Over	30 (12)	20 (23)	27 (35)	4 (9)	19 (20)	
41.	Under	6 (20)	28 (17)	9 (11)	31 (41)	26 (11)	27.880** (13.453)
	Normal	17 (18)	25 (25)	3 (13)	36 (39)	19 (5)	
	Over	5 (16)	33 (27)	1 (3)	49 (45)	12 (9)	

Key: 1. For the prestige of a college degree
 2. It is expected in our family
 3. To make more money
 4. To be with school friends
 5. Enjoy going to school

*First set of figures for males; figures in parentheses for females.

**Significant at the .05 level of confidence or beyond.

Self-Concept of Ability

In items 51 through 54, each student was asked to indicate his expected grades for his first year of college in (1) all courses taken, (2) major subjects, (3) required general education courses and (4) social science courses should he enroll in any (Table 4.11). In a fifth question, item 55, each student was asked what kinds of grades he received in high school social science courses in the last year any

It was hypothesized from the literature reviewed that under-achievers would indicate lower expectations when predicting their first year's academic performance. In item 51, male and female underachievers had significantly lower expectations than normal and overachievers for earning overall high grades in their first year of college. Further, in item 52, female underachievers expected significantly lower grades in their major courses than the other groups. In item 54, male overachievers expected significantly higher grades in social science courses for their first year in college than the other achievement levels. Finally, in item 55, female underachievers received significantly lower grades in high school social science grades than both normal and overachievers. Because of these results, this section of Hypothesis II was rejected for both males and females.

TABLE 4.11
PERCENTAGE OF STUDENTS BY ACHIEVEMENT LEVEL AND SEX INDICATING WHAT KINDS OF GRADES
THEY EXPECTED IN THEIR FIRST YEAR OF COLLEGE

51. What kinds of grades do you expect to receive this coming year at MSU?
52. What kinds of grades do you expect to receive in the subjects of your major?
53. What kinds of grades do you expect to receive in required general education courses?
54. What kinds of grades would you expect to receive should you enroll in social science courses at MSU?
55. What kinds of grades did you receive in high school social science courses in the last year you took courses of this kind?

Item	Underachievers					Normal Achievers					Overachievers					x ²
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	
51.	3*	23	62	13	0	9	31	42	16	1	14	43	33	10	0	23.258**
	(1)	(15)	(64)	(20)	(0)	(3)	(27)	(56)	(14)	(0)	(4)	(46)	(41)	(8)	(1)	(25.886)**
52.	12	52	34	3	0	16	51	25	7	1	25	50	22	3	0	11.176
	(4)	(52)	(41)	(4)	(-)	(12)	(59)	(24)	(6)	(-)	(17)	(62)	(19)	(3)	(-)	(17.157)**+
53.	6	32	44	17	1	12	30	36	20	3	16	40	28	16	0	12.167
	(1)	(26)	(48)	(22)	(2)	(6)	(28)	(47)	(18)	(2)	(5)	(33)	(49)	(12)	(1)	(6.906)
54.	8	44	22	26	1	13	35	31	19	2	8	51	15	22	3	17.450
	(9)	(23)	(38)	(28)	(1)	(7)	(37)	(35)	(19)	(1)	(8)	(38)	(38)	(13)	(3)	(9.679)
55.	40	39	14	7	0	43	40	13	4	0	59	27	12	2	0	10.519
	(40)	(43)	(12)	(4)	(1)	(49)	(43)	(6)	(2)	(0)	(64)	(31)	(4)	(1)	(0)	(19.142)**

Key: 1. Mostly A's; 2. Mostly B's; 3. Mostly B's & C's; 4. Mostly C's; 5. Mostly C's & D's.

*First set of figures for males; figures in parentheses for females.

**Significant at the .05 level of confidence or beyond.

+Computed with 6 D.F. because cells 4 and 5 were collapsed.

Choice of College Major

A freshman may or may not declare a major upon entering Michigan State University. Data regarding choice of major were analyzed by using a simple dichotomy--preference/no preference. This analysis revealed no significant differences among the groups for males or females (Table 4.13); therefore, this section of Hypothesis I was not rejected for either sex.

TABLE 4.12
PERCENTAGE OF STUDENTS BY ACHIEVEMENT LEVEL AND SEX
INDICATING THEIR CHOICE OF MAJOR

Achievement Level	No Preference	Preference	χ^2
Under	19* (27)	81 (73)	2.876 (0.395)
Normal	27 (26)	73 (74)	
Over	21 (30)	79 (70)	

*First set of figures for males; figures in parentheses for females.

Hypothesis II

No differences existed at the time of university matriculation among the groups on selected tests of academic aptitude.

A multivariate analysis of variance (Finn, 1968) was used to carry out the test of the second hypothesis. The .05 level of confidence was chosen to test for statistical significance. Selected tests of academic aptitude were: (1) Michigan State University English Test, (2) Michigan State University Reading Test, and (3) the College Qualification Tests (CQT), Form C. The CQT consisted of three tests from which the following six scores were obtained: (a) Information-Social Science, (b) Information-Natural Science, (c) Information-Total, (d) Verbal, (3) Numerical and (f) CQT-Total.

The analysis of data revealed the following about the study sample:

(1) Sex Differences: It was expected that sex differences and similarities would be found for the study sample regarding average scores on selected tests of academic aptitude which would reflect characteristics noted within the study population (Office of Evaluation Services, 1968). In the study population, males scored higher than females on five of the six CQT tests--about four points more on the Numerical, six points higher on the Information Tests (three points higher on each information subtest) and about eleven points more than females on the total score. Both sexes had about the same averages on the CQT-Verbal test and the MSU Reading Test in the study population, and females scored about two points more than males on the MSU English Test.

Results of analysis were in accordance with expectations. No significant differences existed on the MSU Reading Test and CQT-Verbal test score averages. Significant sex differences did occur on the remaining test score averages, females performing better on the MSU English Test and males scoring better on the other five CQT scores (Tables 4.13 and 4.14).

TABLE 4.13
RAW SCORE MEANS OF SELECTED ABILITY FOR STUDENTS BY
ACHIEVEMENT LEVEL AND SEX

Achievement Level	Selected Ability Tests**							CQT-T
	Eng	Rdg	ISS	ISci	IT	Ver	Num	
Under	24.17*	30.68	24.69	26.90	51.59	54.24	36.85	142.68
	(24.72)	(30.40)	(20.58)	(23.88)	(44.46)	(53.09)	(30.35)	(127.89)
Normal	23.84	32.15	24.73	26.56	51.29	53.12	34.85	139.26
	(25.50)	(31.96)	(21.62)	(23.14)	(44.75)	(54.03)	(30.15)	(128.91)
Over	24.80	33.31	24.66	27.49	52.15	51.58	38.52	142.26
	(27.33)	(34.18)	(22.10)	(22.17)	(44.87)	(54.33)	(29.91)	(129.12)

*First set of figures for males: figures in parentheses for females. Scores are raw scores.

**College Qualification Tests (CQT):

Information-Social Science (ISS)

Information-Natural Science (ISci)

Information-Total (IT)

Verbal (Ver)

Numerical (Num)

CQT-Total (CQT-T)

MSU English Test (Eng)

MSU Reading Test (Rdg)

TABLE 4.14
MULTIVARIATE ANALYSIS OF VARIANCE OF SEX DIFFERENCES
ON SELECTED ABILITY TEST SCORES OF STUDENTS

F-Ratio = 58.61*		
D.F. for hypothesis = 8		
D.F. for error = 1080		
Variables**	Between Mean Squares	Univariate F
Eng	825.98	23.75*
Rdg	2.04	0.04
ISS	2753.01	98.58*
ISci	3481.00	129.04*
IT	12451.08	148.01*
Ver	225.69	1.41
Num	8577.00	107.48*
CQT-T	35884.76	54.72*
D.F. for hypothesis = 1		
D.F. for error = 1087		

*Significant at the .05 level of confidence or beyond.

**See Table 4.13 for abbreviations of variables.

This aspect of Hypothesis II was not rejected for either the CQT-Verbal test or the MSU Reading Test, but was rejected for the MSU English Test and remaining five CQT test score averages according to the differences or similarities noted.

