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FACTORS WHICH DIFFERENTIATE BETWEEN SUCCESSFUL AND
DISMISSED STUDENTS ON ACADEMIC PROBATION AT CENTRAL
MICHIGAN UNIVERSITY

Michigan State University

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FACTORS WHICH DIFFERENTIATE BETWEEN
SUCCESSFUL AND DISMISSED STUDENTS ON ACADEMIC PROBATION AT
CENTRAL MICHIGAN UNIVERSITY

By

Susan Clarkson Repp

A DISSERTATION

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ABSTRACT

FACTORS WHICH DIFFERENTIATE BETWEEN SUCCESSFUL AND DISMISSED STUDENTS ON ACADEMIC PROBATION AT CENTRAL MICHIGAN UNIVERSITY

By

Susan Clarkson Repp

The Problem

When students are admitted to colleges and universities using selective admissions criteria, a judgement is made that they have the potential to succeed in college level work. Many, however, receive failing grades and are placed on academic probation or dismissed. The primary purpose of this study was to identify factors which differentiate between freshmen students on academic probation at Central Michigan University who succeed at raising their grades above probation level, and those who fail to raise their grades and are dismissed. A second purpose was to identify a concise set of factors which can be used to predict the future performance of freshman students on probation.

Procedures

The sample consisted of 139 first semester freshmen on probation at the end of the Fall semester 1976 who could be classified as successful (above 2.00) or academically dismissed after four semesters, and for whom American College Test (ACT) profiles were available. Data were used in discriminant analysis to identify differences and to produce discriminant function coefficients for prediction. Data from a second sample of 122 freshmen on probation at the end of the Fall

semester 1977 were used to cross-validate the results. Thirty-one variables from student records over four semesters were analyzed.

The first hypothesis, tested at the .01 level of significance, was: no variables would be found which discriminated between successful and dismissed students. The second hypothesis, to be tested if the first was rejected, was: variables found to discriminate between successful and dismissed students would not predict success or failure of students on probation at a level greater than chance.

Findings

Over four semesters, twenty-two variables were significant at one or more points in time. Thus, the first hypothesis was rejected. The variables were: sex; high school GPA, four ACT subtest scores; expressed need for help with educational/vocational plans, writing, reading and study skills, and personal counseling; course load during the second, third and fourth semesters; hours withdrawn during the first, second, third and fourth semesters, hours incomplete during the first and second semesters; hours repeated during the third semester; and first semester college GPA.

Discriminant scores were used to predict success or dismissal at four points in time. Predictive accuracy ranged from 71.94 per cent for the first semester to 96.88 per cent for the fourth semester. Predictive accuracy for the cross-validation sample ranged from 64.75 per cent to 77.34 per cent over four semesters. Thus, the second hypothesis was rejected.

Four variables which were consistently significant over time were submitted to final discriminant analysis: high school GPA, first

semester college GPA, the ACT Social Studies score, and the need for help with study skills. This set of variables yielded a predictive accuracy of 69.78 per cent for the first sample, and 66.39 per cent for the cross-validation sample.

Conclusions and Recommendations

The statistical technique of discriminant analysis proved to be an effective method for identifying differences between freshmen students on academic probation at Central Michigan University who were subsequently successful or dismissed. The prediction technique was useful as a diagnostic tool, but the level of accuracy contained too much margin for error to be used as a decision-making tool. The full set of variables provided information which identified trends among the groups, while the reduced set of variables was considered more practical for prediction.

Based on the results of the study, it is recommended that discriminant analysis be used more widely for comparing group differences, and as a predictive device. Further, it is recommended that the technique be applied to data on probationary students at other institutions to identify patterns existing in other educational settings.

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CHAPTER I

THE PROBLEM

When students are admitted to colleges and universities using selective admissions criteria, a judgement is made that they have the potential to succeed in college level work. Many, however, receive failing grades and are placed on academic probation or dismissed. Despite prior achievement and satisfactory aptitude test scores, these students fail to meet the academic standards of the institution. Although some loss of students due to academic failure must be expected, the loss is too great to avoid attention.

John Summerskill, after reviewing thirty studies on college student attrition due to academic reasons, observed that academic failure accounted for thirty-three per cent of the college dropout rate.¹ Summerskill noted that an urgent need existed for further research on academic failure, and further commented that:

"...tens of thousands of students leave college each year because they cannot make the grade academically... Since the objectives of the college are to educate and graduate the students they admit, academic failure must be viewed as a failure on the part of the institution as well as on the part of the individual students."²

Summerskill discussed three reasons why student attrition is of interest to colleges. The first concern is a loss of public trust when the institution is seen as having failed to meet the objective of qualifying young people for careers. The second is a concern for the loss of efficiency represented by the time, energy and money spent on

¹John Summerskill, "Dropouts from College," in The American College, ed. Nevitt Sanford, (New York: John Wiley, 1962).

²Ibid., p. 637.

students who drop out. The third concern, which is not often discussed, is the loss of revenue which occurs when students leave the college.³

The failing student also suffers a loss. The student has also invested a considerable amount of time, energy and money in the educational process, and has also failed to meet an objective. Thomas Cottle described the frustration and loss of self-esteem experienced by a failing student whom he had advised during two years of college.⁴ The student, referred to as Jon, had excellent high school grades, a strong background in science, and planned to become an engineer. When his first term grades resulted in C's and D's, he was embarrassed over his inability to throw himself into his studies. He searched the college catalog for "easy" courses to avoid "feeling dumb". In Jon's words"

"I don't think I'm dumb, but I must be... The whole world thinks that if you're here, you got to be brilliant. So how do you explain to them you're pretty godawful common?... I don't want people to know, except that my parents will have to find out sooner or later, I suppose... Can you see me going home...carrying a record like this? I may be dumb, but I don't go around making sure everybody finds out about this."⁵

As his grades worsened, Jon became preoccupied with studying, but his confidence was totally broken. Not many of his friends knew about his poor grades until expulsion became a reality. Jon flunked out of college at the end of his second year. His parting comments summarized his feelings:

"I am the zero man...absolutely nothing."⁶

³Ibid., p. 634.

⁴Thomas Cottle, College: Reward and Betrayal, (Chicago: Univ. of Chicago Press, 1977).

⁵Ibid., pp. 117-118.

⁶Ibid., p. 127.

Need for the Study

Numerous research studies have identified factors associated with academic achievement, and a lesser amount have been concerned with factors associated with academic failure. Studies concerning the academic achievement of college students on academic probation have been completed at several institutions, but the information provided has limited value for application to students on probation at other colleges and universities. Differences in academic policies and student characteristics at various institutions prevent the generalization of results from one campus to another. This study will provide information which is applicable to students on academic probation at Central Michigan University.

One of the shortcomings of previous studies is that many were completed before common usage of computers as data analyzers, and thus were limited to univariate studies or simple multivariate studies. While these studies are valuable in showing the relationship of one variable, or a small group of variables, to the academic achievement of probationary students, they are too limited in scope to allow for more complete examination of the available information. This study uses a multivariate approach which allows for simultaneous comparison of a larger number of variables.

Another shortcoming of previous studies is that many of them followed the progress of students on probation for a short time period, usually only one or two terms or semesters. This study tracks academic progress for four semesters, which provides the opportunity to confirm or disconfirm trends found in shorter time spans.

Many of the studies reviewed analyzed data from questionnaires

sent to students on probation, or were based on data from personality assessment instruments which were administered to such students. This study employs the use of data contained in student's academic files which is readily available to administrators who make decisions concerning the retention or dismissal of students with low grades. At Central Michigan University, these decisions are made in a concentrated time period between semesters, and involve the review of hundreds of folders. The availability of information on factors relating to the academic achievement of probationary students would be helpful in decision-making on student's academic status, and for advising students on courses of action which could result in improved performance. At a time when retention of students is a major concern in higher education, improved ability to assist probationary students would aid in serving the need for retention techniques at Central Michigan University.

Purpose of the Study

The primary purpose of the study is to identify significant factors which differentiate between freshman students on probation at Central Michigan University who succeed at raising their grades above probation level, and those who fail to raise their grades and are dismissed. In addition, a secondary purpose is to identify a concise set of factors from information available in academic folders which can be used to predict the future performance of freshman students on probation.

Limitations of the Study

The study is limited to first semester freshman students on academic probation at Central Michigan University who subsequently raised their grade point averages above 2.00 or were academically dismissed within the first four semesters of attendance. Probationary students who voluntarily withdrew from the University during the first four semesters or who remained on probation after four semesters were not included in the study. The study is also limited to data found in probationary students' academic folders and does not include data on personality factors, assessment of student motivation for academic achievement, or information from personal interviews.

Research Questions

The basic question to be answered is: which pieces of information in probationary students' folders can be used for effective decision-making and advisement? More specific questions follow from this basic question.

Which variables are associated with improvement, and which are associated with failure?

Which variables most clearly differentiate successful students from students who fail?

Can a combination of factors which discriminate between successful and failing students be used to predict future performance?

How much accuracy can be obtained in prediction?

Hypotheses related to these research questions will be stated in Chapter III, Design of the Study.

Definition of Terms

Definitions of terms used frequently in the study are presented below to provide a common basis for understanding their usage.

Academic achievement refers to the level of accomplishment gained in school coursework as measured by grade point averages (GPA's).

Academic failure or dismissal is used to describe a situation in which a student's achievement level falls below the minimum standards of a college, and results in the college's decision to terminate the student's enrollment. Academic suspension or cancellation are synonymous terms.

Academic probation is used to describe an achievement level which falls below established grade point standards (usually 2.00 but may be lower for freshmen students) but does not fall below the level established for dismissal.

Academic standards refers to the GPA level delineated by a college to determine whether a student's achievement is satisfactory for earning a degree.

Academic progress refers to the process by which a student selects a curriculum and field of study, and successfully completes coursework according to established requirements for a college degree.

Academic success is used to illustrate a grade point average which meets the academic standards of the institution.

Academic aptitude describes a potential for academic achievement as measured by a standardized testing instrument.

Academic withdrawal is a term used to identify those students who voluntarily leave college, for any reason.

Background of the Study

Central Michigan University is a public institution which offers a liberal education in preparation for baccalaureate, masters, specialist and doctoral degrees. A major emphasis is placed on undergraduate education. At the opening of the fall semester, 1979, the University had an enrollment of 16,821, of which 14,302 were undergraduate students.

The academic files of undergraduate students whose grades do not meet minimum standards are reviewed each semester in the Office of Student Affairs. A computer program encodes the grade reports of students below minimum according to established criteria stated in the Central Michigan University Bulletin. Under the supervision of the Director of the Office of Student Affairs, the folders are reviewed by administrative staff members. These administrators attach a label to each folder indicating their judgement of whether the student should be retained on academic probation or dismissed. These decisions are made on the basis of the number of hours attempted, hours earned, points deficient (a measure of the number of credit hours below C), previous academic status, and other academic criteria as deemed appropriate. Each folder is reviewed by the Director of the Office of Student Affairs, who verifies or changes the label applied, and directs the preparation of letters which are mailed to students to inform them of their status.

Some probationary students are asked to make appointments with an administrative staff member in the Student Affairs Office to discuss their status and to participate in an academic advising and referral interview, and all who receive probation letters are informed of this resource. The files of freshmen students are also reviewed by the

Coordinator of the Educational Skills Unit of the Counseling Center, and letters are sent informing these students of courses and tutoring services offered by the Unit.

Dismissed students may request an interview with an administrative staff member. At this point, the student's academic progress, achievement, personal attitudes and difficulties are discussed in depth. A decision may be made to reinstate the student or to recommend that the student apply for readmission after a semester or more away from campus. Decisions on readmission may be appealed to the Vice President for Student Affairs.

In a five year period, from December, 1974, to May, 1979, an average of 646 undergraduate students were retained on academic probation at the end of the fall or winter semesters, and an average of 197 were dismissed.⁷

Organization of the Study

In Chapter II, a review of pertinent literature on prediction of academic achievement and achievement of probationary students is presented. Chapter III contains a description of the research design, and procedures for collecting and analyzing the data. In Chapter IV, the results of the statistical analysis are presented. Chapter V contains a summary of the study, followed by conclusions based on the findings and recommendations for further study.

⁷Office of Student Affairs, Central Michigan University, record of students placed on academic probation or cancelled at the end of the fall and winter semester, 1972-1979, (Mt. Pleasant, Michigan: Central Michigan University, n.d.).

CHAPTER II

REVIEW OF LITERATURE

The review of literature is organized under five major headings. These are: (1) general prediction of academic achievement; (2) predicting academic achievement of probationary students; (3) factors associated with academic failure; (4) treatment programs for students on academic probation; and (5) the relationship of academic achievement to retention. Studies relating to each of these topics are reviewed, in turn, in this chapter.

