PREDICTING STUDENT SUCCESS IN COLLEGE

USING

STEPWISE MULTIPLE REGRESSION

DISSERTATION

Submitted To The Graduate School

of

West Virginia University

In Partial Fulfillment Of The Requirements For

The Degree Of Doctor Of Education

by

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Morgantown

West Virginia

1982

ACKNOWLEDGEMENTS

Special appreciation and gratitude is expressed to my advisor, Dr. John O. Andes, for his assistance with this dissertation, as well as for his encouragement, professional support, and friendship.

Appreciation is expressed to Dr. Lawrence D. Romboski, for his constructive suggestions with this dissertation, as well as his support and friendship.

Gratitude is expressed to Dr. Ernest R. Goeres, Dr. William G. Monahan, and Dr. Edwin R. Smith, for serving on my committee as well as for their encouragement, friendship, and support throughout my doctoral program.

To my family the writer expresses a deep appreciatiion for their understanding, support, and patience.

TABLE OF CONTENTS

TABLE OF CONTENTS (continued)

TABLE OF CONTENTS (continued)

LIST OF TABLES

LIST OF TABLES (continued)

LIST OF TABLES (continued)

LIST OF TABLES (continued)

CHAPTER I

OVERVIEW OF THE STUDY

Declining enrollments are foreseen for most four-year colleges and universities during the next 20 years. These declining enrollments will produce reduced income, which will most certainly lead to trimming of programs and cutbacks in staffing. Administrators will be faced with new challenges in an effort to minimize the effects of a smaller potential clientele.

It is a well known business concept that organizational success depends on maintaining current customers as well as attracting new ones. In the past once students were accepted into an institution of higher education, it seems that no conscious effort was made to help them complete their program. During the period from 1960 to 1975 most colleges had limited concern for its retention of students. Most four-year institutions had more students than they could handle, and dropouts were quickly replaced by new students waiting to enroll. As higher education entered the 1980's, this pattern changed drasticaily. The pool of potential students in the 18-to-24-year age group has begun to diminish with further declines of as much as 25 percent of present levels being projected by 1995. With attrition rates between 40 and 50 percent being common on a national scale, the importance of greater emphasis on student retention is quite evident. By making certain that students do not leave before completion of their studies, institutions will need to attract up to 20 percent fewer new students while maintaining current

enrollment levels.

Increasing attention is being placed on retention efforts by institutions throughout the country. The report of the Carnegie Council on Policy Studies in Higher Education (1980:32) includes the statement that:

> The most dramatic feature of the next 20 years, as far as we now know, is the prospect of declining enrollments after more than three centuries of fairly steady increase.

The report contains some soundly based judgments that will have dramatic impact on all of higher education (1980:43-44):

> We expect colleges to exert an all-out effort to increase the retention rate. We estimate that these efforts may add a 20 percent gain in time spent in college by those who in the past have not completed their four-year degrees and by academic transfer students enrolled in community colleges. Private colleges, in particular, have a great incentive to increase the number of their alumni with degrees since financial support comes proportionately more from them than from those who drop out. We note, however, that the recent retention experience in community colleges has been disappointing and so also has been the transfer rate to four-year colleges. Nevertheless, the internal market of students already on campus is both large and readily available for retention effort.

The admission procedures and practices at Gulf State College have essentially remained the same for several decades. There have been times during this period when the decision to accept or reject an applicant may have been based upon criteria that were more or less stringent, depending upon the College's need for students, but the process has remained essentially unchanged. Basically, students are accepted into the College and even a particular School or degree program, after having met certain entrance requirements, on a first-come, first-served basis. Prospective students are presented a "shopping list" of majors within each School and asked to select one

from the List. For most of the last 10 years, the appllicant was required to select a major and was not permitted to enroll as an "undecided" student. Little or no academic guidance was offered by the College prior to enrollment and the student had to rely upon his high school counselor for information about a particular program of studies.

As the budget crunch that has since hit most of higher education came to Gulf State College, it became clear to some faculty and administrators that the College could no longer sit back and wait for the students to flock to its doors. The State had developed an allocation formula which was based almost entirely on credits produced by the institution, and any decline in enrollment produced a corresponding reduction in appropriations. It has become evident that attracting students in sufficient numbers is essential for the survival of the institution. It is further evident that the College must retain the students that it does attract for as long as possible. Ideally, this means that the College retains the students until completion of the undergraduate degree and even beyond that into the graduate program.

It seems obvious that any counselling that the College is able to provide to the prospective student in order that the student might enroll in a program in which he or she would have greatest success would assist in the area of recruitment and even more so in the area of student retention. Gulf State College has had an attrition rate, depending upon definitions used in counting, that varies from thirty to forty percent. Even a small reduction in this number would have

great impact upon enrollment since the effects are cumulative over a four-year period. If this figure could be reduced, the beneficial impact upon the college and the student would be far-reaching indeed.

Statement of the Problem

Simply stated, then, can a set of prediction equations be developed that might serve as a useful counseling tool to aid in student recruitment and also to help reduce the attrition percentage at Gulf State College.

The specific problem is to determine the feasibility of predicting a student's success at Gulf State College, on the basis of data available at the time of the student's admission to the College.

The research will test the following Null hypothesis: No regression equation can be developed that will predict at a statistically significant level the cumulative Grade Point Average at the time of graduation for students entering Gulf State College as First-time Freshman according to data known at the time of admission to Gulf State College.

Specific Research Objectives

The following objectives are included in this study:

1. To determine whether an equation can be developed that will predict at a statistically significant level the success a student will achieve at Gulf State College.

2. To determine which variables known at the time of admission are most significant in predicting student success at Gulf

State College.

3. To determine whether the equation referred to in objective 1 above can be determined by School within Gulf State College.

4. To determine whether the equation referred to in objectives 1 and 3 can be determined by Major within School at Gulf State College.