(2) Group Differences: It was expected that underachievers would earn significantly lower test score averages than the other two achievement levels on selected tests of academic ability. Results of data analysis were only partially congruent with this hypothesis (Tables 4.13 and 4.15). Underachieving males and females scored significantly lower on the MSU Reading Test and underachieving females scored significantly lower on the MSU English Test than the other groups. Overachieving males did significantly better on the CQT-Numerical test than the other groups; however, on the same test underachieving males

unexpectedly scored better than normal achievers. No significant differences among achievement levels were found on the remaining five CQT test score averages.

TABLE 4.15
MULTIVARIATE ANALYSIS OF VARIANCE OF ACHIEVEMENT LEVEL
DIFFERENCES ON SELECTED ABILITY TEST SCORES OF STUDENTS

F-Ratio = 3.94* D.F. for hypothesis = 16 D.F. for error = 2160		
Variables**	Between Mean Squares	Univariate F
Eng	193.12	5.55*
Rdg	411.65	7.72*
ISS	25.59	0.92
ISci	22.07	0.82
IT	17.26	0.21
Ver	32.08	0.20
Num	346.48	3.09*
CQT-T	221.88	0.34
D.F. for hypothesis = 2 D.F. for error = 1087		

*Significant at the 0.5 level of confidence or beyond.

**See Table 4.13 for abbreviations of variables.

In light of these results, this part of Hypothesis II was rejected for females for the MSU English and Reading Tests, and for males for the MSU Reading Test and the CQT-Numerical test. Hypothesis II was not rejected for either sex for the remaining five CQT test score averages.

(3) Interaction Effects (Sex x Achievement Level): No expectations were held concerning this area. Results of the data analysis indicated that no significant differences regarding sex x achievement level interaction effect occurred among the variables (Table 4.16). This section of Hypothesis II was not rejected.

TABLE 4.16
MULTIVARIATE ANALYSIS OF VARIANCE OF INTERACTION
BETWEEN SEX AND ACHIEVEMENT LEVEL ON
SELECTED ABILITY TEST SCORES OF STUDENTS

	F-Ratio = 1.47	
	D.F. for hypothesis = 16	
	D.F. for error = 2160	

Variables**	Between Mean Squares	Univariate F
-------------	-------------------------	-----------------

Eng	13.96	0.40
Rdg	20.33	0.38
ISS	25.52	0.91
ISci	35.02	1.30
IT	12.52	0.15
Ver	154.24	0.96
Num	279.60	3.50*
CQT-T	396.27	0.60

	D.F. for hypothesis = 2	
	D.F. for error = 1087	

*Significant at .05 level of confidence or beyond.

**See Table 4.13 for abbreviations for variables.

Hypothesis III

No differences existed at the end of the first term of university study among the groups on: (1) First term average credit hours carried, (2) First term average credit hours earned, and (3) First term grade point average.

A multivariate analysis of variance program (Finn, 1968) was used to carry out the test of the third hypothesis. The .05 level of confidence was chosen to test for statistical significance.

The analysis revealed the following about the study sample:

(1) **Sex Differences:** No expectations were held regarding sex differences among the three variables analyzed in this study. Results of data analysis indicated that no significant sex differences occurred (Tables 4.17 and 4.18). Therefore, this aspect of Hypothesis III was not rejected.

TABLE 4.17
RAW SCORE MEANS OF SELECTED ABILITY TESTS FOR STUDENTS
BY ACHIEVEMENT LEVEL AND SEX

Level of Achievement	CHC	Variables* CHE	GPA
Under	13.60** (12.98)	10.40 (9.83)	1.43 (1.42)
Normal	13.55 (13.50)	13.39 (13.41)	2.55 (2.56)
Over	13.36 (13.49)	13.36 (13.47)	3.47 (3.38)

*Credit hours carried (CHC); Credit hours earned (CHE); Grade point average (GPA).

**First set of figures for males; figures in parentheses for females.

TABLE 4.18
MULTIVARIATE ANALYSIS OF VARIANCE OF SEX DIFFERENCES
ON SELECTED ABILITY TEST SCORES OF STUDENTS

F-Ratio - 0.93 D.F. for hypothesis = 1 D.F. for error = 1087		
Variables*	Between Mean Squares	Univariate F
CHC	2.98	0.57
CHE	0.13	0.02
GPA	1563.64	0.65
D.F. for hypothesis = 1 D.F. for error = 1087		

*Credit hours carried (CHC); Credit hours earned (CHE); Grade point average (GPA).

(2) **Group Differences:** It was expected that significant differences among achievement levels would be found by nature of the design. No hypothesis was made concerning differences among the groups for the average credit hours carried and earned. Results of data analysis showed that underachievers of both sexes did not have a significantly lower credit hours carried average than normal and overachievers, but that underachievers did have a significantly lower credit hours earned average. Underachievers of both sexes had a significantly lower grade point average than normal achievers who, in turn, earned a significantly lower grade point average than overachievers (Tables 4.17 and 4.19). Because of these results, this section of Hypothesis III was not rejected for either sex regarding average credit hours carried, but was rejected for both sexes for average credit hours earned and grade point average.

TABLE 4.19
MULTIVARIATE ANALYSIS OF VARIANCE OF ACHIEVEMENT LEVEL DIFFERENCES
ON SELECTED ABILITY TEST SCORES OF STUDENTS

F-Ratio = 287.35* D.F. for hypothesis = 6 D.F. for error = 2170		
Variables**	Between Mean Squares	Univariate F
CHC	4.17	0.79
CHC	739.11	94.62*
GPA	1626371.60	678.33*
D.F. for hypothesis = 2 D.F. for error = 1087		

*Significant at the .05 level of confidence or beyond.

**Credit hours carried (CHC); Credit hours earned (CHE); Grade point average (GPA).

(3) Interaction Effect (Sex x Achievement Level): No hypothesis was made concerning this factor. No significant sex x achievement level interaction effect was noted among the variables analyzed (Table 4.20). Therefore, this section of Hypothesis was not rejected for either sex.

TABLE 4.20
MULTIVARIATE ANALYSIS OF VARIANCE OF INTERACTION BETWEEN SEX
AND ACHIEVEMENT LEVEL ON SELECTED ABILITY TEST
SCORES OF STUDENTS

F-Ratio = 1.03 D.F. for hypothesis = 6 D.F. for error = 2170		
Variables*	Between Mean Squares	Univariate F
CNC	6.77	1.29
CHE	6.43	0.82
GPA	1636.93	0.68
D.F. for hypothesis = 2 D.F. for error = 1087		

*Credit hours carried (CNC); Credit hours earned (CHE); Grade point average (GPA).

Hypothesis IV

There was no difference in the ratio of males to females within each group (when the groups were not chosen on the basis of sex).

Hypothesis IV was tested by the Chi-Square analysis technique. The .05 level of confidence was established to test for statistical significance.

It was hypothesized from the literature reviewed that more males than females would be identified as underachievers when the groups were not chosen with regard to sex. The results of data analysis were in line with this expectation--significant differences did occur. Males

were overrepresented in the underachievers category (Table 4.21). Hypothesis IV was therefore rejected.

TABLE 4.21
PERCENT OF MALES AND FEMALES BY ACHIEVEMENT LEVEL
WHEN LEVELS WERE NOT CHOSEN ON THE BASIS OF SEX

Achievement Level	Males	Females	χ^2
Under	60	40	11.228*
Normal	45	55	
Over	46	54	

*Significant at the .05 level of confidence or beyond.

Summary

This chapter has presented results of statistical analyses of data collected for this study. Results indicated the following for under-, over- and normal achievers:

(1) High School Demographic Variables: A few significant differences occurred among the achievement levels regarding selected demographic variables and opinions students held about their high schools. Unexpectedly, a larger percentage of male parochial schools were normal and overachievers than graduates of public schools. As expected, a greater percentage of graduates of private schools were underachievers. Almost three-quarters of female students who regarded their high school preparation for college as "very poor" were classified as underachievers; whereas, the vast majority of female students who evaluated their high school preparation as "very adequate" were normal and overachievers. Differences also existed among the female groups pertaining to the size of the community in which one's high school was located, but were difficult to interpret. Underachievers came most often from small town/rural schools. Normal achievers came most often from high schools

in suburbs of large cities (200,000+ population). This section of Hypothesis I was rejected for both sexes.

(2) High School Curricula Taken: Only three items of twenty-seven pertaining to kinds and number of terms of courses taken in high school were found to be statistically significant for each sex. No meaningful pattern was discerned. This section of Hypothesis I was not rejected for either sex.