General Prediction of Academic Achievement

David Lavin's comprehensive review of studies on prediction of academic performance provides a foundation for general discussion on prediction. Lavin reviewed and analyzed nearly 300 sources on prediction, almost all of which were published during the period from 1953 to 1961. Lavin reported the studies in three categories according to the nature of the predictors emphasized. The three categories are: (1) intellectual factors; (2) personality factors; and (3) sociological determinants.⁸

Under the category of intellectual factors, Lavin reports sixteen studies on ability tests which use one score to predict subsequent performance. These studies indicate that ability tests correlate approximate +.50 with college grade point average. Twenty studies involving ability tests which used scores from subtests to predict

⁸David E. Lavin, The Prediction of Academic Performance (Hartford, Conn: Connecticut Printers Inc.) for the Russell Sage Foundation, New York, 1965.

performance showed an average correlation of +.65. In both types of studies, those involving tests using a single score and those using subscores, some correlations were computed separately for males and females. Where this separate computation was done, a few showed no sex difference, several found high correlations for females than males, and none found higher correlations for males. Lavin concluded that academic performance of females tends to be more predictable. In addition, from studies which employed high school grades or high school rank in class as predictors, Lavin concluded that the high school academic record is the single best predictor of college grades.⁹

In reporting on personality variables used as predictors, Lavin analyzed over 120 sources to summarize the findings.¹⁰ The majority of the studies employed correlational techniques to predict academic performance from a single variable. The variables used for prediction were: measures of study habits and attitudes toward study, including self-reporting inventories or teacher or peer ratings of study habits; measures of subject matter and/or occupational interests; measures of achievement motivation, through the use of questionnaires or projective techniques; measures of independence or conformity, using personality scales or projective techniques; measures of impulsivity, using personality scales; measures of general anxiety or anxiety concerning level of academic performance, using personality tests such as the Manifest Anxiety Scale; measures of introversion, using personality

⁹Ibid., pp. 51-57, for citations of studies reviewed, see pp. 60-61.

¹⁰Ibid., for citations of studies reviewed, see pp. 111-121.

tests; and measures of adjustment, using the Minnesota Multiphasic Personality Inventory.

In addition to these single variable studies, Lavin reported several multivariate studies which employed multiple correlation analysis and/or factor analysis to test the value of predictors. Lavin summarized and categorized the results of the multivariate studies into six personality dimensions, and further illustrated how findings from single variable studies aligned with the results of multivariate studies.¹¹ Table 1 is a summary review of the findings and Lavin's classification structure.

Studies of sociological determinants consider the effects of social settings or role relationships on academic performance, or the effects of ecological and demographic variables such as socioeconomic status (SES), religion, rural-urban background, and the like. Lavin reviewed over eighty studies of sociological determinants. The largest number of studies considered the effects of socioeconomic status (SES). Objective techniques involving weighted scores on variables such as occupation, education, income, and others, were used to determine SES. At all educational levels from elementary school to graduate school, SES was positively related to academic performance; except in those samples which included only college students from upper class backgrounds, where an inverse relationship was found. Findings on sex differences indicate that the level of academic performance of females is higher than that of males; and that patterns of underachievement

¹¹Ibid., pp. 106-107, p. 110.

TABLE 1

SUMMARY OF LAVIN'S CLASSIFICATION OF SINGLE-VARIABLE AND
MULTIVARIATE STUDIES ON PREDICTION OF ACADEMIC
PERFORMANCE: PERSONALITY VARIABLES ASSOCIATED
WITH HIGHER LEVELS OF PERFORMANCE

Dimensions from Multivariate Findings	Alignment with Single- Variable Findings
I. <u>Social Maturity in the Student Role</u>	
Greater social maturity and socialization, acceptance of responsibility, restraint in social behavior	Better study habits, more positive attitudes toward study, less hostility
II. <u>Emotional Stability</u>	
Higher morale, greater stability more freedom from neurotic orientation to study	Less test anxiety
III. <u>Achievement Motivation</u>	
Higher motivation and greater endurance	Higher achievement motivation
IV. <u>Cognitive Style</u>	
Greater curiosity, originality, and flexibility, more relevant thinking in class, greater class participation, greater liking for thinking, less difficulty with ambiguity and abstraction	Greater flexibility in problem-solving
V. <u>Achievement Via Conformance</u>	
Higher need for order, greater conformance	-----
VI. <u>Achievement Via Independence</u>	
Lower need for affiliation, greater independence, low conformity to peer group standards, moderate impulsivity	More independence and/or introversion, less impulsivity, greater independence in choice of vocational interests

Table 1 (cont'd.)

Dimensions from Multivariate Findings	Alignment with Single- Variable Findings
	<u>Non-aligned single- variable findings:</u>
	More positive self-image, less defensiveness about revealing personality in- adequacy, greater interest in content areas of high achievement

may be different for females than for males.¹²

Inconsistent or inconclusive results were found in studies considering such variables as religion, regional or urban-rural background, high school size, academic load, family size and birth order. In several of these studies, significant relationships were found; but most of the relationships disappeared when SES and/or intelligence were controlled.¹³

Based on his exhaustive review, Lavin cautions that research studies testing the relationship of academic performance should include methods to control for sex, ability, and socioeconomic status. In addition, he asserts that studies of underachievement should differentiate between students of high, medium and low ability; since factors contributing to underachievement may be different, or may operate differently at

¹²Ibid., p. 130, for citations of studies reviewed, see pp. 150-156.

¹³Ibid., p. 138.

different levels of ability. This method of differentiation also allows for the possibility of finding curvilinear rather than linear relationships.¹⁴

Benjamin Bloom and Frank Peters attempted to improve upon previous prediction studies which used high school grades and aptitude test scores to compute correlations. Their review of literature included forty studies, many of which were the same as those reviewed by Lavin. Bloom and Peters' method was to create a prediction scale which included adjusted values for the relative level of achievement of students from a selected sample of high schools at a selected sample of colleges. The purpose of this procedure was to reduce the amount of error contributed by variations in grading standards at different high schools and colleges.¹⁵

The sample included approximately 25,000 students from 150 high schools who had subsequently attended 300 colleges. Data consisting of high school grades, aptitude test scores, and college grades were sorted into groups and used in regression analysis to assign adjusted values for computing correlations. Thus, the grade point average for a student from a high school where liberal grading practices result in inflated values would be adjusted downward before entering into a correlation. The adjusted average could take on three different values depending on which of three classes of colleges was selected for computation. The values assigned for the three classes of colleges

¹⁴Ibid., pp. 18-31.

¹⁵Benjamin S. Bloom and Frank R. Peters, The Use of Academic Prediction Scales (New York: The Free Press of Glencoe, 1966).

were determined by grading practices at the colleges. Similarly, aptitude test scores would be adjusted according to the average aptitude levels at the three classes of colleges. In Bloom and Peters' study, correlations averaged from +.70 to +.80, with some correlations achieving levels of +.85.¹⁶

Based on their findings, Bloom and Peters recommended that national, or at least statewide data agencies be established to collect and process high school grades, aptitude test scores, and college grades for the purpose of providing a more accurate method for predicting academic achievement in college. They readily admitted however, that such a system would require the annual collection of millions of records; and that the greatest barrier would be the resistance of schools and colleges to the releasing of data and allowing their grading scales to be adjusted.¹⁷

E. F. Lindquist used the Bloom and Peters theory as a basis for a similar method of predicting college grades. Lindquist used data on over 9,000 Iowa college students in a comparison of multiple correlations of ACT scores and scaled high school grades versus ACT scores and unscaled grades. Lindquist gained an improvement of only .008 in the multiple correlations of .629 for scaled grades and .621 for unscaled grades.¹⁸ A subsequent attempt by Watley and Merwin to use

¹⁶Ibid., pp. 36-70.

¹⁷Ibid., p. 53.

¹⁸E. F. Lindquist, "An Evaluation of a Technique for Scaling High School Grades to Improve Prediction of Success", Educ. and Psych. Meas. 23 (Winter 1963): 623-646.

the Bloom and Peters concept of adjusting for variations in high schools also failed to produce significant results.¹⁹

More recent studies by Alexander Astin provide some confirmation of Lavin's findings.²⁰ Astin's studies are notable due to the large size and national scope of the samples. Three samples were taken. The first sample included 4,884 students enrolling at 201 four-year institutions in the fall of 1961. The second sample consisted of 38,681 freshmen enrolling at fifty-five institutions in the fall of 1965. The third sample was composed of 36,581 freshmen who enrolled at 180 institutions in the fall of 1966. The data generated from these samples included information from a four-page freshmen information form, aptitude test scores, and follow-up data provided by the institutions on freshmen grade point averages (GPA). The data was used to provide material for correlations and regression analyses for prediction of freshmen GPA's and to generate conversion tables for equating scores on various aptitude tests.²¹

Astin's findings on freshman GPA's show that women earn higher grades than men, even where men and women were matched on the basis of previous high school grades and aptitude scores. High school grades correlated +.50 for men and +.51 for women. Aptitude test scores on the Scholastic Aptitude Test (SAT), or the American College Test (ACT),

¹⁹Donivan J. Watley & Jack C. Merwin, "An Attempt to Improve Prediction of College Success", Educ. and Psych. Meas. 23 (Winter 1963): 623-646.

²⁰Alexander W. Astin, Predicting Academic Performance in College, (New York: The Free Press, and London: Collier-Macmillan Ltd., 1971).

²¹*Ibid.*, pp. 268-269.

or the National Merit Scholarship Qualifying Test (NMSQT) correlated with freshman GPA at +.35 for men and +.43 for women. In combination, high school grades and aptitude yielded correlations of +.51 for men and +.55 for women. In equating the comparative predictive value of the three aptitude tests (SAT, ACT, and NMSQT) composite scores were found to be highly interrelated, with an average correlation of +.85. Contrary to Lavin's findings, Astin found that only a trivial amount of additional predictive value was gained when scores on separate subtests were used rather than composite scores.²²

Data from student questionnaires provided information on background characteristics, high school achievements, future plans, and interests and personal characteristics. Regression analysis was performed to determine which characteristics affect academic performance in college. Thirteen characteristics were found which significantly increased the accuracy of prediction after controlling for sex, high school grades, academic ability and the selectivity level of the college attended. In Table 2, the thirteen characteristics and partial correlations for men and women which were statistically significant ($p < .01$) are listed.²³ Astin points out that since four of the variables which added to prediction after controlling for high school grades were, in fact, variables involving high school grades, a nonlinear relationship between performance in high school and college can be inferred. This lends

²²Ibid., pp. 4-12, pp. 291-292.

²³Ibid., pp. 279-280. In the comparisons listed, selectivity level of the college was determined by categorizing colleges into seven groups according to the mean scores of all entering students on the NMSQT, SAT or ACT; see pp. 23-31.

TABLE 2

ASTIN'S LIST OF STUDENT CHARACTERISTICS THAT PREDICT FRESHMAN
GPA AFTER CONTROLLING FOR SEX, HIGH SCHOOL GRADES
AND COLLEGE SELECTIVITY

Student Characteristics	Partial Correlations of Men	Variables With GPA Women
Drive to achieve (self-rating)	.12	.11
C+ high school average	.07	.05
Member of scholastic honor society	.06	.07
Academic ability (self-rating)	.06	.07
A or A+ high school average	.05	.11
Attended Roman Catholic high school	.05	.09
Turned in paper or theme late	-.10	-.12
Went to movies	-.06	-.06
Attended public high school	-.05	-.07
B high school average	-.05	-.08
B+ high school average	-.05	-.07
Came late to class	-.05	-.05
Made wisecracks in class	-.05	-.05

$p < .01$

credence to Lavin's argument for differentiating college underachievers by prior achievement levels.²⁴

Astin explored the relationship between GPA and the student's race,

²⁴Ibid., p. 280.

religion and socioeconomic background. Astin found that parent's income level had no relationship to freshman GPA either before or after controlling for high school grades, academic aptitude or college selectivity. Students whose parents were highly educated obtained significantly better freshman GPA's ($p < .01$), as did Jewish men and Catholic women. Before controlling for high school grades, aptitude and college selectivity, White students and Orientals attained higher freshman GPA's than Black students. However, the differences were not significant after controls were used, and Astin concludes that differences in academic performance are attributable to differences in ability and past performance, not to any effects of race per se.²⁵

Concerns regarding equal access to college opportunities prompted studies directed toward predicting achievement of minority and disadvantaged students. Charles Thomas and Julian Stanley reviewed thirty such studies to reexamine the value of high school grades and standardized test scores for predicting college grades of black students. Their review of studies about academic aptitude tests resulted in the conclusion that SAT and ACT scores are as valid in predicting for black students as they are for white students. However, they concluded that high school grades and rank are not as accurate in predicting college grades of black students as they are for whites. Similar results were found in studies of blacks in predominantly black colleges and for blacks in predominantly white colleges.²⁶

²⁵Ibid., p. 14, p. 281.

²⁶Charles L. Thomas and Julian C. Stanley, "Effectiveness of High School Grades for Predicting College Grades of Black Students: A Review and Discussion", Journal of Educ. Meas. 6 (Winter 1969): 203-215. For citations of studies reviewed, see pp. 214-215.