5. To determine whether there is a difference in the variables of objective 2 when examined by School.

6. To determine whether there is a difference in the variables of objectives 2 and 5 when examined by Major.

Definition of Terms

The following are definitions of terms used:

1. Gulf State College - a pseudonym used to protect the identity of the institution.
2. Entrance Status - the manner in which a student was admitted to Gulf State College. There are five categories used by the Admissions Office to classify students. They are:
   (a) First-time Freshmen
   (b) Transfer
   (c) Certification Gulf State College graduate
   (d) Certification-graduate of another college
   (e) Transient
3. Measure of Success - The cumulative Grade Point Average

at time of graduation from GSC.

4. School - There are three undergraduate schools at Gulf State College. They are:
   (a) The School of Education
   (b) The School of Arts & Sciences
   (c) The School of Science & Technology
5. Major - The degree program that the student is enrolled in as his primary degree program.
6. N - In any statistical procedure used in this paper, N will represent the number of cases considered.
7. SMR - An abreviation for the statistical procedure known as Stepwise Multiple Regression.

Population Selection

This study deals only with a population that is strictly defined. The population consists of the students who graduated from Gulf State College in the academic year 1978-1979 and who had entered the College as First -Time Freshmen.

This population was chosen for the following reasons:

(1) Admission data are readily available for this population or can be readily obtained when necessary.

(2) The cumulative Grade Point Average is readily available for each student who graduated.

(3) The population is large enough to provide a statistically reliable data base.

(4) By choosing the 1978-1979 graduating class, the

prognostic equation can be tested against the 1979-1980 graduating class, for whom data are also readily available.

Overview of Research Procedures

Specific data items collected at the time of admission were used as values for independent variables in order to construct a multiple regression equation with the student's cumulative grade point average at time of graduation being the dependent variable. The variables were added in a Stepwise Multiple Regression procedure, selecting only those variables which proved to be significant. This procedure was extended to School at Gulf State College and then to selected Majors within School. Only subsets of the population with large enough N were considered. The equations developed in the procedure outlined above were then tested against another class. This population consisted of those students who graduated from Gulf State College during the period from September 1, 1980 to August 31, 1981 and who had also entered Gulf State College as First-Time Freshmen. The predicted Grade Point Average of each student was compared with the actual Grade Point Average at the time of graduation from Gulf State College. This comparison was done by performing Pearson Correlation on the two sets of Grade Point Averages (predicted and observed). The equations developed were analyzed for the significance of the variables in the prediction equations. These equations were also examined for causal relationships that may be enlightening about factors that contribute to student success at Gulf State College.

All statistical analyses performed in this research were done using the Statistical Package for the Social Sciences as documented by Nie et al. (1970). Throughout the remainder of this paper this package will be referred to simply by its popular acronym, SPSS. The statistical procedures used in the study are the following:

1. One-way analysis procedure. CODEBOOK
2. Stepwise Multiple Regression. REGRESSION
3. Pearson Product-Moment Correlation; PEARSON CORR

The first procedure, CODEBOOK, was run on all variables and all cases merely to determine frequencies and missing data for each variable. The second procedure, REGRESSION, was the run on selected variables to determine prediction equations. The third procedure, PEARSON CORR, was then used to measure the correlation between predicted and actual GPA for a test group consisting of the graduating class of 1979-80. The results of these analyses are explained in detail in Chapter 4.

Significance of the Study

The next two decades will present a unique challenge to the institutions of higher education throughout the country. The retention rate will have to be increased for some colleges merely to survive. The process that will be described in this dissertation, if successful, could have significant impact on the future of many four-year colleges and universities where declining enrollment would produce negative results. The ability to increase the time spent in college by those students who would otherwise drop out before

completion of a degree could offset as much as a 20 percent decline in new students enrolled by the institution. This figure lends dramatic emphasis to the importance of higher retention rates in the coming years of anticipated scarce resources.

Limitations of the Study

It is apparent to the researcher that other groups of the population should be studied. For example, the students who did not graduate from Gulf State College are also important. However, many students leave Gulf State College without completing an exit interview, and therefore it is not apparent why they did not complete their studies here. A more compelling reason for excluding these students at this time lies in reason 4 above for choosing the population. There would be no good method of evaluating the prognostic ability of the equation, since there would be no newer group to test the equation on.

Organization of the paper

An elaboration of the details of this study is contained in the following chapters. Chapter 2 contains a review of literature related to this study. The research methodology is explained in detail in Chapter 3. The analyses of the data are made in Chapter 4. Chapter 5 contains the findings, conclusions, and recommendations for further study.

CHAPTER 2

RELATED LITERATURE

The definition of "success" as proposed by the researcher throughout this paper is admittedly a very narrow definition. Hackman and Taber (1979:117) state this opinion about the concept of success in college:

> The meaning of "successful college performance" is elusive. Although students seek to achieve it and colleges profess to foster it, there is neither clarity nor agreement about what college success is. We began the present research with the premise that there are many different ways to succeed or fail in college, and that student performance is more complex than is implied by traditional admissions procedures and measures of student performance.

In spite of this admitted complexity of defining student performance, the researcher has opted to measure successful college performance in the traditional terms of grades and completion of a degree.

Uses of Forecasting Techniques In the Admission Process

The idea of attempting to predict the success of entering college students is by no means a novel idea. Many attempts have been made to predict cumulative Freshman Grade Point Average. According to Hengstler and Reichard (1980) admissions decisions are routinely made by some colleges and universities on the basis of the predicted cumulative Freshman Grade Point Average:

> Students with a predicted Grade Point Average above a given level are normally accepted for admission into the university or college. Students with a predicted Grade

Point Average below the specified level are rejected or may be admitted under special conditions.

In all related literature examined by the researcher, no case could be found in which an attempt was made to predict cumulative Grade Point Average at the time of completion of undergraduate studies.

Since success at the end of the freshman year is not generally considered to be as important as graduating with a "good" Grade Point Average, the researcher has elected to measure success in the manner defined above.