(3) Participation in Selected Extra-Curricular Activities: No significant differences occurred among the groups according to participation in various kinds of social science "out-of-class" experiences, and only one item for each sex regarding participation in various kinds of high school clubs. This section of Hypothesis I was not rejected for either sex.

(4) Study Habits: No significant differences occurred for male students; however, two of nine items for females were significantly different in favor of overachievers. This section of Hypothesis I was not rejected for males and was rejected for females.

(5) Test-wiseness: No significant differences occurred among female achievement levels regarding procedures used in answering questions on objective examinations. One item of doubtful meaning was significant for males. This section of Hypothesis I was not rejected for either sex.

(6) Reasons for Attending College: No differences occurred among either female or male groups concerning the most or second-most important reasons for attending college. This section of Hypothesis I was not rejected for either sex.

(7) Self-Concept of Ability: Underachievers of both sexes had lower expectations than normal and overachievers for earning overall

high grades in their first year of college. Further, female underachievers expected significantly lower grades in their major courses and male overachievers expected significantly higher grades in social science courses for their first year in college than the other groups. This section of Hypothesis I was rejected for both sexes.

(8) Choice of College Major: No significant differences for either sex were found among the achievement levels when students who declared a major immediately upon matriculation were compared to students who did not declare a major at that time. This section of Hypothesis I was not rejected for either sex.

(9) Tests of Academic Aptitude: (a) Sex Differences: No significant sex differences existed on the Michigan State University Reading Test and CQT-Verbal test scores. Females did significantly better on the Michigan State University English Test. Males scored high on the remaining CQT tests. This aspect of Hypothesis II was rejected for the MSU English Test and the College Qualification Tests except the Verbal Test, and not rejected for the MSU Reading Test.

(b) Group Differences: Underachieving males and females scored significantly lower on the MSU Reading Test and underachieving females scored significantly lower on the MSU English Test than the other groups. Over-achieving males did significantly better than the other levels on the CQT-Numerical test. No significant differences among achievement levels were found on the remaining CQT test score averages. This aspect of Hypothesis II was rejected for females for the MSU English and Reading Tests, and was rejected for males for the MSU Reading Test and CQT-Numerical test. Hypothesis II was not rejected for the MSU English Test for males, nor was it rejected for either sex for the remaining five CQT score averages.

(c) Interaction Effect (Sex x Achievement Level): No significant differences regarding sex x achievement level interaction effect occurred among the variables analyzed; therefore, this section of Hypothesis II was not rejected.

(10) Grade Point Average/Credit Hours: (a) Sex Differences: No significant sex differences occurred among the variables analyzed; therefore, this aspect of Hypothesis II was not rejected.

(b) Groups Differences: Underachievers of both sexes earned a significantly lower grade point average than normal achievers who in turn earned a significantly lower grade point average than overachievers. Further, underachievers of both sexes had a significantly lower average for credit hours earned, although no differences occurred among the groups for average credit hours carried. This part of Hypothesis III was not rejected for either sex regarding average credit hours carried but was rejected for both sexes concerning average credit hours earned and grade point average.

(c) Interaction Effect (Sex x Achievement Level): No sex x achievement level interaction effect was noted among variables analyzed; therefore, this section of Hypothesis III was not rejected.

(11) When achievement levels were not identified on the basis of sex, males were significantly overrepresented among underachievers. Hypothesis IV was rejected.

CHAPTER FIVE

SUMMARY, DISCUSSION AND CONCLUSIONS

Problem, Purpose and Procedures

It was the purpose of this study to determine if any differences existed among three groups of students for each sex identified as under-, over- and normal achievers using a model reported in the literature. Differences were to be looked for using mainly non-intellective items; viz., biographical and demographical factors associated with high school characteristics and academic preparation and personal academic behavior patterns. The purpose of this research was not to determine how much the factors included for study contributed to predictive efficiency of standardized intellectual test scores.

The following questions, restated as four testable hypotheses, were formulated to give direction for analyzing data about three groups of students separated by sex and identified as under-, over- or normal achievers after one term of university study.

- (1) Are there differences among the groups associated with selected demographic characteristics of high schools from which they graduated?
- (2) Are there differences associated with high school preparation among the groups with regard to types and number of terms of courses taken in high school?
- (3) Are there differences among groups in selected personal academic behavior patterns?
- (4) Are there differences among groups on selected intellectual variables?

- (5) Are there differences within groups pertaining to the male: female ratio when groups are not identified on the basis of sex?

The review of literature was presented in three parts: (1) A general overview of the subject of over- and underachievement, including definitions, major operational designs, research inadequacies, improvement possibilities and bibliographies, (2) A brief review of factors--mainly personality and biographical--not investigated in this study, but which gave a broader view and understanding of research on over- and underachievement, and (3) A review of literature appropriate to the variables under study in this research.

In general terms, underachievers are students who do not perform up to expectation, normal achievers perform academically as expected and overachievers perform better than expected. In other words, under- and overachievement are actually under- and overprediction. These terms can be operationally defined in several ways; however, students identified at one achievement level by one method are not necessarily so identified by another method.

No comprehensive theory of over- and underachievement was found to exist; however, some directions were discerned from the literature.

(1) Underachievers had a lower self-concept of ability than normal and overachievers; however, many underachievers have been helped to improve their self-concept and hence their academic performance through appropriate counseling focussed on their self-concept. Further, underachievers seemed to under-predict their future grades more so than normal and overachievers.

(2) It seemed that no significant correlation existed between academic and nonacademic (extra-curricular) achievement.

(3) In general, underachievers had poorer study habits than normal and overachievers.

(4) Tentatively, underachievers seemed to have less definite plans for an academic major than normal and overachievers.

(5) It seemed normal and overachievers had a higher level of reading ability or performance than underachievers.

(6) - (7) No pattern of relationship seemed to exist between over- and underachievement and the influence of high school curriculum taken by a student or the size of his high school graduating class.

(8) It seemed more underachievers came from parochial high schools than from public high schools.

(9) No variables had been found to have universal application to all achievement levels in all types of populations or in any single population.

The study population consisted of approximately 7500 new freshmen who matriculated in Michigan State University in the fall term, 1968. The study sample comprised 1093 students: 520 males and 573 females. The sample did not include students who met the following criteria:

- (1) Resided outside the United States of America,
- (2) Were designated as special part-time students,
- (3) Carried less than six credit hours of class,
- (4) Dropped out of Michigan State University during the fall term, 1968, and
- (5) Did not have complete test scores and other necessary data.

These students completed Form C of the Academic Inventory, an instrument especially constructed by the Office of Evaluation Services of Michigan State University to learn what academic preparation and proficiencies students brought with them to college and to investigate selected high school demographic characteristics.

Student scores were available for the Michigan State University English and Reading Tests, and the College Qualification Tests, Form C. First term average credit hours carried, average credit hours earned and grade point average were also made available.

A regression model selection technique reported in the literature (Farquhar and Payne, 1964) was used to differentiate the three achievement levels. Each student was identified as either an under-, normal or overachiever by predicting his first term GPA from his CQT-Total score and then ascertaining whether or not the difference between his actual and predicted GPA was greater than minus one standard error of estimate (underachiever), greater than plus one standard error of estimate (overachiever) or within plus-and-minus one standard error of estimate (normal achiever) from the least squares regression line.

The Chi-Square analysis and a multivariate analysis of variance (Finn, 1968) were the main statistical techniques used to analyze data. The .05 level of confidence was established to determine statistical significance for all hypotheses.

Summary of Research Results

Four null hypotheses were tested using data collected for this study to determine if significant differences existed among under-, over- and normal achievers. In Hypothesis I, selected high school demographic characteristics were investigated. In Hypothesis II, selected tests of academic aptitude were analyzed. In Hypothesis III, average credit hours carried, average credit hours earned and grade point average were analyzed. In Hypothesis IV, the male:female ratio within each achievement level (when levels were not differentiated with regard to sex) was investigated.

A summary of results of this research are as follows:

(1) High School Demographic Variables: A few significant differences occurred among the achievement levels regarding selected demographic variables and opinions students held about their high schools. Unexpectedly, a larger percentage of male parochial high school graduates were normal and overachievers than graduates of public high schools. As expected, a greater percentage of graduates of private schools were underachievers. Almost three-quarters of female students who regarded their high school preparation for college as "very poor" were classified as underachievers; whereas, the vast majority of female students who evaluated their high school preparation as "very adequate" were normal and overachievers. Differences also existed among the female groups pertaining to the size of the community in which one's high school was located, but were difficult to interpret. Underachievers came most often from small town/rural schools. Normal achievers came most often from high schools in suburbs of large cities (200,000+ population). This section of Hypothesis I was rejected for both sexes.