In an later article, Stanley discussed prediction of college grades for educationally disadvantaged in terms of low predicted GPA or persistence, to distinguish the term from expressions such as "culturally disadvantaged" or "socially disadvantaged". Further, he cautions against assuming that all persons of a given race, ethnic group or regional group are educationally disadvantaged or academically under-qualified. Stanley reviewed 47 studies, including many of those reviewed in the earlier article, and concluded that aptitude tests and high school grades usually predict college GPA at least as accurately for disadvantaged as for regular applicants.²⁷

Larry Hedges and Kenneth Majer attempted to improve prediction of college grades for minority students by using an adjustment factor for high school characteristics in stepwise multiple regression analysis. Their reasoning was based on previous studies by Bloom and Peters, Lindquist, and Watley and Merwin. No significant contribution to multiple correlation was found when the high school factor was added to high school GPA and SAT scores. The sample subjects consisted of 161 Educational Opportunity Program students enrolled at the University of California San Diego campus in 1972-1973, a group largely made up of ethnic and racial minorities.²⁸

Concerns regarding declining scores on aptitude tests used as a

²⁷Julian C. Stanley, "Predicting College Success of the Educationally Disadvantaged", Science 171 (1971): 640-647. For citations of studies reviewed, see pp. 646-647.

²⁸Larry V. Hedges and Kenneth Majer, "An Attempt to Improve Prediction of College Success of Minority Students by Adjusting for High School Characteristics," Educ. and Psych. Meas. 36 (Winter 1976): pp. 953-957.

basis for college entrance led Forrest Price and Suk Kim to test the relative value of ACT composite scores and high school grades in predicting college grades. A random sample of 93 junior and senior business students at Fort Hays Kansas State College was used for the study. Price and Kim found a multiple regression coefficient of $+0.71$, and also found that the ACT score contributed more to prediction than high school grades.²⁹

An attempt to predict scholastic success or failure of college students through discriminant analysis was carried out by Vincent Calia at Boston University Junior College. Calia thought that the use of multiple correlation and multiple regression had reached a point of providing a maximal amount of information in terms of the nature of the statistical procedures, and felt that the more general prediction of success versus attrition for academic reasons was of more central concern. He selected discriminant analysis because of the ability to identify which variables contribute to intergroup variation, and to further identify the relative weight of each variable in the determination of group membership. Data from the entering class of 1957 was used for the analysis, and cross-validation was done by using the class of 1956 as a second sample. Thirty-three variables were found to carry considerable weight in discriminating between the groups, but none of the values attained statistical significance following the application of Chi-square tests. Cross validation with the 1956 sample yielded 37 per cent to 74 percent correct prediction of group

²⁹Forrest W. Price and Suk H. Kim, "The Association of College Performance with High School Grades and College Entrance Test Scores", Educ. and Psych. Meas. 36 (Winter 1976): 965-980.

membership in the four batteries.³⁰

Discriminant analysis was also used by Charles Keenen and June Holmes to predict graduation, failure or withdrawal from Boston University College of Liberal Arts. The subjects consisted of full time freshmen students who entered Boston University directly from high school. Thirty-four variables were analyzed, including four intellectual variables consisting of SAT Math, SAT Verbal, high school rank in class, and number of high school credits earned; and thirty content variables which were coded from college application statements. The results indicated that the application statement variables contributed more to discrimination than did the intellectual variables. When the original subjects were classified, intellectual variables correctly predicted thirty-five per cent of the cases, while content variables correctly predicted sixty per cent of the cases.³¹

Predicting Academic Achievement of Probationary Students

Studies attempting to find variables which can be employed to predict achievement of college students on academic probation have been done at some universities.

B. Orson Tew conducted a study to examine differences in personality variables between students who failed or succeeded academically

³⁰Vincent F. Calia, "The Use of Discriminant Analysis in the Prediction of Scholastic Performance", Personnel and Guidance Journal 39 (Nov. 1960): 184-190.

³¹Charles B. Keenen and June E. Holmes, "Predicting Graduation, Withdrawal and Failure in College by Multiple Discriminant Analysis", Journal of Educ. Meas. 7 (Summer 1970): 91-95.

after being admitted on probation. Tew hypothesized that different patterns of personality variables would be found among the two groups. His sample included 98 freshmen who entered Utah State University in 1959 on probationary status. The judgement to admit these students on probation was made on the basis of scholastic performance in high school.³²

Students in the two groups were compared on 86 variables by means of stepwise multiple discriminant analysis. A significant difference ($p < .01$) was found for a combination of twelve variables. The twelve variables are listed in Table 3.³³

According to Tew, the stepwise discriminant analysis method improves prediction by roughly 68 percent over chance. To use the method for prediction, the values of all 12 variables must be known, and must be converted to Z-scores. The Z-scores are then compared to those in the study, and classification is made depending on whether the computed Z-scores fall above or below the midpoint of scores for successful and failing students.³⁴ This method, while recognizing that variables contributing to academic achievement act in combination rather than singly, would be quite cumbersome to use and requires that the MMPI and Mooney Problem Checklist be routinely administered to students on probation.

³²B. Orson Tew, "The Relationship of Measured Personality Variables to the Academic Success of College Students on Academic Probation: (Ph.D. dissertation, Brigham Young University, 1962), pp. 1-6.

³³Ibid., pp. 6-12, pp. 35-43.

³⁴Ibid., pp. 43-45.

TABLE 3

COMBINATION OF VARIABLES ISOLATED BY TEW WHICH DISCRIMINATED
BETWEEN SUCCESSFUL AND FAILING PROBATIONARY STUDENTS

Variable	Difference	
Religion	Successful students preferred the dominant religion of the geographical area	
Preferred Occupation	Successful students preferred more professional types of occupations	
Major	Successful students preferred science as a major	

	<u>Means of Groups</u>	
Minnesota Multiphasic Personality Inventory	Successful	Failing
L Scale (Lie)	2.44	2.93
K Scale (Correction Factor)	15.06	12.17
Hs Scale (Hypochondriasis)	6.44	5.24
Hy Scale (Hysteria)	21.69	17.48
Mf Scale (Interest)	29.06	24.12
Pa Scale (Paranoia)	11.00	8.72
Sc Scale (Schizophrenia)	18.00	14.31
Mooney Problem Checklist		
HPD Scale (Health & Physical Development)	2.72	3.26
FVE Scale (Future: Vocational and Educational)	4.58	3.57

p < .01

Carlton Boxhill conducted a study of freshmen students on academic probation, proceeding from previous attrition students at Rutgers College, an undergraduate men's division of Rutgers, The State University. The previous studies had documented an attrition rate of approximately twenty per cent of all freshmen in Rutgers College, and concluded that about two thirds of the attrition was due to academic difficulties, either from academic dismissal or voluntary withdrawal due to low achievement. No differences on intellectual measures had been found between students on probation who had improved their grades, and those dismissed for academic deficiencies. Thus, Boxhill decided to explore non-intellectual measures by using the Minnesota Multiphasic Personality Inventory (MMPI). The general hypothesis was that a special scale of MMPI items could be developed to differentiate between freshmen students on probation who improved their grades and students who did not improve and were dismissed.³⁵

The subjects consisted of thirty-eight pairs of successful and unsuccessful students who had been matched on five criteria, including the fact that they had taken the MMPI while on probation. A new scale called the RD (retained-dismissed) scale was developed from the responses of the matched groups on the MMPI. T-tests were used to compare responses, and eighteen items were identified as discriminating between the two groups at the .05 level of significance. These items were combined to make up the RD scale. The new scale was used to compute an RD score for each student, and it was found that differences

³⁵Carlton J. Boxhill, "A Special MMPI Scale Related to the Retention and Dismissal of Freshmen College Students on Academic Probation", (Ed.D. dissertation, Rutgers, The State University, 1965), pp. 5-10.

between successful and unsuccessful students were significant at the .001 level.³⁶

Boxhill completed his study by constructing an expectancy table which outlined the chances in 100 for retention or dismissal based on an individual's score on the RD scale, and which could be used as a predictive device. Boxhill recommended that different counseling treatments be offered to students on probation according to their predicted academic status.³⁷

Howard Himmelreich conducted a study to add to understanding the achievement of the student who is dismissed from college because of failure to meet academic standards and then is later readmitted. The study analyzed the relationship between four intellectual and twenty-two non-intellectual variables to achievement as measured by GPA in the first semester following readmission.³⁸

The subjects consisted of 153 of 167 suspended students who had been readmitted to the University of Nebraska for the fall 1965 semester. Four instruments were administered as part of the study. The Pearson product-moment correlation was used to measure the degree of relationship between each of the predictor variables and the criterion of GPA, followed by stepwise multiple regression involving significant

³⁶ Ibid., pp. 47-56, 62-68,

³⁷ Ibid., pp. 71-73, 83-84.

³⁸ Howard W. Himmelreich, "A Study of the Variables Influencing the Achievement of College Students Readmitted to the University of Nebraska Following Academic Suspension," (Ed.D. dissertation, The University of Nebraska-Lincoln, 1967), pp. 2-5

variables. In Table 4, the correlations (r) and significance levels are shown for each of the six variables found to be significant after correlational analysis.³⁹

TABLE 4
VARIABLES FOUND BY HIMMELREICH TO BE SIGNIFICANTLY CORRELATED
WITH ACHIEVEMENT OF PROBATIONARY STUDENTS

Variable	r	Signif. Level
Investigator's Predicted GPA	.39	.01
Change of curriculum to another college and Univ. of Nebraska	.34	.01
Attitude toward School (from Calif. Study Methods Survey, CSMS)	.24	.01
Planning and System (CSMS)	.23	.01
Total CSMS Score	.20	.05
Exhibitionism (from Edwards Personal Preference Inventory)	-.16	.05

After stepwise multiple regression analysis, four of the variables were found to make independent contributions in accounting for variance. The four variables were: (1) investigator's predicted GPA, (2) change of curriculum to another college, (3) attitude toward school, and (4) Exhibitionism scale. The resultant multiple correlation was +.52.⁴⁰

Donald Schuster conducted a study at Iowa State University in

³⁹Ibid., pp. 58-73.

⁴⁰Ibid., pp. 76-77.

which one of the purposes was to predict academic achievement of college students who had been academically dismissed and subsequently readmitted. The samples consisted of 51 students in 1968-1969 and 52 students in 1969-1970 who had been readmitted after being academically dismissed. Twenty-six predictor variables were submitted to stepwise regression analysis. Ten variables which contributed significantly to prediction ($p < .05$) were included in the final analysis. The ten variables were: (1) number of quarters out of school, (2) high school rank, (3) amount of high school math, (4) health problems, (5) percentile score on the Minnesota Scholastic Aptitude Test, (6) year in college, (7) score on a local math test, (8) setting realistic goals, (9) GPA at dismissal point, and (10) number of failing grades not made up on the academic record.⁴¹

The multiple correlation for the first (1968-1969) group was +.80. However, an attempt to cross-validate the findings with the second (1969-1970) group reached a multiple correlation of only +.29. Schuster suggested that the source of variation might have been a lack of homogeneity in the two samples, or a lack of reliability in GPA during the first quarter back in school after dismissal.⁴²

Marvin Motz investigated the predictive validity of thirty-nine selected variables using achievement of college students on academic probation as the criterion. The subjects for the study were 102 undergraduate students on academic probation during the 1968 fall term at

⁴¹Donald H. Schuster, "An Analysis of Flunked-Out and Readmitted Students," J. of Educ. Meas. 8 (Fall 1971): 171-175.

⁴²*Ibid.*, p. 174.

Adams State College. Data was collected from the Office of Student Affairs, the Registrar's Office, and by survey. The resulting data was analyzed by multiple linear regression. Although three correlation coefficients were found to be significant at the .05 level, the multiple regression model using all thirty-nine variables yielded a multiple correlation coefficient of $+ .35$. Motz concluded that this level of predictability was no better than chance.⁴³

Ned Shreffler conducted a study at Ohio State University which compared freshman students on probation with freshman students on academic warning (a less serious status), and freshmen students in good standing. The probation sample consisted of 194 of 293 first quarter freshmen on academic probation for whom ACT profiles were available. Shreffler compared the academic achievement of probationary students with and without ACT profiles and found no reason to believe the groups differed. The other groups in the sample consisted of 100 randomly selected students on academic warning, and 300 randomly selected students in good standing.⁴⁴

Comparisons of seventy-eight variables from ACT profiles by means of discriminant analysis yielded significant differences between the groups at the .05 level on fifteen variables. The fifteen variables were able to successfully classify sixty-nine per cent of the freshmen on probation, twenty-two per cent of the warning group, and eighty-two

⁴³Marvin D. Motz, "Predicting Academic Achievement of Students on Academic Probation at Adams State College," (Ed.D. dissertation, Univ. of Northern Colorado, 1969), pp. 2-5, 30-38, 52-55, 85-89.

⁴⁴Ned L. Shreffler, "A Study of a Means for the Early Identification of Potential High Academic Risk College Students", (Ph.D. dissertation, Ohio State Univ., 1976), pp. 5-7, pp. 55-57.

per cent of the good standing group. A discriminant analysis comparison of freshmen who were dismissed and freshmen who were not dismissed yielded fourteen variables which were significant at the .05 level. These fourteen variables were able to classify dismissed and non-dismissed students correctly in eighty-nine per cent of the cases.⁴⁵ The two lists of significant variables are shown in Table 5.