Having settled upon a quantitative measure of success, the researcher examined the literature for traditional choices for the predictor variables. Research has indicated (Beasley and Sease [1974]) that in addition to the traditional intellective variables such as HSR and SAT, nonintellective variables may be used as valid predictors. That study was done with primary emphasis placed on Black students, but other research (Nagle et. al. [1979:933]) has indicated that a composite score, predicted by intellective and nonintellective variables, can be used effectively in the admissions process.

Value of Specific Predictors

After an extensive search of the literature it was concluded that no real agreement exists concerning the value of specific predictors. Even where High School variables such as RiC (Rank in Class) and GPA (Grade Point Average) are concerned, there are some unanswered questions as to how they can be used. Loeb (1972:20) made

following statement:

> Empirical attempts to answer more detailed questions concerning the use of high school performance indices in college admissions have had, in some cases, less clear-cut results. Such detailed questions include:
> - which performance index, i.e., RiC, HSPR, or GPA, predicts best.
> - whether average or rank in academic courses predicts better than overall average or rank.
> - how many years of high school work need to be included in the rank of GPA.
> - whether the variability of a student's high school grades affects their predictive power.
> - whether rank or grades from some high schools predict better--or differently--than similar indices of performance at other high schools.

With such apparent uncertainty of opinion in mind, further perusal of the literature was conducted. One thought as expressed by Heit et al. (1978:149) seemed to carry some support among various researchers. They said "Components taken collectively are the best predictors of success rather than any individual factor."

As regards another traditional predictor, the SAT score, Perrone (1978) reviewed several studies which in his opinion confirmed that SAT scores are not valid predictors for academic success beyond the first year of college.

The uncertainty of determining which variables are significant and their level of significance seemed to be summarized by Pristo (1979:933) when he said:

> Other studies have shown that procedures which effectively predict success in one school will not necessarily work somewhere else, and that variables selected for one study may be valid predictors in one environment but not in another. The previously mentioned shortcomings encountered in the current study may not be a problem for some other researcher, and in general could possibly be eliminated by working with a larger population, by using different variables, and/or by employing the

canonical procedure in conjunction with the data reduction capabilities of factor analysis.

In general then, most of the literature reviewed seems to support at least indirectly the approach taken by this researcher. That approach can be summarized by the following statements:

1. Begin with as many variables, intellective and nonintellective, as can be reasonably obtained. Let the selection of the variables that are significant in this particular environment be determined by a mathematical procedure.

2. Apply this same technique to different subsets of the entire population. Different variables may be significant in the subsets.

Retention Studies

There has been much research in the area of student retention and the studies appear to fall into two categories. The first type of study aims at discovering the characteristics of the successful student, i.e one who persists to graduation, versus the characteristics of the unsuccessful student or drop-out. The second type considers the application of retention strategies and how effective they are in improving the length of time that students remain in a program.

The approach taken in this study is not the sociological approach of the first type of study. Neither does it concern itself with the effectiveness of retention strategies. What it does attempt to do, however, is to derive mathematically a profile of the

successful student in various programs at Gulf State College. The accuracy of this profile is tested against other groups to see whether it remains true. Thus the approach is an empirical technique used to enable an admissions office to better match a prospective student to a program in which his or her chances of success are greater. The relationship of admissions and recruiting to retention has been largely neglected until recently. Little thought has been given in the past to recruiting for retention. Lenning and Cooper (1978) lay some of the blame for poor retention directly upon those responsible for recruitment:

> Information that postsecondary institutions provide to prospective students is often incomplete, insufficiently detailed, not clearly presented, or presented at the wrong time. The failure to provide adequate information can result in an unwise choice of institutions or programs of of study and, consequently, low student morale, high attrition rates, and future recruiting problems for the institution.

Importance of Academic Advising

Beal and Noel (1980) conducted research that tends to support the idea that inadequate academic advising is the most important reason for poor retention of students. It seems obvious that poor advising is more significant in some programs and to some students than others. The empirical approach to assessing the effect of advising in each program and to students of a given background does not attempt to determine whether the factor is a causal one or merely symptomatic. Instead, the techniques employed by this researcher are intended to show how, for example, a student of a given background, as characterized by certain values of variables considered, should

fare under the conditions of advising as they exist in certain programs. This idea carries through other factors which may or may not affect particular students.

Counseling As a Factor In Retention

In addition to advising, other factors are cited as being important in the retention process. Noel (1976:33-36) has pointed out that the first six months of enrollment are critical and the counseling received during this time plays a vital role in retention. Papke (1978:12-13) emphasizes the effects of counseling prior to actual enrollment. Faculty and staff play an important role in the retention of students. This obvious statement is supported by the research of Rowell (1974) and Heath et al. (1973).

Financial Aid As a Factor In Retention

Financial aid as a factor in student retention has been examined by Austin (1975) and also by Peng and Fetters (1977) with contradictory conclusions. The apparent positive effect of financial aid on the one hand and negative effect on the other lend support to the empirical approach taken in this study. For some students in some programs, financial aid may be helpful in keeping them in school, while for some students in the same or other programs it may actually lead to higher attrition.

Other Factors Impacting Retention

The positive effect of factors such as Orientation programs

as documented by Reimanus (1973) and proper housing as documented by Kuznik (1975:9-12) seems to be agreed upon by most educators.

Need For Empirical Studies

The fact that the effect of some variables upon retention of students can be agreed upon while the effect of other variables upon retention is controversial supports the need for research of the empirical type conducted in this study. The forecasting equations being developed and tested apply the concept of focus forecasting used by many businesses today to forecast inventory needs. The concept is based upon the idea that the most recent historical data best forecast the coming events. Regardless of the forecasting technique used, most recent data are input into the system to predict some future event.