(2) High School Curricula Taken" Only three items of twenty-seven pertaining to kinds and number of terms of courses taken in high school were found to be statistically significant for each sex. No meaningful pattern was discerned. This section of Hypothesis I was not rejected for either sex.

(3) Participation in Selected Extra-Curricular activities: No significant differences occurred among the groups according to participation in various kinds of social science "out-of-class" experiences, and only one item for each sex regarding participation in various kinds of high school clubs. This section of Hypothesis I was not rejected for either sex.

(4) **Study Habits:** No significant differences occurred for male students; however, two of nine items for females were significantly different in favor of overachievers. This section of Hypothesis I was not rejected for males and was rejected for females.

(5) **Test-wiseness:** No significant differences occurred among female achievement levels regarding procedures used in answering questions on objective examinations. One item of doubtful meaning was significant for males. This section of Hypothesis I was not rejected for either sex.

(6) **Reasons for Attending College:** No differences occurred among either female or male groups concerning the most or second-most important reasons for attending college. This section of Hypothesis I was not rejected for either sex.

(7) **Self-Concept of Ability:** Underachievers of both sexes had lower expectations than normal and overachievers for earning overall high grades in their first year of college. Further, female underachievers expected significantly lower grades in their major courses and male overachievers expected significantly higher grades in social science courses for their first year in college than the other groups. This section of Hypothesis I was rejected for both sexes.

(8) **Choice of College Major:** No significant differences for either sex were found among the achievement levels when students who declared a major immediately upon matriculation were compared to students who did not declare a major at that time. This section of Hypothesis I was not rejected for either sex.

(9) **Tests of Academic Aptitude:** (a) **Sex Differences:** No significant sex differences existed on the Michigan State University Reading Test and CQT-Verbal test scores. Females did significantly

better on the Michigan State University English Test. Males scored high on the remaining CQT tests. This aspect of Hypothesis II was rejected for the MSU English Test and the College Qualification Tests except the Verbal Test, and not rejected for the MSU Reading Test.

(b) Group Differences: Underachieving males and females scored significantly lower on the MSU Reading Test and underachieving females scored significantly lower on the MSU English Test than the other groups. Over-achieving males did significantly better than the other levels on the CQT-Numerical test. No significant differences among achievement levels were found on the remaining CQT test score averages. This aspect of Hypothesis II was rejected for females for the MSU English and Reading Tests, and was rejected for males for the MSU Reading Test and CQT-Numerical test. Hypothesis II was not rejected for the MSU English Test for males, nor was it rejected for either sex for the remaining five CQT score averages.

(c) Interaction Effect (Sex x Achievement Level): No significant differences regarding sex x achievement level interaction effect occurred among the variables analyzed; therefore, this section of Hypothesis II was not rejected.

(10) Grade Point Average/Credit Hours: (a) Sex Differences: No significant sex differences occurred among the variables analyzed; therefore, this aspect of Hypothesis II was not rejected.

(b) Groups Differences: Underachievers of both sexes earned a significantly lower grade point average than normal achievers who in turn earned a significantly lower grade point average than overachievers. Further, underachievers of both sexes had a significantly lower average for credit hours earned, although no differences occurred among the groups for average credit hours carried. This part of Hypothesis III was not rejected for either sex regarding average credit hours carried

but was rejected for both sexes concerning average credit hours earned and grade point average.

(c) Interaction Effect (Sex x Achievement Level): No sex x achievement level interaction effect was noted among variables analyzed; therefore, this section of Hypothesis III was not rejected.

(11) When achievement levels were not identified on the basis of sex, males were significantly overrepresented among underachievers. Hypothesis IV was rejected.

Discussion of Research Results

The purpose of this section is to discuss the meaning of salient findings of data analysis performed for this study. Educators concerned about helping each underachieving student perform up to his ability level should be interested in evidence gained from this study which are congruent with the literature regarding possible reasons causing or factors influencing underachievement.

Counselors, especially, should be aware of "factors important to academic success" in their respective institutions because such factors vary from college to college (Centi, 1959). Further, reasons for a given individual's underachievement varies from student to student (Ratchick, 1953; Barrett, 1957; and Abe, 1966).

It seems appropriate from the results of this study that one concerned about helping underachievers at Michigan State University improve their academic performance should focus primarily on the following factors congruent with the literature which seemed to influence student achievement for both sexes in this study sample:

(1) Self-concept of ability, implied by one's expected or predicted future performance: Underachievers of both sexes had significantly

lower expectations than overachievers and normal achievers of overall grades for their first year of college.

(2) Reading comprehension level: Underachievers of both sexes scored significantly lower than normal and overachievers in this area.

(3) Declaration of major: No statistically significant difference occurred among achievement levels regarding students of either sex who declared a major immediately upon entering college and those who made no immediate preference.

Secondarily, one could then focus his attention upon the under-achieving student's proficiency in English grammar and expression, his study skills and habits, his sophistication in taking objective examinations, his evaluation of high school preparation for college, type of high school (public, parochial or private) from which he graduated, and size of the community in which his high school was located. The reason for evaluating these factors secondarily was that results of the data analysis were either not identical for both sexes, difficult to interpret or seemingly incongruent with the literature reviewed for this study.

At this point, it does not seem that one would gain much insight into an underachieving student's problem by attempting to determine what kinds of courses he took in high school, his amount of participation in high school extracurricular activities, his reasons for attending college or the kinds of demographic characteristics about the student's high school found not to be statistically significant in this study. This conclusion is congruent with the literature reviewed for this study.

The first three hypotheses considered students differentiated into three achievement levels after separation by sex to determine if sex differences would occur. Since the two groups were similar in size at

the start, the achievement groups were also about the same size (Table 4.1). However, to test Hypothesis IV, students were not separated by sex when placed into achievement levels. Results of testing the hypothesis indicated that males were significantly overrepresented in the underachiever category by a ratio of three males to two females (Table 4.21). One important implication of this finding is that in whole numbers, counselors may be working with more males than females regarding academic underachievement.

Finally it should be realized that no statistically significant differences occurred among achievement levels within each sex on the average CQT-Total score. This indicated that underachieving students in the study population did not perform poorly because they did not have the basic ability to succeed in college at the start. Stated another way, tests of academic ability indicated the underachieving students considered in this study had the ability to be academically successful at Michigan State University. They were unsuccessful for a complexity of reasons some of which were researched in this study.

Limitations of the Study

Several limitations of this study were noted.

(1) There was no assurance that students comprising the study population were representative of succeeding student populations at Michigan State University or similar institutions, although it was assumed that findings of the study based on this population may be useful for generating hypotheses about similar populations.

(2) The first term college GPA used as the criterion in identifying each of the achievement groups was a heterogeneous criterion. The measure was used because it was the standard by which the university retained or dropped its students.

(3) Factors found not to be significant for this study sample might be for another and vice versa.

(4) The predictor, CQT-Total score, seemed to favor males. This limitation was based upon male/female comparative standings on CQT-Total score for all freshmen who entered Michigan State University in fall, 1968, published in a report by the Office of Evaluation Services (1968). Female scores were about eleven points lower than males at given percentile intervals.

(5) The predictor also accounted for only about 19.4% of the variance in GPA for males and 25% for females in the study sample. However, this was not too different from most similar cognitive predictors.

(6) High-ability students had relatively little room to demonstrate overachievement because of the GPA "ceiling" and low-ability students had relatively little room to demonstrate underachievement because of the GPA "floor" (Cf. Duff and Siegel, 1960).

Suggestions for Future Research

Firstly, it seems appropriate for this research to be extended to analysis of identical and similar items contained in Part I of the other five forms of the 1968 Academic Inventory to determine if results would be congruent with findings of this study and/or to enable one to better understand results of this study difficult to interpret.

Secondly, it is strongly recommended that this research also be extended to analysis of two instruments constructed from the six forms of the Academic Inventory--the Exam and Study Skill Survey and the Academic Questionnaire. Both instruments were administered to all students entering Michigan State University in the fall term, 1969.

The study sample size would be larger than that of this study which would allow a greater number of student responses to items of a given subject to be analyzed. More items per subject existed on the 1969 instruments which would allow more aspects of the subject to be explored. It is possible that some variables not found significantly different in this study might be upon analysis of items in the 1969 forms; a.e., test-wiseness and reasons for attending college.