From the analysis, Shreffler created a profile of the probation study in comparison to students on warning or in good standing. The student on probation has a lower high school GPA, lower high school rank, and lower ACT English and social science scores. Probationary students had less frequently taken high school foreign language or been active in high school extracurricular music activities. More of the probation students expressed a need for help in math, while fewer expressed a need for help in writing skills. The probation groups was composed of more older students and more part-time students than the warning or good standing groups.⁴⁶

⁴⁵Ibid., pp. 75-85.

⁴⁶Ibid., p. 93.

TABLE 5
SIGNIFICANT VARIABLES IN SHREFFLER'S
DISCRIMINANT ANALYSIS

Probation/Warning/Good Standing	Dismissed/Non-dismissed
High school GPA	ACT Math score
ACT English score	Interest in credit by exam in social studies
High school rank	Date ACT taken
Interest in credit by exam in social studies	High School GPA
Participation in H.S. athletics	Degree of certainty of major
Birthdate	Sex
Need help in math skills	Need personal counseling
Need help with writing skills	Type of H.S. program
Need help finding work	ACT Social Sciences score
ACT Social Sciences score	Years of H.S. science
Type of college selected	Interest in credit by exam in math
Foreign language in H.S.	% of H.S. same race
Participation in H.S. music	
Full/part time attendance	

Factors Associated with Academic Failure

Reasons for the poor academic achievement of college students on academic probation have been a frequent topic of study. Harold Husa compared successful and unsuccessful students at Northern Illinois University who had been readmitted after academic dismissal. The subjects consisted of fifty-seven students who were successful in raising their grades after readmission; and 101 students who failed to raise their grades and were dismissed a second time. Twenty-four

variables were compared by Chi square, F-tests, and t-tests. The thirteen variables found to be significant are listed in Table 6.⁴⁷

TABLE 6
SIGNIFICANT VARIABLES IN HUSA'S COMPARISON OF
SUCCESSFUL AND UNSUCCESSFUL STUDENTS

High School Rank by quartiles
Transfer status at admission
Certain ACE scores
California Test of Personality
Kuder Preference Record-Vocational
First semester college GPA
Cumulative college GPA
Major field GPA at first or only dismissal
Experience between dismissal and readmission
Campus residence
Semester of dismissal
Total hours of credit at dismissal
Marital status

Louis Ninegar gathered data on approximately 500 students at Kearney State College (Nebraska) who had been academically dismissed from 1961 to 1964. He found that three-fourths of the subjects were in the lower half of their high school graduating class, with more than one-third in the lower quarter. At the time of applying for

⁴⁷Harold E. Husa, "An Analysis of Various Characteristics Related to the Subsequent Success of Students Readmitted to Northern Illinois University Following Academic Dismissal," (Ed.D. dissertation, Michigan State Univ., 1961, abstracted in Diss. Abstracts Int.: 22/06-A), pp. 1874-1875.

admission, principals or guidance counselors had predicted average or below average chances for success in college. Intelligence test scores were below average the fiftieth percentile for one-fourth of the subjects. From questionnaires mailed to each subject, Ninegar found that lack of adequate advising, lack of study skills, and lack of self-discipline were the chief causes which led to dismissal, as listed by the respondents. Ninety percent of the men and sixty-five percent of the women expressed a desire to return to college.⁴⁸

Kenneth Kersh compared probationary students at the University of Arkansas who subsequently succeeded or failed academically. Sixteen variables were individually considered by means of t-tests. The only variables which proved to be significant were the first semester college GPA, and cumulative hours at first probation. Although results were not statistically significant, Kersh also concluded that changing the major following probation enhances chances for recovery, and that students living in residence halls or fraternity/sorority houses have a better chance of succeeding.⁴⁹

The personality makeup of students on academic probation was the subject of a study by Charles Smith and Miriam Winterbottom. Through experience in counseling probationary students at Princeton,

⁴⁸Louis C. Ninegar, "Academic Suspension at Kearney State College". (Ed.D. dissertation, University of Nebraska Teachers College, now University of Nebraska-Lincoln, 1965), abstracted in Diss. Abstracts Int.: 26/01-A, pp. 173-174.

⁴⁹Kenneth G. Kersh, "Academic Progress of Arkansas Students Subsequent to Placement on Scholastic Probation," (Ed.D. dissertation, University of Arkansas, 1966), abstracted in Diss. Abstracts Int.: 27/03-A, p. 604.

the authors had noted that many often appeared indifferent, missed appointments, and did not avail themselves of remedial services. The subjects of their study consisted of forty-nine sophomore liberal arts students on probation who were matched with non-probation students on SAT scores, high school grades, and type of secondary school attended (public or private). Each student answered two confidential questionnaires, and responses were analyzed by t-tests.⁵⁰

Based on the results, Smith and Winterbottom concluded that students on probation did not have realistic academic expectations, since they expected to make significantly higher grades than their matched counterparts even though actual grades were significantly worse. Probation students did not differ from matched counterparts on study habits or participation in extracurricular activities or jobs, but significantly more probationary students perceived the sources of their problems as related to their current courses or to lack of adequate preparation in high school. Probation students were also significantly more likely to find their courses less interesting, more difficult, and were more likely to fall behind in the coursework. Probation students seriously considered leaving college significantly more than the matched students, although no significant differences existed in their satisfaction with social life and extracurricular activities. In summary, Smith and Winterbottom concluded that the apparent apathy of probationary students was primarily due to a lack of positive motivation, and the discouragement of disconfirmed

⁵⁰Charles P. Smith and Miriam T. Winterbottom, "Personality Characteristics of College Students on Academic Probation," Journal of Personality 38 (Sept. 1970): pp. 380-384.

expectations.⁵¹

A comparison of academic performance of working and nonworking probationary students was done by Jerry Augsburger at Northern Illinois University. Augsburger's underlying purpose was to test the reasonableness of a university policy which discouraged students on probation from working at jobs on or off campus. Information on work schedules was obtained by questionnaire, and GPA's were obtained from university records. Questionnaires were returned by ninety-six per cent of the full time undergraduate students on probation. A comparison of GPA's by analysis of variance resulted in no significant difference between nonworking students and those who worked twenty hours per week or less. Significantly lower GPA's were found for students who worked more than twenty hours per week.⁵²

A study by John Safarik analyzed the effects of a rule at Chico State College (California) which limited the number of hours students were allowed to carry without permission. When an earlier study indicated that students carrying more than sixteen hours did not earn more grades less than 2.0, the rule was eliminated for 1969-70. Safarik's sample consisted of all students enrolled for Fall 1965 and Fall 1969, divided into four groups of overload students above and below 2.0, and non-overload students above and below 2.0. In both years, under the rule and without the rule, overload students more

⁵¹Ibid., pp. 386-389.

⁵²Jerry D. Augsburger, An Analysis of Academic Performance of Working and Non-Working Students on Academic Probation at Northern Illinois University, (Bethesda, MD.: ERIC Documents Reproduction Service, ED 053 668, 1971), pp. 2-7, 12-18.

frequently earned grades of 2.0 or higher than grades below 2.0 ($p < .001$). The incidences of grades below 2.0 in 1965 was eight per cent for overload students, and sixteen percent for non-overload students. In 1969, one per cent of the overload students earned grades below 2.0, compared to fourteen per cent of the non-overload students.⁵³

Jane Brown, et al., conducted a study to determine the effect of academic probation on the scholastic performance of marginal freshmen students at Georgia Southern College. The subjects included 128 randomly selected freshman students with predicted GPA's of 1.7 to 1.99 who attended full time during 1971-72. All freshmen students are enrolled in essentially the same course in a core curriculum. The students were divided into four groups of equal academic ability as measured by SAT scores: males on probation and males not on probation; females on probation and females not on probation. T-tests were used to compare GPA's and mean gains from fall to winter semester. The mean gains were significant for males and females on probation, and were not significant for non-probation students. The authors concluded that some degree of motivation could be attributed to being placed on academic probation, although they did not discuss the possibility of regression effects contributing to the results.⁵⁴

Terry Procuick and Lawrence Breen conducted a study to examine the relationship between locus of control and two academic variables:

⁵³ John G. Safarik, "A Retest of Institutional Regulation of Academic Load," Calif. Journal of Educ. Research 23, (Nov. 1972), pp. 224-227.

⁵⁴ Jane L. Brown, et al., "Academic Probationary Status and College Student Marginal Ability", Intellect 102, (Feb. 1974): 313-314.

study habits and attitudes, and college academic performance. The hypothesis was that students with internal locus of control would be more successful than students with external locus of control. The subjects consisted of eighty-nine psychology students at the University of Manitoba who voluntarily participated in the study. GPA's were obtained from the Registrar. The subjects were administered Levenson's Internal, Powerful Others and Chance scales (an adaptation of Rotter's I-E Scale); and the Brown and Holtzman Survey of Study Habits (SSHA). No differences were found between males and females. Pearson product-moment correlations of the Internal scale with SSHA and GPA were significant. The Powerful Others scale correlated significantly with SSHA, and the Chance scale correlated significantly with both SSHA and GPA. The authors concluded that students who received reinforcements from powerful others or who felt that their successes and failures were due to chance, luck or fate had poorer study habits and lower levels of achievement than students who found internal sources for reinforcement.⁵⁵

Jae Choi and Joseph Malak surveyed faculty members at Frostburg State College (Vermont) to determine faculty perceptions of reasons for poor performance of students who received failing grades. Faculty were asked to respond to twenty-one objective items on a five point scale ranging from strongly agree to strongly disagree. Only forty-three per cent of the questionnaires were returned, but all departments

⁵⁵Terry J. Procuick and Lawrence J. Breen, "Locus of Control, Study Habits and Attitudes, and College Academic Performance," Journal of Psych. 88, (Sept. 1974), 91-95.

were represented. A rank order listing of the top ten responses is shown in Table 7.⁵⁶

TABLE 7
REASONS FOR POOR ACADEMIC PERFORMANCE RANKED BY
FACULTY IN CHOI AND MALAK'S SURVEY

Reasons in Rank Order	
1.	Inability to synthesize factual and conceptual principles
2.	Inability to apply principles in analogous situations
3.	Inability to perform adequately on major exams
4.	Inability to write effective essays
5.	Failure to attend class regularly
6.	Inability to complete assignments on time
7.	Inability to comprehend conceptual principles
8.	Insufficient prerequisite knowledge and skills
9.	Inability to ask questions in class
10.	Lack of participation in class discussion

Michael Keller administered a survey to identify the factors which freshmen on academic probation at Miami University (Ohio) believed to be most responsible for their poor grades. The sample consisted of 375 freshmen who earned less than a 2.0 GPA during their

⁵⁶Joe W. Choi and Joseph F. Malak, "Faculty Perceptions of Poor Academic Performance of Students," Journal of College Student Personnel 16 (July 1975), pp. 317-318.

first term on campus in the Fall of 1977. The responses were submitted to factor analysis in order to isolate patterns of intercorrelation. Nine significant categories were found ($p = .05$): (1) Instruction, (2) Study and Motivation, (3) Institutional Incompatibility, (4) Educational Background, (5) Personal Frustration, (6) Advising and Counseling, (7) Personal Problems, (8) Finances, and (9) Interest in Courses. In Table 8, the sixteen primary factors which students reported as being most responsible for their poor achievement are listed. Among the sixteen reasons, nine were related to study and motivation.⁵⁷

Treatment Programs for Students On Academic Probation

Considerable attention in recent years has been given to treatment programs designed to assist students on academic probation in improving their grades. The majority of the treatments have consisted of counseling, study skills instruction, or a combination of both.

Karl Rickabaugh reported on the effectiveness of an Efficient Study Program sponsored by the Counseling Center at the University of Utah. The program was an integrated approach combining didactic presentation of study methods and group discussions centering on issues of educational-vocational needs and personal-social adjustment. The treatment group consisted of twenty-five students who voluntarily participated in Efficient study groups during the autumn of 1968

⁵⁷Michael J. Keller, Factors Affecting the Poor Academic Achievement of First Term Freshmen at Miami University: Survey Report (Arlington, VA: ERIC Document Reproduction Service, ED 154 763, 1978), pp. 1-16.

TABLE 8

SIXTEEN PRIMARY FACTORS LISTED BY KELLER'S RESPONDENTS AS BEING
MOST RESPONSIBLE FOR POOR ACADEMIC ACHIEVEMENT

Factor	Mean	Category
Failure to schedule time well	2.98	Study & Motivation
Poor study habits	2.93	Study & Motivation
Difficulty taking examinations	2.83	Instruction
Failure to learn how to study well	2.71	Study & Motivation
Required courses not my choice	2.67	Interest in Courses
Failure to keep up in courses	2.59	Study & Motivation
Lack of interest in courses	2.58	Interest in courses
Inability to concentrate	2.58	Study & Motivation
Too few examinations	2.57	Instruction
Failure to discuss difficulties with instructors	2.53	Advising & Counseling
Lack of personal discipline	2.52	Study & Motivation
Study conditions in residence halls	2.50	Study & Motivation
Unrealistic idea of amount of study necessary	2.44	Study & Motivation
Too much time spent on extra- curricular activities	2.43	Study & Motivation
Examinations did not fairly test knowledge	2.42	Instruction
Nonstimulating instructors	2.41	Instruction

quarter. Control group I consisted of fourteen students who expressed a desire to participate in Efficient Study but did not follow through.