Success Forecasting As a Retention Strategy

By using this type of forecasting, it is not necessary to agree upon the positive or negative effects of certain factors, or even upon their causal or symptomatic relationship to the event to be forecast. In this approach, it is assumed that students of certain profiles should do about the same in specific programs as those students of similar profile who most recently completed the program. If an individual prospective student has an idea in advance of how well other students of the same or similar background have done in a particular program of study, he or she should be able to make a choice of college and program that gives the most likelihood of

successful completion, and thereby the retention rate of new students in the College will increase.

Need for Additional Research

While the importance of retention of students to a college or university when enrollments decline is understood, little use has been made of success forecasting as a retention tool. One reason for the failure of college administrators to use this tool appears to be due to the apparent complexity of forecasting techniques. The establishment of computer facilities on most college campuses and the availability of many "canned" statistical packages makes these complexities fade when weighed against the potential results of the proper use of these statistical techniques.

This study was designed to develop forecasting equations and then to test their effectiveness in predicting college success. When enrollments decline, research is needed in student retention as well as recruitment strategies. This study was designed to help fulfill that need.

The literature suggested that admitting students to colleges and universities on the basis of predicted freshman grade point average is not uncommon, but no evidence could be found where success at the end of the senior year was being predicted. There was no evidence that success is being predicted in different degree programs at the present time. It was desired to test the feasability of these two ideas at a specific college. This study has accomplished these goals.

The literature indicated that institutions must identify the factors that affect their functioning. Student retention is one important factor affecting any college or university which has limited resources. When the goal is to maintain or increase enrollment, research has indicated that student retention is a very important factor. To determine if retention rates can be improved by better matching prospective students to the environments they face in particular schools and degree programs, formal studies in success forecasting must be conducted.

CHAPTER 3

RESEARCH METHODOLOGY

This study required four separate research procedures to be carried out: (1) determining which variables, known at the time of admission to GSC, were to be used as predictors; (2) finding the missing data in the variables selected; (3) updating the computer records that were maintained on this population; (4) and performing the statistical procedures necessary to test the Null hypothesis.

Selecting Variables

1. CUMGPA - The cumulative Grade Point Average of the student at the time of graduation from GSC. This is the dependent variable.
2. SEX - Sex of the student.
3. RACE - Race category in which the student declares himself to belong.
4. MARITAL - Last known marital status of student.
5. HSIZE - The size of the student's high school in hundreds.
6. ENTRY - The year and semester in which the student entered GSC.
7. HSR - High school rank expressed in quartiles.
8. YRGHS - Year the student graduated from high school.
9. SATV - The score received on the verbal section of the SAT test.
10. SATM - The score received on the mathematical section of

the SAT test.

11. HSS - The high school stanine as reported to GSC by the student's high school.
12. CURR - The major in which the student pursued a degree.
13. FA - Expresses whether or not the student received financial aid at GSC.
14. HOUSING - The type of housing that the student selected while attending GSC.
15. RELIGION - The student declares to be a follower of a specific organized religion or none.
16. HSCURR - The curriculum taken by the student while in high school.
17. BIRTH - Year in which student was born.

Finding Missing Data

After these variables were selected, the SPSS procedure CODEBOOK was performed on the data. An attempt was made to determine as many missing values as possible. In some cases it was not possible to determine all missing data. For example, some students who entered GSC as first-time freshmen were not required to present SAT scores. Veterans fell in this category. If this result of the CODEBOOK run showed that data were missing for a particular variable, the data base was sorted on that variable and those with missing data were selected and their paper records in various campus offices were investigated. These offices included those of the Registrar, Admissions, Placement, and School Deans.

Updating Magnetic Media Records

As these missing data were retrieved from secondary sources, the computer files at GSC were then updated with the new information. This was done in several ways including keypunching of data, batch processing the punched cards to update the files, and also direct updating of on-line files through interactive computer terminals.

Statistical Procedures

When it had been determined that all available data had been collected and when the data base was properly updated, two statistical procedures from the SPSS package were then run on the data.

Running CODEBOOK on the Data

In order that one might have an idea of the basic characteristics of each variable that was being considered as a predictor, the SPSS procedure CODEBOOK was performed on all the variables. The output of this procedure and analysis of the one-way descriptive statistics for each variable were analysed. Various statistics relating to central tendency, variability and dispersion, and shape of the distribution were evaluated in order to determine any anomalies in the variables and the amount of missing data.

Running Stepwise Multiple Regression Using all Variables

The procedure known as Stepwise Multiple Regression provides the researcher with a powerful tool for choosing independent

variables that will determine an equation for the best possible prediction of the dependent variable with the least number of independent variables. An explanation of Mulitple Regression Analysis is presented in Appendix A.

Stepwise Multiple Regression was run on the data available for 411 students who graduated from GSC during the 1978–1979 academic year. This procedure provides a means of choosing the variables that made the greatest contribution in predicting the cumulative Grade Point Average for each member of the group.

Selecting The Best Predictors

When the entire population was considered, it was determined that six variables should be used in the regression equation. A detailed analysis of this choice and the six variables chosen is presented in Chapter 4.

Using the Prediction Equation

The next step in the process was to write a computer program to apply the prediction equation (six independent variables) to the graduating class of the next academic year, 1980–1981. This program reads each of the values of the six variables as they were determined for each student in the class and then calculates a predicted Grade Point Average using the coefficients determined previously by Stepwise Multiple Regression. These predicted Grade Point Average values along with actual Grade Point Average values for each student of the test group were written to a file. If any of the test group had missing data, their Grade Point Average was not calculated.

Pearson Correlation on
The Grade Point Average

A Pearson product moment correlation run was performed on the data representing the actual and predicted Grade Point Average of this test group. The results of this procedure are presented and analyzed in Chapter 4.

Dividing the Population
Into Subgroups

The 411 students who were the graduating class of 1978-1979 and who had entered the College as first-time freshmen were divided into two groups. Those who were in the School of Arts and Sciences or the School of Science and Technology were placed in one group. Those who were in the School of Education were placed in a second group. The School of Science and Technology was combined with the School of Arts and Sciences since there were only 17 graduates of the School of Science and Techhnology in 1978-1979.