Thirdly, in light of the literature reviewed for and the findings of this study, it is suggested that further research of non-intellective predictors of academic success be performed concerning the entering college student's own expectation or prediction of future academic performance.

Fourthly, it is urged that research be done into the kinds of successful and unsuccessful programs colleges and universities have used or are using to immediately identify and help potential under-achievers enrolled in their institutions. Presentation of a model program of such endeavors should be a logical result of such research (Cf. Bozak, 1969; Bednar and Weinberg, 1970).

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APPENDIX A

PART I OF ACADEMIC INVENTORY, FORM C

C

MICHIGAN STATE UNIVERSITY

Academic Inventory

Michigan State University continually attempts to develop educational programs that will best meet the needs of its students. In order to do this effectively it is necessary to know as much as possible about the academic backgrounds of our entering students. This inventory is designed to produce some information in this area.

The inventory consists of two parts.

Part I is concerned with your high school experiences and Part II is concerned with what you have learned as a consequence of these and other educational experiences.

Do not begin working until you have read, understood and carried out the directions below.

1. On each of the answer sheets, print in the appropriate places your name (LAST NAME FIRST), the date, and your student number.
2. Unless your STUDENT NUMBER IS CORRECTLY MARKED in pencil in the six rows of spaces under the words STUDENT NUMBER, your answer sheet CANNOT BE PROCESSED. First, WRITE your student number in the vertical column of blank boxes under the heavy arrow. Then MARK ONE SPACE in EACH of the SIX ROWS of ten spaces that corresponds to each number of your student number. Be sure that (a) you have ONE MARK in each of the six rows, (b) that there is ONLY ONE MARK in a given row, (c) that you CHECK EACH SPACE you marked again to make sure that you have indicated your correct student number. (The example below for John N. Doe is marked correctly for student number 917604.)

MICHIGAN STATE UNIVERSITY

NAME <u>DOE, JOHN N.</u>	DATE _____	STUDENT NO <u>917604</u>	SEX <u>M</u>	F																																																		
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6	0	1	7	6	0	4	1	1	1																																													
4	0	1	7	6	0	4	1	1	1																																													
SECTION _____	INSTRUCTOR _____																																																					
NAME OF TEST _____	FORM _____																																																					
BE SURE YOUR MARKS ARE HEAVY AND BLACK ERASE COMPLETELY ANY ANSWER CHANGED																																																						

3. Record all your answers on the answer sheets with your special pencil. Use the Inventory booklet for notations or computations (extra pages at back).
4. For each part of the inventory pay particular attention to the directions given. Make sure that you record your responses in the appropriate spaces on the answer sheet.
5. If you decide to change an answer, be sure to erase your first answer completely.

PART I

The questions in this part of the inventory will be concerned with the High School from which YOU GRADUATED. In order to develop more meaningful academic programs, we need to learn about the high schools that are producing our entering students.

We are considering high school as consisting of grades 9 through 12 even though many of you went to a junior high school for your 9th grade.

Remember that if you attended more than one high school, you are to respond to the questions in terms of the high school from which you graduated.

Please read each question carefully and mark your answer in the appropriate space on the 5-choice answer sheet labeled Part I.

1. How many students were in your high school graduating class?
 1. Under 25
 2. 25 to 99
 3. 100 to 199
 4. 200 to 399
 5. 400 or more
2. In your opinion, how adequate was the financial support for your high school?
 1. Very well financed or supported
 2. Above average in financial support
 3. Average financial support
 4. Below average finances
 5. Very poorly financed
3. Would you say that your high school was noted for modern and innovative instructional procedures or was it rather conservative and traditional?
 1. Very innovative and modern
 2. Somewhat innovative and modern
 3. Somewhat conservative and traditional
 4. Very conservative and traditional
4. From what type of high school did you graduate?
 1. Public
 2. Parochial (church supported)
 3. Private
5. Approximately what percentage of students in your graduating class definitely plan to go to college this coming year?
 1. Less than 25%
 2. 25% to 49%
 3. 50% to 74%
 4. 75% to 89%
 5. 90% or over

6. In general, how do you evaluate the preparation your high school gives its graduates for college work?

1. Very adequate
2. Above average
3. Average
4. Below average
5. Very poor

7. Which of the following best describes the community in which your high school was located?

1. Within the city limits of a large city (200,000 population or over)
2. Within a suburb of a large city (within 25 miles)
3. Within the city limits of a medium sized city (50,000 to 199,000)
4. Within a suburb of a medium sized city (within 10 miles)
5. Within a small city or town or rural area

8. Which of the following describes the degree of industrialization in your high school community?

1. Exclusively residential
2. Primarily residential with some light industry (office buildings, research parks, etc.)
3. Primarily residential with some heavy industry (factories, foundries, etc.)
4. Primarily heavy industry with some residential
5. Primarily light industry with some residential

9. Which of the following best describes the administrative arrangement of your high school system?

1. Three year senior high school with a three year junior high school.
2. Three year senior high school with a two year junior high school.
3. Four year senior high school with a two year junior high school.
4. Four year senior high school with a three year junior high school or middle school.
5. Some other arrangement.

10. How did you typically get to high school during your senior year?

1. Rode a school bus
2. Walked or rode a bicycle
3. Drove my own car or parent's car
4. Rode with someone else or in a car pool
5. Rode on public transportation (bus, subway, or taxi)

11. Approximately when was your high school built?

1. The entire building was built during the past 5 years.
2. The entire building was built between 5 and 15 years ago.
3. The main part of the building was built before 1963 but major additions have been made during the past 5 years.
4. The main part of the building was built before 1953 but major additions were made between 5 and 15 years ago.
5. The entire building was built before 1953 and no major additions have been made since that time.

* * * * *

Items 12 to 23 refer to the courses that you took in Grades 9 through 12 (four years).

Indicate for each of the areas listed below the number of terms (semesters) of high school work you have had. Use the following Key:

- KEY: 1. Did not take courses in this area in Grades 9 through 12.
2. Took one or two terms in this area.
3. Took three or four terms in this area.
4. Took five or six terms in this area.
5. Took seven or more terms in this area.

12. Art (include ceramics, sculpture, design, crafts, etc.)
13. Music (include band, chorus, orchestra, theory, appreciation, etc.)
14. Biological Sciences (include biology, botany, physiology, etc., but DO NOT include general science).
15. Physical Science (include physics, chemistry, astronomy, electronics, etc., but DO NOT include general science).
16. Commercial Arts (include typing, shorthand, bookkeeping, etc.).
17. English Grammar and Composition (include creative writing, journalism, etc.).
18. Literature (include American, English, and world literature, etc.).
19. Foreign Language (include all languages studied in Grades 9-12).
20. History (include state, national, world, ancient, modern, etc.).
21. Social Science (include civics, economics, government, geography, etc.).
22. Mathematics (include algebra, geometry, trigonometry, calculus, etc., but DO NOT include general, business or shop mathematics, etc.).
23. Vocational Education (include home economics, agriculture, industrial arts, etc.).

PLEASE GO ON TO THE FOLLOWING PAGE.

Items 24 through 38 list specific courses that you may have taken in Grades 9 through 12. The course titles listed may not be the exact titles used in your high school, but use your best judgment in indicating whether you have had a course or courses similar to each one listed. Use the following Key to indicate the number of terms or semesters of high school work you have had in each area.

KEY: 1. Never studied this subject
2. One term or semester
3. Two terms or semesters
4. Three terms or semesters
5. Four or more terms or semesters

- 24. Statistics
- 25. Political science
- 26. American literature
- 27. English literature
- 28. Art
- 29. Music
- 30. Vocational agriculture
- 31. Home economics
- 32. Industrial arts
- 33. European history
- 34. World history
- 35. Geography
- 36. Aeronautics
- 37. Philosophy or logic
- 38. General or consumer mathematics

* * * * *

Students attend college for a variety of reasons. Some of these are listed below. Select from these possible reasons in answering questions 39 through 41.

- 1. For the prestige of a college degree
- 2. It is expected in our family
- 3. To make more money
- 4. To be with school friends
- 5. Enjoy going to school

- 39. Which of these reasons seems to be most important to you personally?
- 40. Which appears to be next in importance?
- 41. Which of these reasons seems to be the least important to you personally?