Control group II consisted of fourteen students who chose not to participate in the program. Control group III consisted of a random sample of fifty students who did respond to a letter from the Counseling Center.⁵⁸

Two measures of achievement were employed in t-tests to analyze the effect of the treatment conditions: (1) GPA obtained during the quarter following treatment, and (2) pre-post differences in GPA before and during the quarter after treatment. All between-group comparisons were in favor of the Efficient Study treatment group. Significant gains in achievement (.05 level) were made by the experimental group in comparison to Control group I, probationary students who expressed an interest in participating but did not follow through. A greater percentage of the non-participating probationary students withdrew from school or received failing grades than participating students. Rickabaugh concluded that the short-term integrated approach used by the Counseling Center did help motivated students to realize academic recovery.⁵⁹

Robert Berg conducted a study at Rock Valley College (Illinois) to determine the relationship between group counseling and behavioral change in students on academic probation. Thirty-two probationary students who received group counseling during the second quarter were matched with a control group of non-counseled probation students

⁵⁸Karl Rickabaugh, Effecting Academic Recovery: An Efficient Study Program Pilot Study, (Bethesda, MD., ERIC Document Reproduction Serv., ED 034 226, 1969), pp. 3-6

⁵⁹Ibid., pp. 6-8.

according to sex, age, GPA and ACT composite scores. No vast differences appeared between the groups as pertained to course load or withdrawal from college. Analysis by t-tests revealed no significant difference in achievement, although gains were consistently greater for the experimental group. No significant differences were found on self concept as measured by scores on an instrument designed for the study. Significant changes in behavior were found among the experimental group members, who showed increased tolerance and ability to relate to others on the Semantic Differential Form (.01 level). Pre-post tests using the Group Behavior Inventory revealed a significant shift (.05 level) toward pairing among the counseled experimentals.⁶⁰

The effectiveness of a voluntary academic rehabilitation program for probationary students was measured by Sterling Church at Arizona State University. Twenty-eight students in the College of Liberal Arts were divided into two groups. The first participated in an improvement seminar during the first semester 1969-70, and the second group was asked to wait until a later date. The seminar provided discussion of topics related to academic success, and was designed to utilize student service agencies already existing on the campus. Analysis of variance was employed to measure group differences after treatment. No significant differences were found in academic achievement, in scores on the Brown-Holtzman SSHA, or on scores obtained on

⁶⁰Robert C. Berg., "The Effect of Group Counseling on Students Placed on Academic Probation at Rock Valley College, Rockford, Illinois, 1966-67," Ed.D. dissertation, Northern Illinois University, 1968, abstracted in Diss. Abstracts Int.: 29/01-A), pp. 115-116

Bills' Index of Adjustment and Values.⁶¹

At the University of Rochester, Marquita West conducted a study comparing probationary students who did or did not see a counselor. All probationary students received a letter from the Dean of Students asking them to make an appointment with a counselor. The subjects, sixty randomly selected students, were interviewed by West, who was not a member of the Counseling Center staff and was unaware if the students had seen a counselor or not. Judgements were made on the basis of the interview on family background, motivation for college and emotional health. GPA and SAT scores were obtained from student files. Ratings tests by Chi-square revealed no significant differences between those who had or had not seen a counselor.⁶²

Robert Kaye investigated the effectiveness of a combined treatment program consisting of individual counseling, group guidance, and study skills training.⁶³ A group of thirty-six failing freshmen at The University of Connecticut with GPA's of 1.2 or lower were randomly selected and divided into experimental and control groups. The students had been previously matched according to sex, SAT scores,

⁶¹ Sterling R. Church, "The Effects of an Academic Rehabilitation Program on College Academic Probation Students", Ph.D. dissertation, Arizona State Univ., 1970, abstracted in Diss. Abstracts Int.: 31/04-A pp. 1571-1572.

⁶² Marquita West, "Sophomore Students on Academic Probation: A Comparison of Users and Nonusers of a University Counseling Facility". Journal of the Amer. College Health Assoc. 19 (April 1971): 235-238.

⁶³ Robert A. Kaye, "The Effectiveness of a Guidance-Counseling-Study Skills Treatment Program on the Academic Achievement of Failing College Freshmen," Ph.D. dissertation, The Univ. of Connecticut, 1971 abstracted in Diss. Abstracts Int.: 32/01-A, p. 180.

GPA and high school rank. T-tests and Chi-square were used to measure differences after treatment. The second semester GPA was significantly higher for the experimental group ($p < .01$). Seventeen per cent of the experimental group dismissed from the University, compared to fifty per cent of the control group ($p < .05$).⁶⁴

Stephen Anthony studied sixty-one freshmen and sophomore females on academic probation at the University of Pittsburgh. The subjects were divided into two types based on scores on the SSHA. Type I students were diagnosed as lacking proficient study skills, and Type II students were diagnosed as having adequate skills. Two experimental groups and a control group were formed. Treatment group A received a study skills course. Treatment group B participated in a self-understanding program which focused on problems of identity, self concept and relationships with others. Anthony had hypothesized that Type I students would benefit more from study skills instruction, and that Type II students would benefit more from greater self understanding. Comparisons of academic achievement with the control group indicated that both treatments had a significant effect on the academic improvement of both Type I and Type II students. No significant differences were found in comparing only Type I and Type II students. Anthony concluded that the supportive program helped meet the needs of low achievers.⁶⁵

⁶⁴Ibid., p. 180

⁶⁵Stephen J. Anthony, "The Effects of a Study Skills Course and a Self-Understanding Program on Low Achieving College Students, Ph.D. dissertation, Univ. of Pittsburgh, 1971, abstracted in Diss. Abstracts Int.: 32/04-A, p. 1843.

Other treatment programs have also revealed significant increases in achievement for probationary students. James MacArthur found significant improvement at Brigham Young University among probationary students who participated in an academic rehabilitation program which included study skills, career orientation and interpersonal skills development.⁶⁶ Barbara Green reported that significantly better grades were attained by probation students at Purdue who elected to participate in a treatment program which combined study skills advice, vocational exploration and goal setting exercises.⁶⁷

Academic Achievement and Retention

A central concern in studying students on academic probation is the relationship of academic achievement to retention. Numerous studies have indicated that poor grades contribute heavily to college student attrition.

In 1962, John Summerskill summarized existent research findings on student attrition. The nature of the research reviewed was of three types: attrition rates, reasons for leaving college, and correlations between attrition or persistence with selected predictor variables. Summerskill found that accuracy in calculating attrition rates was difficult to determine because of variations in definitions

⁶⁶James D. MacArthur, "A Diagnostic-Prescription Treatment Program for Students on Academic Probation at Brigham Young University," Ph.D. dissertation, Brigham Young Univ., 1976, abstracted in Diss. Abstracts Int.: 38/01-A, p. 221.

⁶⁷Barbara C. Green, "An Investigation of Treatment Programs for University Students on Academic Probation", Ph.D. dissertation, Purdue Univ., 1976, abstracted in Diss. Abstracts Int.: 37/10-A, p. 6273.

of dropouts, and variations in procedures from college to college. After reviewing some thirty-five studies, Summerskill concluded that American colleges lost about half of their students in the four years following matriculation. Approximately forty per cent graduated within four years, and it was estimated that another twenty per cent graduated from some college at a later time.⁶⁸

Among factors identified as reasons for leaving college, Summerskill reported that academic factors carried heavy weight in determining persistence in college. Numerous studies found that lower high school grades and lower aptitude test scores were significantly related to higher levels of attrition. Academic failure was typically cited as the leading single cause of attrition, accounting for approximately thirty-three per cent of the dropout rate. Summerskill noted that an urgency existed for further research on academic failure, based on the premise that the problem must be viewed as a failure on the part of the institutions as well as on the part of individual students.⁶⁹

Alexander Astin studied college dropouts from a national perspective, using data from 217 institutions of higher education which participated in the Cooperative Institutions Research Program (CIRP). The sample included all entering freshmen in 1966, with a follow-up on a randomly selected portion of the original sample in 1970. The results on academic ability and persistence showed a clearly consistent relation-

⁶⁸ John Summerskill, "Dropouts from College", in The American College, ed. Nevitt Sanford, (New York: John Wiley, 1962), pp. 627-631. For citations of studies reviewed, see pp. 650-657.

⁶⁹ Ibid., pp. 634-637.

ship between high school grades and aptitude tests with persistence. After four years, eighty-eight per cent of the "A" high school students had received a degree, were still enrolled, or had requested a transfer; compared to seventy-three per cent of the "B" students and fifty-three per cent of the "C" students. The same relationships were found in comparing various levels of SAT and ACT scores.⁷⁰

Two groups of college dropouts, those who were dismissed and those who withdrew, were compared on cognitive and personality measures by Richard Vaughan. The subjects included seventy-eight male undergraduates who were dismissed, sixty-two male undergraduates who withdrew and a randomly selected control group of 141 males who were still completing their education. Measures used in the study were the MMPI, the Iowa Silent Reading Advanced Test (ISRT), and the SAT, all of which were part of a battery of tests administered to freshmen before admission or at orientation.⁷¹

Dismissed students scored significantly lower on the SAT and ISRT than persisters, but were not significantly different from withdrawals. Dismissed students manifested significantly more pathology on the MMPI than persisters, being more impulsive, more restless and unstable, and lacking a deep commitment to education. No significant differences were found in comparisons of the MMPI with withdrawals. When Vaughan lumped together withdrawals and persisters into one group

⁷⁰Alexander W. Astin, College Dropouts: A National Profile, (Bethesda, MD.: ERIC Doc. Rep. Serv., ED 059 691, 1972).

⁷¹Richard P. Vaughan, "College Dropouts: Dismissed vs. Withdrew", Pers. & Guid. Journal 46 (Mar. 1968): 685-688.

for comparison with persisters, the significant differences largely disappeared, leading to the conclusion that the dismissed students were primarily responsible for the differences. The hypotheses that dismissed students would differ from persisters, and that grouping dismissals with withdrawals would obscure the relationships, were substantiated by the results.⁷²

Jack Rossman and Barbara Kirk examined differences in ability, personality characteristics and attitudes between freshmen students at the University of California Berkeley who returned for their sophomore year and those who did not return. Non-returning students were categorized as withdrawals if their GPA's were above 2.0, or as failures if GPA's were below 2.0.⁷³

Ability was measured by the School and College Ability Test (SCAT), personality was measured by the Omnibus Personality Inventory (OPI), and attitudes were measured by a Student Questionnaire (SQ) designed for the study. The three instruments were voluntarily administered to all freshmen during registration week prior to the fall quarter, and seventy-five per cent completed the instruments. T-tests were used to compare persisters with voluntary withdrawals and to compare withdrawals to failures. Persisters were found to have significantly higher SCAT-Verbal scores, and to be more intellectually oriented. Significantly higher SCAT-Verbal scores were found among withdrawals compared to

⁷²Ibid., pp. 685-688.

⁷³Jack E. Rossman and Barbara A. Kirk, "Factors Related to Persistence and Withdrawal Among University Students," Journal of Couns. Psych. 17 (Jan. 1970): 56-62.

failures. Total scores on the SCAT were higher among voluntarily withdrawals than failures for both men and women. Women voluntary withdrawals differed significantly from failing women on seven OPI scales, yielding a profile of a more intellectual, more independent and autonomous, more aesthetic, and less practically oriented student. The direction of scores for failing men was the same as for women, but reached significance on only two scales.⁷⁴

Andrew Bean and Robert Covert conducted a study to discriminate between college persisters, withdrawals, and academic dismissals on the basis of scholastic aptitude and personality. The sample consisted of 1125 male and female students for whom SAT-Verbal scores, SAT-Math scores, and scores on the Runner Studies of Attitude Patterns were available. Univariate F-tests of between groups differences resulted in significant differences for both males and females. Among males, the academic dismissals had higher scores on the Runner Acquiescence Scale than either persisters or withdrawals ($p < .05$); and SAT scores, both Verbal and Math, were lower than both other groups ($p < .001$). For females, significantly lower scores were found on the Runner Independence Scale among academic dismissals ($p < .01$); scores on the Runner Nonassertiveness Scale fell between persisters and withdrawals ($p < .05$); and SAT-Verbal and Math scores were significantly lower ($p < .001$).⁷⁵

Clinton Chase, et al., also compared academically dismissed stu-

⁷⁴Ibid., pp. 56-62.