Stepwise Multiple Regression
On The Subgroups

The statistical procedures outlined above were repeated on each of the subgroups. Two new predictor equations were developed. Each regression suggested the inclusion of seven independent variables in the predictor equation. The variables were different for each subgroup. These two equations were then applied to the data of each subgroup of the 1979-1980 class. Through the use of the program previously mentioned, a predicted Grade Point Average was calculated. This predicted Grade Point Average and the actual Grade

calculated. This predicted Grade Point Average and the actual Grade Point Average were written to a file, as had been done for the entire class previously.

Pearson Correlation
On The Subgroups

The prediction value of each equation for each of the two subgroups was tested by performing a Pearson Correlation on the pairs of actual vs. predicted Grade Point Averages. The two subgroups consisted of 1979-1980 graduates of: (1) The school of Education; (2) The schools of Arts and Sciences or Science and Technology. The analyses of each subgroup by these two procedures are also detailed in Chapter 4.

CHAPTER 4

ANALYSES OF DATA

The specific problem of this study was to determine the feasibility of predicting a student's success at Gulf State College, on the basis of data available at the time of admission to the college.

Three general mathematical procedures were used to determine the answer to this question. They were: (1) Stepwise Multiple Regression to determine a predictor equation; (2) the use of a computer program to apply the equation to a new set of data; (3) Pearson Correlation to determine the significance of the relationship between the predicted and actual Grade Point Averages.

Stepwise Multiple Regression on All 17 Variables Using All 1978-1979 Data

The following tables and those presented in Appendix B contain the output from the SPSS procedure REGRESSION. The first table of Appendix B, Table 11 contains the setup procedures used to process the data and is presented merely for reference material. Table 1 lists all 17 variables including the dependent variable CUMGPA along with means and standard deviations. Notice that the number of cases has been reduced to 318 from the original 411. This reduction is due to the REGRESSION option chosen by the researcher to eliminate from the equation any case whose datum was missing for any one of the 17 variables. Table 2 is the print-out of the matrix of correlation coefficients. It can be seen by comparing the

correlation coefficients of CUMGPA and each independent variable with the Sample R column of Table 28 of the summary output that they are one and the same.

Table 1

REGRESSION Print-out Including Means and Standard Deviations
Entire 1978-1979 Class and All Variables

VARIABLE	MEAN	STANDARD DEV	CASES
HSIZE	11.9277	6.6847	318
SEX	1.5031	0.5008	318
MARITAL	1.9403	0.2374	318
RACE	2.9403	0.3364	318
ENTRY	5.0314	1.6847	318
HSR	2.8868	1.5806	318
YRGHS	74.4686	1.2798	318
SATV	395.2987	83.8580	318
SATM	427.9560	86.8693	318
CUMGPA	2.9409	0.4356	318
HSS	6.8679	0.9928	318
CURR	4.1415	2.1510	318
FA	1.5818	0.4940	318
HOUSING	1.9119	1.5024	318
RELIGION	1.7107	0.4542	318
HSCURR	1.2484	0.7046	318
BIRTH	56.4717	0.9078	318

Table 2

REGRESSION Print-out of Matrix of Correlation Coefficients
Entire 1978-79 Class and All Variables

	HSIZE	SEX	MARITAL	RACE	ENTRY	HSR	YRGHS	SATV	SATM
HSIZE	1.00000	-0.05600	-0.02261	-0.13241	-0.03369	0.13268	-0.08342	-0.03843	-0.05230
SEX	-0.05600	1.00000	-0.01168	0.01048	-0.16090	-0.19484	0.08383	0.02195	-0.15177
MARITAL	-0.02261	-0.01168	1.00000	-0.04485	-0.08205	0.07440	0.16512	-0.00861	-0.10231
RACE	-0.13241	0.01048	-0.04485	1.00000	-0.10245	-0.17297	0.05791	0.19803	0.20957
ENTRY	-0.03369	-0.16090	-0.08205	-0.10245	1.00000	0.17194	-0.38143	0.02405	0.01510
HSR	0.13268	-0.19484	0.07440	-0.17297	0.17194	1.00000	-0.12965	-0.30689	-0.40008
YRGHS	-0.08342	0.08383	0.16512	0.05791	-0.38143	-0.12965	1.00000	0.00325	0.00864
SATV	-0.03843	0.02195	-0.00861	0.19803	0.02405	-0.30689	0.00325	1.00000	0.53407
SATM	-0.05230	-0.15177	-0.10231	0.20957	0.01510	-0.40008	0.00864	0.53407	1.00000
CUMGPA	-0.11225	0.23607	-0.11387	0.21590	-0.32709	-0.58937	0.14167	0.42941	0.37685
HSS	-0.10934	0.13408	-0.02020	0.13689	-0.12765	-0.50410	0.06872	0.59309	0.56161
CURR	-0.04755	-0.11902	-0.01428	0.10329	-0.04389	-0.12239	-0.01156	0.23525	0.19739
FA	0.03379	-0.03929	0.08213	0.03898	-0.22293	0.06037	0.11135	-0.04951	-0.07731
HOUSING	0.03988	-0.03317	0.07365	0.00828	0.08710	0.21233	-0.12121	0.09047	0.01070
RELIGION	0.05959	0.01788	0.04398	-0.01026	-0.10764	-0.09851	0.04400	-0.06440	-0.11339
HSCURR	0.09023	-0.02457	0.01358	-0.09690	-0.01723	0.19246	-0.01755	-0.13981	-0.18907
BIRTH	-0.09053	0.23265	0.23365	0.12358	-0.59553	-0.20890	0.55858	0.04953	0.06187