* * * * *

Questions 42 to 50. This section asks about general methods you use in STUDY. You are to consider each of the statements about study procedures and determine how often you act in the way described. Use the following Key in responding to each of the statements:

KEY: 1. Almost always (over 90% of the time)
2. Usually (75% - 90% of the time)
3. Often (26% - 74% of the time)
4. Sometimes (10% - 25% of the time)
5. Rarely (less than 10% of the time)

- 42. In taking notes on required library readings, do you try to record the exact sentences as written rather than rewriting the thoughts in your own words?
- 43. Do you try to ask yourself questions and to answer them as you study?
- 44. Do you regularly review your class notes from lectures and assigned readings?
- 45. Is the final copy of your lecture notes organized in some kind of an outline form?
- 46. When you listen to a lecture, do you try to copy down as much as you can, rather than relying on key words to help you recall general ideas?
- 47. When you study history, do you try to look for the relationships among various events?
- 48. In first reading an assignment, do you try to read each paragraph thoroughly?
- 49. Do you pause during your study to think about the material?
- 50. After you learn a general principle or rule, do you try to think of examples which illustrate it?

* * * * *

For items 51 through 55 use the following Key:

KEY: 1. Mostly A's
2. Mostly B's
3. Mostly B's and C's
4. Mostly C's
5. Mostly C's and D's or lower

- 51. What kinds of grades do you expect to receive this coming year at MSU?
- 52. What kinds of grades do you expect to receive in the subjects of your major?
- 53. What kinds of grades do you expect to receive in required general education courses (e.g., AT&L, N.S.)?
- 54. What kinds of grades would you expect to receive should you enroll in social science courses at MSU?
- 55. What kinds of grades did you receive in high school social science courses in the last year you took courses of this kind?

* * * * *

Items 58 through 66 list selected EXTRA CURRICULAR organizations and activities that are available in some high schools. Use the following Key to indicate if this type of activity was available in your high school and also if you actively participated in the organization.

- KEY: 1. NOT AVAILABLE in my high school as far as I know
 2. AVAILABLE and I actively participated
 3. AVAILABLE but I did not participate

- 56. Astronomy club
- 57. Classical literature club (Great Books, etc.)
- 58. French language club
- 59. Spanish club
- 60. Future teachers club
- 61. History club
- 62. Science club
- 63. School newspaper
- 64. Debating or forensic club
- 65. Journalism club
- 66. Music organization

* * * * *

Questions 67 to 75 list experiences or "out-of-class" accomplishments you may have had in high school. Read each of these accomplishments in SOCIAL SCIENCE and indicate the extent of your experience in each area by using the following Key:

- KEY: 1. None - have not had the experience
 2. Had the experience one time or for a year or less
 3. Had the experience two times or more or for more than a year

- 67. Have on my own (not as a class assignment) gone to the library to get facts on social issues which arise in discussions with other students or adults.
- 68. Helped organize and conduct an opinion or information poll (e.g., Gallup, Roper-type) in my school or community.
- 69. Have on my own (not as a class assignment) made it a special project to talk to or interview people with backgrounds different from my own to get information on current issues or a particular problem.
- 70. Was a primary organizer of a student or community service group.
- 71. Belonged to a student honorary society in one of the Social Sciences (economics, civics, etc.).
- 72. Helped a teacher or other social scientists conduct a research project in the Social Sciences (not part of a class assignment).

- 73. Participated in a student political group (Young Democrats, Young Republicans, etc.).
- 74. Wrote a letter to a congressman about pending, proposed, or needed legislation.
- 75. Have read six articles a year in Atlantic, Commonwealth, Harpers, and/or Saturday Review.

* * * * *

Questions 76 to 84. This section asks about procedures you use in taking OBJECTIVE EXAMINATIONS (true-false, multiple-choice, etc.). You are to consider each of the statements and to determine how often you tend to act in the way specified. Use the following Key in responding to each of these statements:

- KEY: 1. Almost always (over 90% of the time)
 2. Usually (75% - 90% of the time)
 3. Often (25% - 74% of the time)
 4. Sometimes (10% - 25% of the time)
 5. Rarely (less than 10% of the time)

- 76. Do you find it advisable to not change answers even when you later think another answer seems to be as good or even a little better?
- 77. Do you tend to put off actually starting until you have "thumbed through" the entire examination to get a feel for the complete test?
- 78. When taking a very important examination, do you find it advisable to recheck your answers as many as three or four times?
- 79. If a multiple-choice question has two choices which are very similar as possible answers, do you tend to choose one of these as your answer rather than the other choices?
- 80. Do you expect that many questions on final examinations are designed to "trick you" into answering these questions wrong on the basis of small, insignificant details in the question?
- 81. When one of the possible answers on a multiple-choice test is much longer than the other answers, do you regard this longer answer as more likely to be correct rather than incorrect?
- 82. Do you try to answer the easiest questions on an examination first and to go back later to answer the difficult ones?
- 83. Do you read a difficult question on an examination at least three or four times before moving on to the next question?
- 84. If you have only a vague idea of the answer to a question, do you tend to record your answer at this stage with a mark for later reference in preference to leaving it blank and coming back to answer it?

* * * * *

End of Part I. Please go on to Part II.

APPENDIX B

**STATISTICALLY NON-SIGNIFICANT RESULTS OF
ANALYSIS OF NON-INTELLECTIVE ITEMS IN
THE ACADEMIC INVENTORY, FORM C,
PERTAINING TO HYPOTHESIS I, AND
FOUR TABLES PERTAINING TO
HYPOTHESES II AND III.**

APPENDIX B.1
PERCENTAGE OF STUDENTS BY ACHIEVEMENT LEVEL AND SEX INDICATING SIZE OF
THEIR HIGH SCHOOL GRADUATING CLASS (ITEM 1)

Level of Achievement	1- 24	25- 99	100- 199	200- 399	400- up	χ^2
Under	1*	24	21	24	29	
	(0)	(11)	(17)	(33)	(38)	
Normal	1	15	20	28	36	11.833
	(1)	(12)	(17)	(27)	(43)	(3.637)
Over	0	14	24	16	45	
	(3)	(12)	(17)	(27)	(42)	

*First set of figures for males; figures in parentheses for females.

APPENDIX B.2
PERCENTAGE OF STUDENTS BY ACHIEVEMENT LEVEL AND SEX INDICATING THEIR
OPINION OF THE ADEQUACY OF FINANCIAL SUPPORT OF THEIR
HIGH SCHOOL (ITEM 2)

Level of Achievement	Very Well	Above Ave	Ave	Below Ave	Very Poor	χ^2
Under	10*	30	50	10	0	
	(9)	(26)	(47)	(14)	(5)	
Normal	18	28	34	17	3	15.010
	(19)	(29)	(40)	(12)	(1)	(11.307)

*First set of figures for males; figures in parentheses for females.

APPENDIX B.3
PERCENTAGE OF STUDENTS BY ACHIEVEMENT LEVEL AND SEX INDICATING THEIR
OPINION OF THE INNOVATIVENESS OF THEIR HIGH SCHOOL'S
INSTRUCTIONAL PROCEDURES (ITEM 3)

Level of Achievement	Very Innov	Somewhat Innov	Somewhat Conserv	Very Conserv	χ^2
Under	12* (22)	54 (47)	33 (23)	1 (7)	9.538 (6.612)
Normal	14 (15)	52 (53)	27 (27)	6 (5)	
Over	9 (14)	53 (51)	26 (25)	12 (10)	

*First set of figures for males; figures in parentheses for females.

APPENDIX B.4
PERCENTAGE OF STUDENTS BY ACHIEVEMENT LEVEL AND SEX INDICATING THE
APPROXIMATE PERCENTAGE OF STUDENTS IN THEIR HIGH SCHOOL
GRADUATING CLASS DEFINITELY PLANNING ON GOING
DIRECTLY TO COLLEGE (ITEM 5)

Level of Achievement	1-24	25-49	50-74	75-89	90-up	χ^2
Under	6* (2)	40 (32)	23 (38)	18 (23)	13 (4)	6.880 (11.383)
Normal	7 (5)	30 (29)	29 (32)	22 (26)	13 (8)	
Over	13 (5)	28 (31)	27 (22)	20 (37)	13 (5)	

*First set of figures for males; figures in parentheses for females.