⁷⁵Andrew G. Bean and Robert W. Covert, "Prediction of College Persistence, Withdrawal, and Academic Dismissal: A Discriminant Analysis," Educ. and Psych. Meas. 33 (Summer 1979): 407-411.

dents with persisters and withdrawals. Data were collected of 14,000 students after 1, 2, 4, 8, and 10 semesters. The findings were similar to Bean and Covert's in that the SAT scores and high school rank were lower for dismissals than for persisters or withdrawals.⁷⁶

Summary

In Chapter II, recent literature pertaining to the topic of college students on academic probation was reviewed. The major conclusions which can be made concerning general prediction of academic achievement are that many intellectual and non-intellectual factors correlate with achievement, but that high school grades and aptitude test scores remain the best predictors. Results of studies to predict academic achievement or identify factors associated with the low achievement of students on academic probation have varied from institution to institution, although high school grades and aptitude tests have quite consistently emerged as significant predictors. Scores on the Brown-Holtzman Survey of Study Habits and Attitudes and responses to some items on the Minnesota Multiphasic Personality Inventory have frequently been found to be significant for probationary students. Results of studies concerning treatment programs have not always been significant or consistent. The most effective programs appear to be those which utilize a combined study skills/guidance and counseling approach. Studies on retention of college students have revealed that poor achievement is a major contributing factor for approximately one third of the dropouts. High school

⁷⁶Clinton I. Chase, et al., Persistence and Conditions Related to It: A Persistent Question, (Arlington, VA.: ERIC Document Reproduction Service, ED 136 697, 1976), pp. 1-5, pp. 15-27.

grades and aptitude test scores again appeared as consistent predictors of persistence or attrition.

CHAPTER III

DESIGN OF THE STUDY

In this chapter, the design of the study is presented. The population and samples are identified, and the thirty-one variables which were analyzed are listed. The procedures for data collection are described. The ex post facto design and accompanying statistical analysis are explained, followed by a discussion of reliability and validity concerns. Finally, the research hypotheses are presented.

Population and Samples

The population for the study was all first semester freshmen on academic probation at Central Michigan University. Two separate samples were drawn. The first sample consisted of 139 first semester freshmen on academic probation at the end of the Fall semester 1976 who could be classified as successful (above 2.00), or academically dismissed by the end of four semesters (Winter, 1978); and for whom ACT profiles were available. Data from the first sample were used in discriminant analysis to produce discriminant function coefficients for prediction.

The second sample consisted of 122 first semester freshmen on academic probation at the end of the Fall semester 1977 for whom ACT profiles were available, and who could be classified as successful or dismissed at the end of four semesters (Winter, 1979). Data from the second sample were used to cross-validate the prediction results of the first analysis.

Variables Studied

The variables used in the study consisted of thirty-one nominal, ordinal and interval variables based on information available in student's academic folders. These variables were selected from all possible data due to findings in studies reviewed, or because of their potential use in academic advising. One additional variable, ethnic group, was included in the data collection, but was dropped from the analysis due to the high occurrence of missing data which would have greatly reduced the sample sizes.

The three sources of data were student applications for admission, ACT profiles, and semester grade reports. The application for admission contains information on the sex of the student. The high school principal or guidance counselor provides the high school GPA on the admissions form. The ACT profile contains the student's test scores, and self-reported information on degree objective, certainty of major and vocational choice, and indication of needing assistance in reading, writing, math or study skills, and personal counseling. The semester grade reports contain data relating to course load, hours withdrawn (W), hours of incomplete (I), hours repeated (R), and cumulative college GPA.

The first fifteen variables are based on entering characteristics of students, and the values for an individual student remain constant over the time of the study. The remaining variables are based on academic data for four semesters. All thirty-one variables and their possible values are listed in Table 9.

TABLE 9
VARIABLES STUDIED AND POSSIBLE VALUES

Variable	Possible Values
1. Sex	1=Male, 2=Female
2. High School GPA	From 2.00 to 4.00
3. ACT English score	From 1 to 36
4. ACT Math score	From 1 to 36
5. ACT Natural Science score	From 1 to 36
6. ACT Social Studies score	From 1 to 36
7. Degree Objective	1=None, 2=vocational/technical, 3=two-year, 4=Bachelor's degree, 5=graduate study, 6=Ph.D., or professional degree
8. Certainty of major	0=None, 1=Not sure, 2=Fairly sure, 3=Very sure
9. Certainty of vocation	0=None, 1=Not sure, 2=Fairly sure, 3=Very sure
10. Need help with educational or vocational plans	1=No, 2=Yes
11. Need help with writing skills	1=No, 2=Yes
12. Need help with reading skills	1=No, 2=Yes
13. Need help with study skills	1=No, 2=Yes
14. Need help with math skills	1=No, 2=Yes
15. Need personal counseling	1=No, 2=Yes
16. Course load, 1st semester	From 1 to 20
17. Hours withdrawn, 1st sem.	From 1 to 19
18. Hours incomplete, 1st sem.	From 1 to 19
19. 1st Semester GPA	From 0.00 to 1.70
20. Course load, 2nd Semester	From 1 to 20
21. Hours withdrawn, 2nd sem.	From 0 to 19
22. Hours incomplete, 2nd sem.	From 0 to 19
23. Hours repeated, 2nd sem.	From 0 to 9
24. Course load, 3rd semester	From 1 to 20
25. Hours withdrawn, 3rd sem.	From 0 to 19

Table 9 (cont'd.)

Variable	Possible Values
26. Hours incomplete, 3rd sem.	From 0 to 19
27. Hours repeated, 3rd sem.	From 0 to 9
28. Course load, 4th semester	From 1 to 20
29. Hours withdrawn, 4th sem.	From 0 to 19
30. Hours incomplete, 4th sem.	From 0 to 19
31. Hours repeated, 4th sem.	From 0 to 9

Classification of Subjects

All subjects were classified into two groups. The first group, successful students, consisted of probationary students who, by the end of four semesters or less, were able to raise their GPA's above the level of 2.00, and were no longer on probation. The second group, dismissed students, consisted of probationary students who, by the end of four semesters or less, had failed to maintain grades above or within the probationary range and were academically dismissed from the University. Classification was based on academic standing at the end of the fourth semester, or at the end of the last semester of enrollment if the student was no longer in attendance at the end of the fourth semester. By this method, students who remained on probation or who voluntarily withdrew from the University were eliminated. Students who transferred to other colleges or universities and subsequently returned to Central Michigan University were also eliminated. In the 1976 sample, sixty-four students were classified as successful,

and seventy-five were dismissed. In the 1977 sample, sixty-five were successful, and fifty-seven were dismissed.

Procedures for Data Collection

Data for each student classified as successful or dismissed were gathered by reviewing the academic folders and obtaining values for each of the thirty-one variables used for analysis. The values were recorded on computer coding forms and then key punched onto 80 column punch cards. No data from spring or summer session enrollments were included in the study.

Research Design and Statistical Analysis

The study followed the form of an ex post facto quasi-experimental design in that the experimenter lacks control over the subjects' exposure to experimental stimuli.⁷⁷ The ex post facto design, introduced by Chapin, is an attempt to find cause-and-effect relationships in reverse by assuming that some present situation is an effect of causal factors occurring in the past.⁷⁸

Discriminant analysis is a multivariate statistical technique which is used to identify which of numerous variables are important in discriminating between two or more groups of subjects which have been classified according to a dependent variable. Discriminant analysis

⁷⁷Donald T. Campbell and Julian C. Stanley, Experimental and Quasi-Experimental Designs for Research, (Chicago: Rand McNally Pub. Co., 1966), p. 34.

⁷⁸Francis S. Chapin, Experimental Designs in Sociological Research, (New York: Harper & Bros., 1947), p. 45.

also provides information as to the influence of different variables in contributing to the classification.⁷⁹

In the first step of analysis, all thirty-one variables from the 1976 sample were submitted to discriminant analysis based on the value of the variables at four points in time, the end of each semester from Fall 1976 to Winter 1978. The stepwise discriminant analysis program from the Statistical Package for the Social Sciences (SPSS) was used to analyze the data. The stepwise method selects variables from the full set of variables on the basis of their discriminating power. The process begins by selecting the single variable which has the highest value on the criterion.⁸⁰ In this study, the criterion for selection was the value of the F-ratio. After selecting the variable with the highest value, the initial variable is paired with all others, one at a time, to identify the best combination of two variables. The process continues until the remaining variables no longer make a significant contribution to discrimination. The set of variables which is selected is referred to as the discriminant function. Chi-square is used to test the significance of the discriminant function derived. As a check on the accuracy of the discriminant function, the original subjects are classified on the basis of the variables in the discriminant function. The classification procedure produces the probability of

⁷⁹Lalitha Sanathenan, "Discriminant Analysis," in Introductory Multivariate Analysis, ed. Daniel J. Amick & Herbert J. Walberg, (Berkeley, Calif.: McCutchan Pub. Co., 1975), p. 236.

⁸⁰William Klecka, "Discriminant Analysis," in SPSS: Statistical Package for the Social Sciences, Second Edition, Normal H. Nie, et al., (New York: McGraw-Hill, 1975), p. 447.

membership in each group, and the subject is assigned to the group with the highest probability of membership.⁸¹

In addition to classifying the original subjects from the 1976 sample, the predictive accuracy of the variables comprising the discriminant function was cross-validated by classifying the subjects from the 1977 probation lists. The cross-validation step was included to test the ability of the discriminant function derived from information on the first group of subjects to be applied to another group.

Validity and Reliability

Campbell and Stanley criticized Chapin's original ex post facto design due to lack of control in selection of subjects, and because Chapin's sample underwent considerable shrinkage in finding matched pairs to submit to analysis.⁸² In this study, the use of discriminant analysis eliminated the need for matched pairs, but the criticism regarding lack of control over selection of subjects does apply to this study. The subjects were selected because of their probationary status, and according to the availability of data. Since students on probation are an extreme group by virtue of GPA, statistical regression toward the mean must be considered as a factor in potential reduction of validity. However, since both groups compared in the analysis were from probation lists, regression tendencies were equalized and did not effect the comparison.

Experimental mortality also took place in the analysis, since

⁸¹Ibid., p. 442, p. 436, p. 447.

⁸²D. T. Campbell and J. C. Stanley, Experimental and Quasi-Experimental Designs, p. 70.

values of variables for students dismissed before four semesters were dropped from the analysis over time. The extended time sequence of four semesters does provide, however, the opportunity to observe the stability or instability in significance of variables over time. Comparisons made at each of the four points in time are limited to those students who remained in school for the duration of the time period.

Potential reduction of internal validity due to history or maturation of subjects was equalized since conditions were the same for all subjects. No treatment interactions or experimenter effects were present because no treatment was administered, and the subjects were not aware of the research project.

Information on reliability and validity of the ACT was obtained from Burors' Mental Measurements Yearbook. Reliability correlations for scores on the four subtests were found to range from +.75 to +.89, and approximately +.90 for the composite score. Internal consistency reliability was approximately +.90 for the four subtests. Stability ranged from +.67 to +.89 on repeated measures at one to five month intervals, with the lower correlations found at longer intervals. Content validity was judged to be reasonable, and it was noted that test items were reviewed by minority group members before final selection. Self-reported grades by high school students have been found to be quite accurate, although correlations declined in recent years. In 1963, correlations with actual grades ranged from +.91 to +.93, while in 1968 correlations of approximately +.80 were found. The largest discrepancy between reported and actual grades was observed in low scoring students. Answers to items which form the profile were sixty-

nine to ninety-nine per cent accurate when verifiable items were checked against high school records.⁸³

The use of grades as a measure of academic performance in high school or college is subject to many sources of unreliability. As noted by Lavin, grades are subject to considerable variation because students do not all take the same subjects, and because teachers use different criteria in assigning grades. Moreover, students vary in their ability to perform on different types of examinations.⁸⁴

The results of the study are generalizable only to the population specified, freshmen students on academic probation at Central Michigan University. Variations in selectivity levels, academic policies, and lack of homogeneity of student characteristics from college to college prevent direct generalizations to other settings.

Hypotheses

The first hypothesis tested in the study concerned the potential ability of the thirty-one variables to identify differences between successful and failing students on academic probation. Stated in the null form, the hypothesis was:

no significant variables would be found which discriminated between the two classification categories of successful and dismissed students.

⁸³John R. Hills, The Eighth Mental Measurements Yearbook, ed. Oscar Krisen Buros, (Highland Park, N.J.: Gryphon Press, 1978), pp. 617-626.

⁸⁴D. E. Lavin, The Prediction of Academic Performance, pp. 19-20.

The second hypothesis is, to be tested if the first was rejected, concerned the ability of the significant variables identified by discriminant analysis to predict success or failure for students on academic probation. Stated in the null form, the hypothesis was:

variables found to discriminate between successful and dismissed students would not predict success or failure of students on probation at a level greater than chance (50 per cent).

Summary

In Chapter III, the design of the study was described. The population and two samples were specified, and thirty-one variables from student files were identified. Procedures for collecting the data were outlined. The ex post facto design was presented, and the statistical analysis was explained. Concerns regarding validity and reliability were discussed, followed by presentation of research hypotheses. In Chapter IV, the results of the analysis are reported.