	CUMGPA	HSS	CURR	FA	HOUSING	RELIGION	HSCURR	BIRTH
HSIZE	-0.11225	-0.10934	-0.04755	0.03379	0.03988	0.05959	0.09023	-0.09053
SEX	0.23607	0.13408	-0.11902	-0.03929	-0.03317	0.01788	-0.02457	0.23265
MARITAL	-0.11387	-0.02020	-0.01428	0.08213	0.07365	0.04398	0.01358	0.23365
RACE	0.21590	0.13689	0.10329	0.03898	0.00828	-0.01026	-0.09690	0.12358
ENTRY	-0.32709	-0.12765	-0.04389	-0.22293	0.08710	-0.10764	-0.01723	-0.59553
HSR	-0.58937	-0.50410	-0.12239	0.06037	0.21233	-0.09851	0.19246	-0.20890
YRGHS	0.14167	0.06872	-0.01156	0.11135	-0.12121	0.04400	-0.01755	0.55858
SATV	0.42941	0.59309	0.23525	-0.04951	0.09047	-0.06440	-0.13981	0.04953
SATM	0.37685	0.56161	0.19739	-0.07731	0.01070	-0.11339	-0.18907	0.06187
CUMGPA	1.00000	0.44627	0.07181	-0.01185	-0.17235	0.02845	-0.11997	0.28371
HSS	0.44627	1.00000	0.22002	-0.06796	-0.06069	0.01993	-0.14686	0.19185
CURR	0.07181	0.22002	1.00000	0.01431	0.06829	-0.07744	-0.14608	0.04164
FA	-0.01185	-0.06796	0.01431	1.00000	0.09898	-0.00672	-0.02682	0.22322
HOUSING	-0.17235	-0.06069	0.06829	0.09898	1.00000	-0.07444	-0.01205	-0.06891
RELIGION	0.02845	0.01993	-0.07744	-0.00672	-0.07444	1.00000	-0.01128	0.09485
HSCURR	-0.11997	-0.14686	-0.14608	-0.02682	-0.01205	-0.01128	1.00000	-0.05062
BIRTH	0.28371	0.19185	0.04164	0.22322	-0.06891	0.09485	-0.05062	1.00000

Tables 11 through 27 present the step-by-step results of adding variables to the regression equation. Each table presents the variable(s) included at each step. Then follows, in Table 28, the statistical summary of the total equation. Included in this summary are Multiple R, R-Squared, and the Standard Error. R-Squared can be interpreted as the fraction of the variance in the dependent variable that is accounted for by the prediction equation. The R-Square value of Table 12 indicates that thirty-four percent of the variance of the Grade Point Average is accounted for by the single variable HSR for this population. The residual is defined as the difference between the actual Grade Point Average and the predicted Grade Point Average. The Standard Error is the standard deviation of the residual. Since regression results in residuals with mean zero, the Standard Error can be interpreted as the typical size of the residual values as just defined. The F statistic is the ratio of the Mean Square of the Regression to the Mean Square of the residuals. This F value is used to assess the significance of the regression equation.

On the left side of Tables 12 through 27 are given the variables included in the prediction equation and their coefficients, both regular B and normalized Beta. Next is given, for each variable, the Standard Error of B. This should be interpreted to mean that the range of the regular regression coefficient should be thought of as B plus or minus the Standard Error of B. Since HSR takes on values of one through six with one being highest, the sign of B is negative as expected. Since the magnitude of B is more than ten times the magnitude of the Standard Error, the sign can be

interpreted with confidence. Therefore it may be stated that as the high school class rank moves toward smaller values, the predicted Grade Point Average should increase.

Proceeding through Tables 13 through 27, the following observations may be made. The next variable which contributes most to predicting the cumulative Grade Point Average is the SATV score. As the SATV increases, then so does the dependent variable, as indicated by the positive sign of B. Note that in this case the magnitude of the variable is seven times the magnitude of the Standard Error. Now consider Table 14. The third variable to be brought into the equation is surprising at first glance. It is the variable, ENTRY. However, if one considers that the sign of B is negative, one then reasons that the smaller the value of ENTRY, the higher the predicted Grade Point Average. This simply means that the longer it takes to complete the studies, the higher the cumulative Grade Point Average will generally be. This is no doubt a direct result of the liberal repeat policy at Gulf State College which gives the student only the last grade in a repeated course to be used to calculate overall Grade Point Average. The fourth variable to be added to this equation is SEX. Since the recode option of REGRESSION made 1=Male and 2=Female we interpret the positive coefficient to mean that in general females did better than males over the entire graduating class. Note that the ratio of the coefficient to its Standard Error is still a comfortable three to one. See Table 15. MARITAL was the fifth variable added to the regression equation. The values were coded as 1=married and 2=single. The negative sign of

the coefficient shows that for the entire graduating class the married student generally did better than the single one. See Table 16. The sixth variable entered into the equation was HOUSING. Values for housing were coded as 1=commuter and 2=resident. Resident students included on-campus dorm, off-campus dorm, fraternity, sorority, and private housing near campus. The negative sign illustrates an inverse relationship between the housing values and Grade Point Average. No real determination can be made here but one could say that the tendency was for commuters to do better than students who were campus residents. See Table 17.

It was decided that these six variables would be used to construct an equation to predict the Grade Point Average values for the 1979-1980 test group for several reasons: (1) Further variables do not add very much to the R-squared value. The contribution of all the remaining independent variables is less than two percent.

(2) It is desirable to make prediction equations contain as few terms as necessary in order to make them easy to deal with. (3) The F level has fallen below four, which is a traditional cut-off point. These points may be observed by examining Tables 18 through 27.

SMR on Six Most Significant Variables

Using All 1978-1979 Data

In the following Table 3, the output of the prediction equation when only the six best variables from the preceding run are used, is presented. The number of valid cases has increased to 357 since there are fewer variables which might have missing values.

Note that the order in which the variables are added has changed with the addition of other data values.