APPENDIX B.5

PERCENTAGE OF STUDENTS BY ACHIEVEMENT LEVEL AND SEX INDICATING THE DEGREE OF INDUSTRIALIZATION IN THEIR HIGH SCHOOL COMMUNITY (ITEM 8)

Level of Achievement	1	2	Key 3	4	5	χ^2
Under	24*	33	29	5	8	
	(15)	(32)	(43)	(5)	(5)	
Normal	12	45	34	5	5	11.105
	(17)	(46)	(30)	(3)	(4)	(10.805)
Over	16	47	35	7	5	
	(13)	(42)	(37)	(1)	(6)	

- Key: 1. Exclusively residential.
 2. Primarily residential with some light industry.
 3. Primarily residential with some heavy industry.
 4. Primarily heavy industry with some residential.
 5. Primarily light industry with some residential.

*First set of figures for males; figures in parentheses for females.

APPENDIX B.6

PERCENTAGE OF STUDENTS BY ACHIEVEMENT LEVEL AND SEX INDICATING THE ADMINISTRATIVE ARRANGEMENT OF THEIR HIGH SCHOOL SYSTEM (ITEM 9)

Level of Achievement	3/3	3/2	4/2	4/3	Other	χ^2
Under	38*	1	32	12	17	
	(53)	(2)	(28)	(7)	(9)	
Normal	40	2	35	7	15	8.836
	(44)	(2)	(32)	(9)	(13)	(5.357)
Over	36	0	34	16	14	
	(47)	(3)	(25)	(8)	(18)	

Senior high years/junior high years.

*First set of figures for males; figures in parentheses for females.

APPENDIX B.7
PERCENTAGE OF STUDENTS BY ACHIEVEMENT LEVEL AND SEX INDICATING THEIR
MODE OF TRANSPORTATION TO HIGH SCHOOL DURING
THEIR SENIOR YEAR (ITEM 10)

Level of Achievement	School Bus	Walked-Bicycle	Drove Car	Rode in Car	Pub. Trans.	χ^2
Under	17* (33)	26 (16)	36 (26)	21 (21)	1 (4)	
Normal	20 (34)	26 (21)	35 (15)	17 (28)	2 (3)	3.507 (11.384)
Over	16 (31)	24 (15)	37 (17)	22 (29)	0 (8)	

*First set of figures for males; figures in parentheses for females.

APPENDIX B.8
PERCENTAGE OF STUDENTS BY ACHIEVEMENT LEVEL AND SEX INDICATING
WHEN THEIR HIGH SCHOOL WAS BUILT (ITEM 11)

Level of Achievement	1	2	3	4	5	χ^2
Under	12* (23)	44 (23)	14 (17)	24 (25)	6 (11)	
Normal	16 (17)	32 (31)	19 (17)	21 (26)	13 (10)	9.452 (8.645)
Over	16 (17)	37 (32)	22 (14)	14 (19)	9 (18)	

- Key:**
1. The entire building was built during the past 5 years.
 2. The entire building was built between 5 and 15 years ago.
 3. The main part of the building was built before 1963 but major additions have been made during the past 5 years.
 4. The main part of the building was built before 1953 but major additions were made between 5 and 15 years ago.
 5. The entire building was built before 1953 and no major additions have been made since that time.

*The first set of figures for males; figures in parentheses for females.

APPENDIX B.9
PERCENTAGE OF STUDENTS BY ACHIEVEMENT LEVEL AND SEX INDICATING THEIR PARTICIPATING
PARTICIPATION IN SELECTED HIGH SCHOOL EXTRA CURRICULAR ORGANIZATIONS/ACTIVITIES
(Items 56-66)

Item	Underachievers			Normal Achievers			Overachievers			x ²
	1	2	3	1	2	3	1	2	3	
56. Astronomy Club	88* (90)	1 (0)	10 (10)	87 (90)	1 (1)	13 (9)	88 (87)	1 (0)	10 (13)	1.172 (2.264)
57. Great Books Club	81 (76)	3 (5)	17 (19)	73 (76)	4 (3)	23 (21)	80 (69)	3 (6)	16 (24)	3.300 (5.009)
58. French Club	26 (20)	9 (21)	65 (59)	25 (20)	7 (20)	68 (60)	33 (28)	6 (14)	62 (58)	2.346 (3.560)
59. Spanish Club	36 (21)	8 (10)	56 (69)	29 (26)	8 (11)	63 (63)	27 (26)	15 (17)	58 (58)	5.571 (3.965)
60. Future Teachers Club	27 (7)	5 (23)	68 (69)	24 (17)	6 (25)	70 (58)	19 (12)	2 (22)	79 (67)	3.846 (7.354)
61. History Club	84 (79)	4 (1)	12 (20)	75 (80)	2 (2)	24 (18)	83 (76)	3 (0)	14 (24)	7.958 (3.824)
62. Science Club	49 (35)	17 (11)	35 (54)	32 (34)	13 (8)	55 (58)	37 (36)	17 (5)	45 (59)	12.339** (1.986)
63. School News- paper	0 (6)	19 (26)	81 (67)	6 (6)	19 (25)	75 (70)	6 (5)	21 (23)	73 (72)	4.785 (0.323)
64. Debating or Forensic Club	15 (37)	9 (13)	76 (50)	23 (16)	12 (19)	65 (65)	26 (17)	13 (8)	62 (76)	4.032 (27.047)**
65. Journalism Club	46 (42)	4 (12)	50 (46)	40 (45)	8 (12)	52 (43)	49 (40)	7 (10)	44 (50)	3.631 (1.504)
66. Music Club	12 (10)	27 (38)	62 (51)	9 (7)	28 (42)	66 (51)	5 (6)	29 (38)	66 (55)	2.655 (1.492)

Key: 1. NOT AVAILABLE in my high school as far as I know; 2. AVAILABLE and I actively participated;
3. AVAILABLE but I did not participate.

*First set of figures for males; figures in parentheses for females.

APPENDIX B.10
PERCENTAGE OF STUDENTS BY ACHIEVEMENT LEVEL AND SEX INDICATING THEIR HIGH SCHOOL
"OUT-OF-CLASS" EXPERIENCES/ACCOMPLISHMENTS IN SOCIAL SCIENCE (ITEMS 67-75)

67. Have on my own (not as a class assignment) gone to the library to get facts on social issues which arise in discussions with other students or adults.
68. Helped organize and conduct an opinion or information poll...in my school or community.
69. Have on my own (not as a class assignment) made it a special project to talk to or interview people with backgrounds different from my own to get information on current issues or a particular problem.
70. Was a primary organizer of a student or community service group.
71. Belonged to a student honorary society in one of the Social Sciences (economics, civics...).
72. Helped a teacher or other social scientist conduct a research project in the Social Sciences (not part of a class assignment).
73. Participated in a student political group (Young Democrats, Young Republicans, etc.).
74. Wrote a letter to a congressman about pending, proposed, or needed legislation.
75. Have read six articles a year in Atlantic, Commonwealth, Harpers, and/or Saturday Review.

Item	Underachievers			Normal Achievers			Overachievers			X ²
	1	2	3	1	2	3	1	2	3	
67.	28*	36	36	39	29	32	30	30	39	4.949
	(33)	(33)	(35)	(34)	(36)	(31)	(35)	(46)	(19)	(6.206)
68.	81	10	9	78	16	6	83	16	1	6.399
	(68)	(26)	(6)	(71)	(22)	(7)	(74)	(18)	(8)	(1.605)
69.	62	17	22	55	20	25	53	30	16	7.614
	(60)	(20)	(20)	(55)	(25)	(20)	(49)	(19)	(32)	(7.001)
70.	82	8	10	74	16	10	73	12	15	6.210
	(53)	(28)	(20)	(66)	(20)	(14)	(63)	(18)	(19)	(6.720)
71.	94	3	3	90	5	5	88	6	6	1.600
	(91)	(5)	(4)	(90)	(5)	(5)	(81)	(9)	(10)	(6.548)
72.	85	12	4	88	10	2	87	10	2	1.101
	(86)	(11)	(3)	(90)	(7)	(3)	(83)	(14)	(3)	(4.605)
73.	86	8	6	81	10	9	86	6	8	2.502
	(73)	(16)	(11)	(81)	(12)	(7)	(85)	(12)	(4)	(5.013)

APPENDIX B.10--Continued

Item	Underachievers			Normal Achievers			Overachievers			χ^2
	1	2	3	1	2	3	1	2	3	
74.	74 (76)	23 (20)	3 (4)	80 (76)	14 (17)	6 (7)	81 (74)	17 (18)	1 (8)	7.878 (1.695)
75.	55 (48)	24 (18)	21 (31)	58 (49)	26 (28)	16 (23)	58 (53)	19 (25)	23 (22)	4.289 (4.809)

Key: 1. None--have not had the experience.