CHAPTER IV

RESULTS OF THE ANALYSIS

The primary purpose of this study was to identify significant factors which differentiated between freshmen students on probation who subsequently succeeded in raising their grades above probation and those who were dismissed due to failing grades. A related purpose was to identify a concise set of factors which can be used to predict the future performance of freshmen students on probation. The first hypothesis to be tested concerned the ability of the selected variables to identify differences between successful and failing students on probation. The null hypothesis, tested at the .01 level of significance was:

no significant variables would be found which discriminated between the two classified categories of successful and dismissed students.

The second hypothesis, to be tested if the first hypothesis was rejected, concerned the ability of the significant variables identified by discriminant analysis to predict success or failure of students on probation. The second hypothesis was:

variables found to discriminate between successful and dismissed students would not predict success or failure of students on probation at a level greater than chance.

The results of the analysis pertaining to each hypothesis are presented, in turn, in this chapter.

Significant Variables

In the first step of the analysis, data on nineteen variables for 139 freshman students from the Fall 1976 academic probation list were submitted to step-wise discriminant analysis. Of the total of 139 students, sixty-five were subsequently successful and seventy-five were dismissed. The data consisted of information on these students at the first point in time, the end of their first semester in college. At the end of seven steps, seven variables were found which discriminated between successful and dismissed students. The seven variables, the values of the F-ratios, and significance level are listed in Table 10.

TABLE 10
SIGNIFICANT VARIABLES AFTER FIRST SEMESTER

Variable	F	Sig. Level (7, 131 df)
1st Semester GPA	24.95	.001
Sex	18.60	.001
High School GPA	14.46	.001
ACT Math	11.50	.001
ACT Social Studies	9.43	.001
Need help, study skills	8.05	.001
Need personal counseling	7.08	.001

Standardized discriminant function coefficients, and the mean scores for successful and dismissed groups in relationship to the grand mean are shown in Table 11. The discriminant function coefficients, when the sign is ignored, can be interpreted as a measure of the relative weight of a variable in determining the discriminant function. Table 11, the coefficient for 1st Semester GPA was $-.746$, compared to a coefficient of $-.401$ for high school GPA. Thus, 1st semester GPA carried almost twice as much weight as high school GPA.

TABLE 11
DISCRIMINANT FUNCTION COEFFICIENTS AND GROUP MEANS
AFTER FIRST SEMESTER

Variable	Disc. Func. Coefficient	Success Mean	Grand Mean	Dismissed Mean
1st Semester GPA	$-.746$	1.45	1.31	1.19
High School GPA	$-.401$	2.82	2.73	2.64
Sex	$-.384$	1.61	1.49	1.39
ACT Social Studies	.213	14.45	15.78	16.92
Need help, study skills	.201	1.47	1.49	1.51
ACT Math	.192	14.86	16.03	17.03
Need personal counseling	.185	1.39	1.37	1.35

In the second step of the analysis, twenty-three variables, representing information on the same 139 students at the end of the second semester were included in the step-wise discriminant analysis.

At the end of eight steps, eight variables were found to be significant. Six of the variables were the same as those found to be significant at the end of the first semester. Summary statistics on the eight variables are shown in Tables 12 and 13.

TABLE 12
SIGNIFICANT VARIABLES AFTER SECOND SEMESTER

Variable	F	Sig. Level (8, 130 df)
1st Semester GPA	24.95	.001
Sex	18.60	.001
Hours I, 2nd semester	16.21	.001
High School GPA	13.44	.001
Hours W, 2nd semester	11.17	.001
Need help, study skills	9.60	.001
Need personal counseling	8.45	.001
ACT Social Studies	7.56	.001

TABLE 13
DISCRIMINANT FUNCTION COEFFICIENTS AND GROUP MEANS
AFTER SECOND SEMESTER

Variable	Disc. Func. Coefficient	Success Mean	Grand Mean	Dismissed Mean
1st Semester GPA	.718	1.45	1.31	1.19
Hours I, 2nd Semester	-.414	1.05	1.24	1.44
Sex	.408	1.61	1.49	1.39
High school GPA	.307	2.82	2.73	2.64
Need help, study skills	-.230	1.47	1.49	1.51
Hours W, 2nd semester	-.213	0.05	0.28	0.48
Need personal counseling	.193	1.39	1.37	1.35
ACT Social Studies	-.178	14.45	15.78	16.92

In the third step of the analysis, twenty-seven variables, representing information on eighty-two students who remained in school for three semesters was included in the step-wise discriminant analysis. Of the eighty-two students, fifty-one were classified as successful and thirty-one were classified as dismissed. The loss in the number of students from the first two points in time is due to the fact that forty-four students were dismissed at the end of the second semester, and thirteen successful students left school of their own accord. After thirteen steps, thirteen variables were found to be significant in discriminanting between successful and dismissed students. Six of the thirteen are the same as variables found to be significant at the end

of the first or second semesters. Summary statistics describing the thirteen variables are listed in Tables 14 and 15.

TABLE 14
SIGNIFICANT VARIABLES AFTER THIRD SEMESTER

Variable	F	Sig. Level (13, 67 df)
Course load, 3rd semester	11.37	.001
High School GPA	8.78	.001
ACT Social Studies	8.35	.001
Hours W, 1st semester	7.30	.001
1st semester GPA	6.87	.001
Hours I, 2nd semester	6.72	.001
Course load, 2nd semester	6.35	.001
Need help, ed/voc plans	6.17	.001
Need help, study skills	5.78	.001
ACT Natural Science	5.49	.001
Hours I, 1st Semester	5.16	.001
Need help, writing skills	4.82	.001
ACT English	4.59	.001

TABLE 15
DISCRIMINANT FUNCTION COEFFICIENTS AND GROUP MEANS
AFTER THIRD SEMESTER

Variable	Disc. Func. Coefficient	Success Mean	Grand Mean	Dismissed Mean
Course load, 3rd semester	.947	15.24	14.74	13.94
1st semester GPA	.635	1.44	1.40	1.33
Course load, 2nd sem.	-.511	14.78	14.75	14.71
ACT Social Studies	-.463	13.68	14.56	15.97
Hours I, 2nd sem.	-.455	0.06	0.12	0.23
Need help ed/voc plans	.437	1.60	1.56	1.48
Need help, study skills	-.393	1.46	1.49	1.54
ACT Natural Science	-.376	18.00	18.59	19.55
Hours I, 1st semester	-.311	0.10	0.23	0.45
Hours W, 1st semester	.304	0.90	0.77	0.55
ACT English	.268	15.36	15.38	15.42
Need help writing	.247	1.32	1.31	1.29
High school GPA	.204	2.82	2.73	2.60

Data included in the analysis in the fourth step of the analysis consisted of all thirty-one variables, representing information on sixty-four students who remained in school for four semesters. Of these sixty-four students, forty-eight were classified as successful, and fifteen were classified as dismissed. The loss of students from the number in school at the end of the third semester is due to the

fact that sixteen had been dismissed at the end of the third semester, and three successful students had left school of their own accord. After sixteen steps, fourteen variables were found which discriminated between the successful and dismissed students. Ten of the fourteen had previously been found to be significant at the end of the first, second or third semesters. Summary statistics pertaining to the fourteen variables are presented in Tables 16 and 17.

TABLE 16
SIGNIFICANT VARIABLES AFTER FOURTH SEMESTER

Variable	F	Sig. Level (14, 48 df)
Course load, 4th semester	11.11	.001
Course load, 3rd semester	9.10	.001
Hours I, 1st semester	8.86	.001
Hours W, 3rd semester	8.79	.001
Course load, 2nd semester	8.55	.001
Hours W, 4th semester	8.53	.001
Hours I, 1st semester	8.51	.001
Need help, ed/voc plans	8.41	.001
High School GPA	8.26	.001
Hours R, 3rd semester	8.26	.001
Need help, reading skills	8.12	.001
ACT English	8.04	.001
Need help, study skills	8.04	.001
Hours W, 1st semester	8.00	.001

Table 16 (cont'd.)

Variable	F	Sig. Level (14, 48 df)
Hours I, 2nd semester	7.87	.001
1st Semester GPA	7.86	.00.

TABLE 17

DISCRIMINANT FUNCTION COEFFICIENTS AND GROUPS MEANS
AFTER FOURTH SEMESTER

Variable	Disc. Func. Coefficient	Success Mean	Grand Mean	Dismissed Mean
Course load, 3rd sem.	-.969	15.27	14.89	13.67
Course load, 2nd sem.	.881	14.81	14.87	14.07
Course load, 4th sem.	-.832	15.22	14.71	13.07
ACT English	.783	15.21	15.57	16.73
Need help, writing skills	.685	1.40	1.43	1.53
1st semester GPA	-.659	1.45	1.43	1.35
Hours I, 2nd sem.	.585	0.06	0.11	0.27
Hours W, 1st sem.	-.488	0.92	0.86	0.67
Hours W, 3rd sem.	.485	1.27	1.40	1.80
Hours R, 3rd sem.	-.362	0.40	0.35	0.20
High school GPA	-.351	2.82	2.76	2.58
Need help, study skills	-.346	1.458	1.460	1.467

Table 17 (cont'd.)

Variable	Disc. Func. Coefficient	Success Mean	Grand Mean	Dismissed Mean
Hours W, 4th sem.	-.332	1.19	1.25	1.47
Need help, educ/voc plans	-.304	1.60	1.54	1.33

Variables Over Time

Over the four points in time considered in the analysis, twenty-two of the original set of thirty-one variables were found to be significant at one or more points in time. Thus, the null hypothesis that no significant variables would be found was rejected. A summary table showing the occurrence of the twenty-two variables as significant factors at each of the four points in time is presented in Table 18. The influence of each variable is also shown as it pertains to the successful students.

TABLE 18
SIGNIFICANCE AND INFLUENCE OF VARIABLES OVER TIME

Variable	Semester				Characteristics of Successful Students
	1	2	3	4	
Sex	X	X			Females more successful
High school GPA	X	X	X	X	Higher GPA
ACT English			X	X	Lower score
ACT Math	X				Lower score

Table 18 (cont'd.)

Variable	Semester				Characteristics of Successful Students
	1	2	3	4	
ACT Social Studies	X	X	X		Lower score
ACT Natural Science			X		Lower score
Need help ed/voc plans			X	X	More likely to express need
Need help, writing skills			X		More likely to express need
Need help, reading skills				X	Less likely to express need
Need help, study skills	X	X	X	X	Less likely to express need
Need personal counseling	X	X			More likely to express need
Course load, 2nd sem.			X	X	Heavier course load
Course load, 3rd sem.			X	X	Heavier course load
Course load, 4th sem.				X	Heavier course load
Hours W, 1st sem.			X	X	More hours W
Hours W, 2nd sem.		X			Fewer hours W
Hours W, 3rd sem.				X	Fewer hours W
Hours W, 4th sem.				X	Fewer hours W
Hours I, 1st sem.			X		Fewer hours I
Hours I, 2nd sem.		X	X	X	Fewer hours I
Hours R, 3rd sem.				X	More hours R
1st semester GPA	X	X	X	X	Higher GPA

Three variables were significant discriminators at all four points in time: high school GPA, first semester college GPA, and the need for help with study skills. Scores on the ACT subtest in Social Sciences were significant at the end of the first, second and third semesters, but not at the end of the fourth semester. The number of hours of incomplete during the second semester was a significant factor at the end of the second, third and fourth semesters. Course load and hours withdrawn consistently appeared as significant variables beginning with the second semester, although the pattern of influence is more difficult to track because of the changes which occur over time.

Sex, ACT English, the need for help with educational or vocational plans, and the need for personal counseling were significant at two of the four points in time. The ACT Math score, need for help with writing skills, the need for help with reading skills, and hours of repeat courses appeared as significant factors once during the four semesters.

Prediction of Success or Dismissal

Discriminant analysis can also be used as a classification technique. Classification of each subject is made on the basis of the values of the subject's standardized discriminant score. The classification process yields the probability of membership in each group. The subject is then classified into the group with the higher probability of membership. To illustrate the classification process, the discriminant scores, classification probabilities, and actual group membership for ten subjects at the end of the first semester are shown in Table 19. For the ten examples shown, the accuracy of prediction was

seventy per cent.

TABLE 19
EXAMPLES FROM CLASSIFICATION TECHNIQUE

Subject	Disc. Score	Predicted Group	1st Prob.	2nd Prob.	Actual Group	Accuracy of Prediction
1	-1.259	Successful	.815	.185	Successful	Correct
2	1.436	Dismissed	.860	.140	Dismissed	Correct
3	- .154	Successful	.532	.468	Successful	Correct
4	.185	Successful	.571	.429	Dismissed	Incorrect
5	- .983	Dismissed	.758	.242	Successful	Incorrect
6	-2.548	Successful	.955	.045	Successful	Correct
7	-1.72	Successful	.798	.202	Successful	Correct
8	.482	Successful	.657	.343	Dismissed	Correct
9	.593	Dismissed	.687	.313	Dismissed	Incorrect
10	- .559	Successful	.651	.349	Successful	Correct

The classification procedure was used to predict success or dismissal for each of the subjects over the four points in time. Results for the prediction of group membership at the end of the first semester are shown in Table 20. Prediction results for the three successive semesters are shown in Tables 21, 22, and 23.