The addition of variable HOUSING to the regression equation now precedes MARITAL. By comparing Tables 34 and 27, it can be seen that the magnitude of the regression coefficients B and the Standard Errors of each have remained relatively the same. The R-square value has dropped from .52 to .49 owing to the loss of the contributions of the 10 other variables no longer considered. However, the same six variables that were selected for reasons stated previously are used in the equation, and coefficients are determined to construct a prediction equation with 6 variables. The resulting equation follows:

CUMGPA = -.10423 * HSR + .00172 * SATV - .06101 * ENTRY
+.09837 * SEX - .03118 * HOUSING - .16659 * MARITAL
+ 3.11957

Table 3

REGRESSION Print-out Including Means, Standard Deviations and Correlation Coefficients for Entire 1978-1979 Class Using Best Six Variables

VARIABLE	MEAN	STANDARD DEV	CASES
SEX	1.5042	0.5007	357
MARITAL	1.9440	0.2303	357
ENTRY	5.0168	1.6540	357
HSR	2.8739	1.5734	357
CUMGPA	2.9640	0.4406	357
SATV	398.5854	86.3363	357
HOUSING	1.9748	1.5184	357

CORRELATION COEFFICIENTS

	SEX	MARITAL	ENTRY	HSR	CUMGPA	SATV	HOUSING
SEX	1.00000	-0.02231	-0.16629	-0.19366	0.23963	0.02369	-0.07191
MARITAL	-0.02231	1.00000	-0.09339	0.05798	-0.09468	0.01225	0.08432
ENTRY	-0.16629	-0.09339	1.00000	0.18863	-0.31289	0.01728	0.08406
HSR	-0.19366	0.05798	0.18863	1.00000	-0.57396	-0.32317	0.21030
CUMGPA	0.23963	-0.09468	-0.31289	-0.57396	1.00000	0.44648	-0.19064
SATV	0.02369	0.01225	0.01728	-0.32317	0.44648	1.00000	0.08790
HOUSING	-0.07191	0.08432	0.08406	0.21030	-0.19064	0.08790	1.00000

Calculation of Grade Point Average for Entire 1979-1980 Graduating Class

When the prediction equation containing six variables is examined for significance by considering the F statistic, it is seen to be significant at the .01 level. It was desired by the researcher to test further the predictive value of the equation by using it to predict the Grade Point Average values for the 1979-1980 graduating class. Since the cumulative Grade Point Average is already known for this group, it presents a convenient test group with which to evaluate the equation developed.

The equation developed for the 1978-1979 class was used to predict the cumulative Grade Point Average for the 1979-1980 class.

There were 338 cases of the 415 students in this class for whom data was available for all six variables of the prediction equation. The predicted Grade Point Average was calculated for each of these 338 students. Both the predicted Grade Point Average and the actual Grade Point Average were written to a computer disk file.

Correlation of Predicted Grade Point Average vs. Actual Grade Point Average for 1979-1980 Class

Table 4 contains the output of the SPSS procedure Pearson Correlation. The correlation coefficient for this comparison is +.6725, which is significant at the .001 level.

Table 4

PEARSON CORRELATION Print-out of
Actual vs. Predicted Values
1979-1980 Entire Class

VARIABLE	CASES	MEAN	STD DEV
ACTGPA	338	2.9314	0.4796
PRDGPA	338	3.1666	0.3258

VARIABLES		CASES	CROSS-PROD DEV	VARIANCE-COVAR
ACTGPA	PRDGPA	338	35.4109	0.1051

PEARSON CORRELATION COEFFICIENTS

	ACTGPA	PRDGPA
ACTGPA	1.0000 (0) S=0.001	0.6725 (338) S=0.001
PRDGPA	0.6725 (338) S=0.001	1.0000 (0) S=0.001

Statistical Analysis Using Data For Separate Schools

The following tables represent the SPSS REGRESSION Results for the students who were Majors in the School of Education and graduated in the 1978-1979 academic year. For this subgroup of the population, the regression equation was selected from the first seven variables to be entered, for the same reasons enumerated for the entire population procedure.

These seven variables explained fifty-three percent of the variance in the dependent variable, and the equation was statistically significant at the .01 level.

SMR on Seven Most Significant Variables for School of Education Data

Following the procedure used for the entire 1978-1979 class, the SPSS REGRESSION procedure was run, allowing only the seven best variables to be used in the equation. The output of this procedure follows in Table 5 and Table 6.

The equation determined by allowing only the seven best variables into the REGRESSION procedure is as follows:

$$\begin{aligned} \text{CUMGPA} = &-.10329 * \text{HSR} - .06306 * \text{ENTRY} + .00140 * \text{SATV} \\ &-.02509 * \text{CURR} - .04243 * \text{HOUSING} + .09939 * \text{RACE} \\ &+.04198 * \text{HSS} + 2.58759 \end{aligned}$$

Table 5

REGRESSION Print-out Including Means and Standard Deviations
1978-1979 School of Education Data
Using All Variables

VARIABLE	MEAN	STANDARD DEV	CASES
HSIZE	12.7353	7.2312	170
SEX	1.6235	0.4859	170
MARITAL	1.9412	0.2360	170
RACE	2.9412	0.3389	170
ENTRY	4.8941	1.6714	170
HSR	2.9294	1.5214	170
YRGHS	74.5941	0.8104	170
SATV	380.3235	80.5715	170
SATM	413.9412	85.8945	170
CUMGPA	2.9329	0.4080	170
HSS	6.7882	0.9862	170
CURR	3.2412	2.5779	170
FA	1.5882	0.4936	170
HOUSING	1.7000	1.3967	170
RELIGION	1.7471	0.4360	170
HSCURR	1.2765	0.7298	170
BIRTH	56.5412	0.9301	170

Table 6

REGRESSION Print-out of Matrix of Correlation Coefficients
School of Education Using All Variables