2. Had the experience one time or for a year or less.

3. Had the experience two times or more or for more than a year.

*First set of figures for males; figures in parentheses for females.

APPENDIX B.11
PERCENTAGE OF STUDENTS BY ACHIEVEMENT LEVEL AND SEX INDICATING THEIR
PROCEDURES USED IN TAKING OBJECTIVE EXAMINATIONS (ITEMS 76-84)

76. Do you find it advisable to not change answers even when you later think another answer seems to be as good or even a little better?
77. Do you tend to put off actually starting until you have "thumbed through" the entire examination to get a feel for the complete test?
78. When taking a very important examination, do you find it advisable to recheck your answers as many as three or four times?
79. If a multiple-choice question has two choices which are very similar as possible answers, do you tend to choose one of these as your answer rather than the other choices?
80. Do you expect that many questions on final examinations are designed to "trick you" into answering these questions wrong on the basis of small, insignificant details in the question?
81. When one of the possible answers on a multiple-choice test is much longer than the other answers, do you regard this longer answer as more likely to be correct rather than incorrect?
82. Do you try to answer the easiest questions on an examination first and to go back later to answer the difficult ones.
83. Do you read a difficult question on an examination at least three or four times before moving on to the next question?
84. If you have only a vague idea of the answer to a question, do you tend to record your answer at this stage with a mark for later reference in preference to leaving it blank and coming back to answer it?

Item	Underachievers					Normal Achievers					Overachievers					X ²
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	
76.	8*	21	22	21	30	12	21	20	24	24	14	22	16	23	24	3.393
	(20)	(24)	(20)	(23)	(14)	(16)	(24)	(18)	(24)	(17)	(12)	(26)	(18)	(21)	(24)	(5.126)
77.	8	9	13	19	51	10	10	12	19	49	7	10	8	14	60	5.098
	(3)	(14)	(11)	(11)	(61)	(9)	(10)	(9)	(18)	(55)	(6)	(12)	(6)	(27)	(49)	(11.807)
78.	19	23	15	15	27	20	20	15	26	18	23	21	16	20	20	6.266
	(28)	(15)	(18)	(28)	(13)	(25)	(18)	(16)	(22)	(20)	(32)	(23)	(13)	(18)	(14)	(7.924)
79.	13	13	24	38	12	14	19	14	36	16	8	15	34	27	16	21.515**
	(13)	(16)	(20)	(34)	(18)	(15)	(19)	(18)	(30)	(18)	(17)	(24)	(18)	(23)	(18)	(3.637)

APPENDIX B.11--Continued

Item	Underachievers					Normal Achievers					Overachievers					X ²
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	
80.	4	8	21	40	28	7	8	16	34	35	2	12	14	44	28	8.794
	(5)	(10)	(16)	(48)	(21)	(5)	(11)	(19)	(40)	(24)	(5)	(8)	(25)	(35)	(27)	(4.474)
81.	1	4	5	22	68	0	5	8	25	61	0	5	9	28	58	4.614
	(0)	(4)	(9)	(24)	(64)	(1)	(3)	(7)	(27)	(62)	(0)	(4)	(6)	(22)	(68)	(3.494)
82.	19	24	21	22	14	17	22	22	21	17	19	19	17	23	22	3.199
	(16)	(26)	(19)	(24)	(15)	(21)	(21)	(19)	(20)	(19)	(23)	(28)	*18	(14)	(17)	(5.566)
83.	27	37	15	15	5	19	27	29	19	6	22	33	16	23	6	13.952
	(21)	(41)	(19)	(14)	(5)	(27)	(29)	(20)	(18)	(5)	(27)	(29)	(23)	(15)	(5)	(5.758)
84.	24	26	17	16	17	27	28	18	13	14	27	35	21	12	5	8.448
	(29)	(35)	(10)	(14)	(12)	(30)	(28)	(14)	(17)	(11)	(36)	(26)	(13)	(14)	(10)	(3.201)

Key: 1. Almost always (over 90% of the time); 2. Usually (75% - 90% of the time); 3. Often (26% - 74% of the time); 4. Sometimes (10% - 25% of the time); 5. Rarely (less than 10% of the time).

*First set of figures for males; figures in parentheses for females.

**Significant at the .05 level of confidence or beyond.

APPENDIX B.12
LEAST SQUARE ESTIMATES OF CONTRASTS OF RAW SCORE MEANS
OF SELECTED ABILITY TESTS

Contrasts	Selected Ability Tests							
	Eng	Rdg	ISS	ISci	IT	Ver	Num	CQT-T
1**	-1.91	-0.13	3.26	3.72	6.99	-0.84	6.60	12.76
2	-2.13	-3.21	-0.75	0.26	-0.49	0.71	-0.62	-0.40
3	-1.40	-1.69	-0.21	-0.28	-0.49	0.62	-1.72	-1.60
4	0.98	1.15	1.55	-1.70	-0.15	3.91	-2.11	1.65
5	0.87	1.06	0.55	-1.30	-0.73	1.83	-3.92	-2.79

MSU English Test (Eng);

MSU Reading Test (Rdg);

College Qualification Tests (CQT):

Information - Social Science (ISS)

Information - Natural Science (ISci)

Information - Total (IT)

Verbal (Ver)

Numerical (Num)

CQT-Total (CQT-T)

*Key to Contrasts:

1. Sex differences--male/female.
2. Group differences: underachievers vs. overachievers.
3. Group differences: normal achievers vs. overachievers.
4. Group interaction: sex vs. achievement level.
5. Group interaction: sex vs. achievement level.

APPENDIX B.13
STANDARD ERRORS OF LEAST SQUARE ESTIMATES OF CONTRASTS OF RAW SCORE MEANS
OF SELECTED ABILITY TESTS

Contrasts	Selected Ability Tests							
	Eng	Rdg	ISS	ISci	IT	Ver	Num	CQT-T
1*	0.46	0.57	0.41	0.41	0.72	0.99	0.70	2.00
2	0.66	0.81	0.59	0.58	1.02	1.41	0.99	2.85
3	0.51	0.63	0.46	0.45	0.79	1.09	0.77	2.21
4	1.31	1.63	1.18	1.16	2.04	2.82	1.99	5.70
5	1.02	1.26	0.91	0.89	1.58	2.18	1.54	4.41

MSU English Test (Eng);

MSU Reading Test (Rdg);

College Qualification Tests (CQT):

Information - Social Science (ISS)

Information - Natural Science (ISci)

Information - Total (IT)

Verbal (Ver)

Numerical (Num)

CQT-Total (CQT-T)

*Key to Contrasts:

1. Sex differences--male/female.
2. Group differences: underachievers vs. overachievers.
3. Group differences: normal achievers vs. overachievers.
4. Group interaction: sex vs. achievement level.
5. Group interaction: sex vs. achievement level.

APPENDIX B.14
LEAST SQUARE ESTIMATES OF CONTRASTS OF RAW SCORE MEANS
OF SELECTED ABILITY TESTS

Contrasts**	Variables*		
	CHC	CHE	GPA
1	0.18	0.14	2.89
2	-0.13	-3.31	-199.55
3	0.10	-0.02	-86.29
4	0.75	0.68	-8.55
5	0.18	0.09	-9.85

*Credit hours carried (CHC); Credit hours earned (CHE); Grade point average (GPA).

**Key to contrasts:

1. Sex differences--male/female.
2. Group differences: underachievers vs. overachievers.
3. Group differences: normal achievers vs. overachievers.
4. Group interaction: sex vs. achievement level.
5. Group interaction: sex vs. achievement level.

APPENDIX B.15
STANDARD ERRORS OF LEAST SQUARE ESTIMATES OF RAW SCORE MEANS
OF SELECTED ABILITY TESTS

Contrasts**	Variables*		
	CHC	CHE	GPA
1	0.18	0.22	3.82
2	0.26	0.31	5.45
3	0.20	0.24	4.22
4	0.51	0.62	10.91
5	0.39	0.48	8.43

*Credit hours carried (CHC); Credit hours earned (CHE); Grade point average (GPA).

**Key to Contrasts:

1. Sex differences--male/female.
2. Group differences: underachievers vs. overachievers.
3. Group differences: normal achievers vs. overachievers.
4. Group interaction: sex vs. achievement level.
5. Group interaction: sex vs. achievement level.