TABLE 20
PREDICTION RESULTS AFTER FIRST SEMESTER

Actual Group	N	Predicted Group Successful	Dismissed	% Correct
Successful	64	46	18	71.88%
Dismissed	75	21	54	72.00%
Total	139			71.94%

TABLE 21
PREDICTION RESULTS AFTER SECOND SEMESTER

Actual Group	N	Predicted Group Successful	Dismissed	% Correct
Successful	64	51	13	76.69%
Dismissed	75	21	54	72.00%
Total	139			75.54%

TABLE 22
PREDICTION RESULTS AFTER THIRD SEMESTER

Actual Group	N	Predicted Group		% Correct
		Successful	Dismissed	
Successful	51	43	8	84.31%
Dismissed	31	3	28	90.32%
Total	82			86.59%

TABLE 23
PREDICTION RESULTS AFTER FOURTH SEMESTER

Actual Group	N	Predicted Group		% Correct
		Successful	Dismissed	
Successful	49	47	2	95.92%
Dismissed	15	0	15	100.00%
Total	64			96.88%

At the end of the first semester, the predictive accuracy was 71.94 per cent. The predictive accuracy increased slightly by the end of two semesters to 75.54 per cent. Accuracy at the end of three semesters increased to 86.59 per cent, and to 96.88 per cent at the end of four semesters. At all four points in time, the accuracy of prediction was greater than fifty per cent. Therefore, the null hypo-

thesis that variables found to discriminate significantly between successful and dismissed students would not predict success or failure at a level greater than chance was rejected.

Cross-Validation

In order to test the predictive ability of the discriminant function derived from data on the 1976 subjects, the classification process was extended to predict success or dismissal for 122 subjects in the 1977 sample. Prediction results after four semesters, from Fall 1977 to Winter 1979, are shown in Tables 24, 25, 26, and 27.

TABLE 24

CROSS-VALIDATION: PREDICTION RESULTS AFTER FIRST SEMESTER

Actual Group	N	Predicted Group		% Correct
		Successful	Dismissed	
Successful	65	46	19	70.77%
Dismissed	57	24	33	57.89%
Total	122			64.75%

TABLE 25

CROSS-VALIDATION: PREDICTION RESULTS AFTER SECOND SEMESTER

Actual Group	N	Predicted Group Successful	Dismissed	% Correct
Successful	65	46	19	70.77%
Dismissed	57	25	32	56.14%
Total	122			63.93%

TABLE 26

CROSS-VALIDATION: PREDICTION RESULTS AFTER THIRD SEMESTER

Actual Group	N	Predicted Group Successful	Dismissed	% Correct
Successful	51	34	17	66.67%
Dismissed	16	6	10	62.50%
Total	67			65.67%

TABLE 27

CROSS-VALIDATION: PREDICTION RESULTS AFTER FOURTH SEMESTER

Actual Group	N	Predicted Successful	Predicted Group Dismissed	% Correct
Successful	48	40	8	83.33%
Dismissed	5	4	1	20.00%
Total	53			77.34%

Predictive accuracy for subjects in the 1977 sample was lower than for subjects in the 1976 sample, from which the discriminant functions were derived. Accuracy was greater when predicting successful students than it was for dismissed students. The level of accuracy, however, was still greater than chance.

Final Discriminant Analysis

At this point in the study, all steps in the analysis had been carried out, and the primary purpose of the study, to identify those factors which discriminate between successful and dismissed students, had been accomplished. The second purpose, to identify a concise set of variables which could be used for prediction, was not satisfied at this point. At the end of the analysis, twenty-two variables had been identified across the four points in time. Since twenty-two variables was considered too many for practical use in prediction, an additional step was added to the analysis in an attempt to reduce the list of

variables. The additional step was a final discriminant analysis by direct method. In the direct method, all selected variables are entered at once rather than one at a time as in the step-wise method.

Four variables were selected for inclusion in the final discriminant analysis. The four variables were: high school GPA, ACT Social Studies score, expressed need for help with study skills, and first semester college GPA. These variables were selected because they were significant factors over time in the step-wise discriminant analysis. The combination of four variables yielded a discriminant function which was significant at the .001 level. Discriminant function coefficients, a measure of the relative contribution of each variable, are shown in Table 28.

TABLE 28
DISCRIMINANT FUNCTION COEFFICIENTS IN
FINAL DISCRIMINANT ANALYSIS

Variable	Coefficient
First Semester GPA	.737
ACT Social Studies	-.432
High School GPA	-.431
Need help with study skills	.140

The classification procedure was also used in the final discriminant analysis to predict group membership based on the values of the variables at the end of the first semester of enrollment. Classification

was 69.78 per cent correct for the 1976 sample, and 66.39 per cent correct for the 1977 cross-validation sample. Classification results for each sample are shown in Table 29 and Table 30.

TABLE 29
CLASSIFICATION RESULTS IN FINAL DISCRIMINANT ANALYSIS
1976 SAMPLE

Actual Group	N	Predicted Group		% Correct
		Successful	Dismissed	
Successful	64	51	13	79.69%
Dismissed	75	29	46	61.33%
Total	139			69.78%

TABLE 30
CLASSIFICATION RESULTS IN FINAL DISCRIMINANT ANALYSIS
1977 CROSS-VALIDATION SAMPLE

Actual Group	N	Predicted Group		% Correct
		Successful	Dismissed	
Successful	65	51	14	78.46%
Dismissed	57	27	30	52.63%
Total	122			66.39%

Summary

In this chapter, the results of the discriminant analysis were presented. Variables found to be significant in discriminating between successful and dismissed students over four semesters were listed. Classification results for the 1976 sample and the 1977 cross-validation sample were presented. Results from a final discriminant analysis using four variables which were the most consistent predictors were given. In Chapter V, the study is summarized, conclusions drawn from the results are discussed, and recommendations for further study are made.

CHAPTER V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Purpose

The primary purpose of this study was to identify significant variables which differentiated between freshmen students on academic probation at Central Michigan University who succeed at raising their grades above probation level, and those who fail to raise their grades and are dismissed. In addition, a secondary purpose was to identify a concise set of factors which can be used to predict the future performance of freshmen students on academic probation.

Hypotheses

Two null hypotheses were tested. The first hypothesis, tested at the .01 level of significance, was that no significant variables would be found which discriminated between the two classification categories of successful and dismissed students. The second hypothesis, to be tested if the first hypothesis was rejected, was that variables found to discriminate between successful and dismissed students would not predict success or failure at a level greater than chance.

Procedures

Data on thirty-one variables were collected for 139 students on the Fall 1976 academic probation list who had ACT profiles and who could be classified as successful (grades above 2.00) or academically dismissed at the end of four semesters or less. In the first step of analysis, data for fifteen variables representing information on 139 students after the first semester were submitted to discriminant

analysis. In the second step, data for twenty-three variables, representing information on the same 139 students after the second semester were analyzed. In the third step, twenty-seven variables representing information on eighty-two students who remained in school for three semesters were analyzed. In the fourth step, the full thirty-one variables, representing information on sixty-four students who remained in school for four semesters were submitted to discriminant analysis.

Findings

Over the four semesters, twenty-two of the original set of variables were found to be significant at one or more points in time. Three variables were significant at all four points in time: high school GPA, first semester college GPA, and expressed need for help with study skills from the ACT profile. Scores on the ACT subtest in Social Sciences were significant at the end of the first three semesters, but not at the end of the fourth semester. Sex, ACT English, need for help with educational or vocational plans, need for personal counseling, course load during the third semester, course load during the fourth semester, and number of hours withdrawn during the first semester were significant variables at two of the four points in time. ACT Math, ACT Natural Science, need for help with writing skills, need for help with reading skills, hours withdrawn during the second semester and hours of incomplete during the fourth semester, and hours of repeat courses during the fourth semester were significant at one of the four points in time. Thus, the first hypothesis was rejected.

Discriminant scores for each of the subjects in the sample were used to predict success or dismissal at each of the four points in time.

Since the actual classification is known, this step tested the predictive accuracy of the discriminant functions. At the end of the first semester, predictive accuracy was 71.94 per cent. The accuracy increased to 75.54 per cent at the end of the second semester, to 86.59 per cent at the end of the third semester, and to 96.88 per cent at the end of the fourth semester. Predictive accuracy for a cross-validation sample of 122 freshmen on the Fall 1977 probation list ranged from 64.75 per cent to 77.34 per cent over four semesters. Based on the results, the second hypothesis was also rejected.

At this point in the study, the primary purpose of identifying discriminating variables was accomplished, but the second purpose of identifying a concise group of variables which could be used for prediction was not accomplished. To meet this need, a final discriminant analysis by direct method was done, using only the four variables which were the most consistent predictors across time: high school GPA, first semester college GPA, ACT Social Sciences score, and expressed need for help with study skills. The combination of four variables yielded a discriminant function which was significant at the .001 level. Prediction results, based on the values of the variables at the end of the first semester, yielded 69.78 per cent accuracy for the 1976 sample, and 66.39 per cent accuracy for the 1977 cross-validation sample.

Conclusions Based On Findings

The discriminant analysis technique used in the study proved to be an effective method for identifying differences between freshman students on academic probation who are subsequently successful or dismissed. The results pertaining to sex, high school GPA, and first

semester college GPA's were consistent with previous studies in that females were more successful than males during the first year, and that higher high school GPA's and first semester college GPA's were found among the successful students. The findings in the relationship of ACT subtest scores were contrary to previous studies in that the successful students had lower mean scores than did dismissed students. This may suggest that motivation to achieve may have been stronger for the successful students, or that ACT scores are less reliable as predictors for students in this range of scores.

Student's expression of a need for help with study skills was a significant factor across time in the study. Need for help with educational or vocational plans, reading skills, writing skills and a need for personal counseling were significant factors at some points in time. Although differences in means of successful and dismissed students were significant, and were useful in pointing out overall trends, the separation between groups was not great enough to be recognizable from the raw scores of 1 or 2 which represent "Yes" or "No" responses to these items. The general conclusion that can be drawn is that the expression of need for assistance merits consideration in working with students on academic probation.

The findings on course load of students on probation suggest that taking an average course load of fifteen hours of credit is a more successful practice than dropping back in hours. The findings on withdrawing from classes suggest that dropping classes worked to the advantage of successful students in the first semester, but was disadvantageous for dismissed students in subsequent semesters. The pattern of taking oncomplete grades in courses was also disadvantageous

to dismissed students. The implications of these findings are that many dismissed students may have been falling into a self-defeating pattern of taking fewer credits at the start of the semester, then dropping back further by withdrawing from classes or taking incompletes. This pattern may indicate that these students may be withdrawing from difficulty rather than facing it, or deluding themselves into thinking that a reduced course load will result in better achievement in the remaining classes. Where repeating of courses was a significant factor, dismissed students were less likely to use this means of improving their grade point averages, which also suggests an avoidance pattern.

Using the full set of variables, accuracy in predicting success or dismissal for students on academic probation was 71.94 per cent at the end of the first semester, and gradually increased each semester to 96.88 per cent by the end of the fourth semester for the original sample. This trend for improvement of accuracy over time shows that the two groups of students were further apart as time progressed. Accuracy for the cross-validation sample was 64.75 per cent after the first semester and did not improve greatly until the fourth semester, when it reached 77.34 per cent. When the number of variables was reduced to the four most consistent predictors in the final discriminant analysis, prediction at the end of the first semester was 69.78 per cent for the original sample and 66.39 per cent for the cross-validation sample. By this method, very little accuracy was lost from using the larger set of variables, and accuracy was greater for the cross-validation group. These findings suggest that information from the larger group of variables is of more value for identifying patterns and trends than they are for prediction. In addition, the margin of

possible error in prediction is too great to use as a decision-making method, but seems to have promise for use as a diagnostic tool in advising students on courses of action, or referring students to sources of assistance.

Recommendations

Based on the results of the study, it is recommended that the statistical technique of discriminant analysis be used more widely for comparing group differences and as a predictive device. Further, it is recommended that the technique be applied at other institutions to identify patterns existing in other educational settings.

More specific recommendations can be made in regard to assisting freshmen students on academic probation at Central Michigan University. Further exploration into the findings on the ACT subtest scores should be done to attempt to identify why significantly lower scores were found for the successful students. The use of the classification procedure for predicting successful or dismissed students is recommended for use in identifying probabilities for success for students on academic probation. The probabilities should be used as a means of identifying those students who have the greatest need for individual attention and assistance. Since patterns may change as students change, it is recommended that discriminant analysis be repeated at two or three year intervals to form updated discriminant functions for use in prediction.

The purposes of this study were accomplished through the identification of factors which differentiated between freshman students on probation who were successful or dismissed from the University, and

through the identification of a concise set of variables which can be used in predicting the future performance of freshman students on probation. It is hoped that this information will be of value in assisting probationary students in meeting their educational goals at Central Michigan University.

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