	HSIZE	SEX	MARITAL	RACE	ENTRY	HSR	YRGHS	SATV	SATM
HSIZE	1.00000	-0.12283	-0.00224	-0.26232	0.02264	0.21451	-0.04570	-0.04530	-0.05585
SEX	-0.12283	1.00000	0.01214	0.08031	-0.21694	-0.18023	0.25579	0.17920	-0.09467
MARITAL	-0.00224	0.01214	1.00000	-0.04352	-0.15090	0.10374	0.27664	-0.05345	-0.11694
RACE	-0.26232	0.08031	-0.04352	1.00000	-0.28266	-0.16877	0.21417	0.13505	0.16249
ENTRY	0.02264	-0.21694	-0.15090	-0.28266	1.00000	0.19717	-0.69593	0.00860	-0.02181
HSR	0.21451	-0.18023	0.10374	-0.16877	0.19717	1.00000	-0.22495	-0.29935	-0.38365
YRGHS	-0.04570	0.25579	0.27664	0.21417	-0.69593	-0.22495	1.00000	0.03419	0.02482
SATV	-0.04530	0.17920	-0.05345	0.13505	0.00860	-0.29935	0.03419	1.00000	0.50183
SATM	-0.05585	-0.09467	-0.11694	0.16249	-0.02181	-0.38365	0.02482	0.50183	1.00000
CUMGPA	-0.15632	0.23977	-0.08795	0.24256	-0.37316	-0.58884	0.31634	0.41717	0.34790
HSS	-0.17717	0.21542	-0.00299	0.13954	-0.15009	-0.42017	0.14354	0.61595	0.48350
CURR	0.02376	-0.03573	-0.01545	0.15179	-0.13274	-0.11784	0.07262	0.21457	0.16644
FA	0.06709	0.01596	0.04482	0.06658	-0.26116	0.10290	0.23058	-0.05391	-0.06477
HOUSING	0.07528	-0.01918	0.01795	0.03750	0.16374	0.22110	-0.10821	0.08315	-0.00340
RELIGION	0.05183	0.07853	0.08458	-0.02120	-0.09381	-0.05384	0.14314	-0.01871	-0.23710
HSCURR	0.07113	-0.05516	0.02627	-0.22094	0.02414	0.15092	-0.01924	-0.14141	-0.16002
BIRTH	-0.09206	0.30942	0.22676	0.25175	-0.63282	-0.20701	0.88971	0.07818	0.07683

	CUMGPA	HSS	CURR	FA	HOUSING	RELIGION	HSCURR	BIRTH
HSIZE	-0.15632	-0.17717	0.02376	0.06709	0.07528	0.05183	0.07113	-0.09206
SEX	0.23977	0.21542	-0.03573	0.01596	-0.01918	0.07853	-0.05516	0.30942
MARITAL	-0.08795	-0.00299	-0.01545	0.04482	0.01795	0.08458	0.02627	0.22676
RACE	0.24256	0.13954	0.15179	0.06658	0.03750	-0.02120	-0.22094	0.25175
ENTRY	-0.37316	-0.15009	-0.13274	-0.26116	0.16374	-0.09381	0.02414	-0.63282
HSR	-0.58884	-0.42017	-0.11784	0.10290	0.22110	-0.05384	0.15092	-0.20701
YRGHS	0.31634	0.14354	0.07262	0.23058	-0.10821	0.14314	-0.01924	0.88971
SATV	0.41717	0.61595	0.21457	-0.05391	0.08315	-0.01871	-0.14141	0.07818
SATM	0.34790	0.48350	0.16644	-0.06477	-0.00340	-0.23710	-0.16002	0.07683
CUMGPA	1.00000	0.44809	0.01548	-0.03520	-0.25564	0.00379	-0.16027	0.31516
HSS	0.44809	1.00000	0.26458	-0.10725	-0.04210	-0.04274	-0.13193	0.20953
CURR	0.01548	0.26458	1.00000	0.03665	0.03007	-0.04543	-0.17404	0.11552
FA	-0.03520	-0.10725	0.03665	1.00000	0.17165	-0.04690	-0.01063	0.20469
HOUSING	-0.25564	-0.04210	0.03007	0.17165	1.00000	-0.10591	0.00058	-0.09747
RELIGION	0.00379	-0.04274	-0.04543	-0.04690	-0.10591	1.00000	-0.02068	0.09150
HSCURR	-0.16027	-0.13193	-0.17404	-0.01063	0.00058	-0.02068	1.00000	-0.02995
BIRTH	0.31516	0.20953	0.11552	0.20469	-0.09747	0.09150	-0.02995	1.00000

Calculation of Predicted Grade Point Average For School of Education Data

The equation determined by the SPSS REGRESSION procedure as applied to 1978-1979 School of Education Data was then used to calculate the predicted Grade Point Average for 151 School of Education Majors of the 1979-1980 graduating class. Again, both actual and predicted Grade Point Average values were written to a computer disk file.

Correlation of Predicted vs. Actual Grade Point Average for School of Education

The following Table 7 is the result of the SPSS Pearson Correlation procedure. The correlation produced a correlation coefficient of .7154 for 151 cases which is statistically significant at the .001 level.

Table 7

PEARSON CORRELATION Print-out of
Actual vs. Predicted Values
1979-1980 Entire Class

VARIABLE	CASES	MEAN	STD DEV
ACTGPA	151	2.9843	0.5283
PGPA	151	3.1633	0.3583

VARIABLES	CASES	CROSS-PROD DEV	VARIANCE-COVAR
CUMGPA PGPA	151	20.3149	0.1354

PEARSON CORRELATION COEFFICIENTS

	ACTGPA	PGPA
CUMGPA	1.0000	0.7154
	(0)	(151)
	S=0.001	S=0.001
PGPA	0.7154	1.0000
	(151)	(0)
	S=0.001	S=0.001

Stepwise Multiple Regression on Seven Most Significant Variables for Arts and Sciences or Science and Technology Data

Following the procedure used for the entire 1978-1979 class the SPSS REGRESSION procedure was run allowing only the seven best variables to be used in the equation. The output of this procedure follows in Table 8 and Table 9.

The equation determined by allowing only the seven best variables into the REGRESSION procedure is as follows:

$$\begin{aligned} \text{CUMGPA} = &-.08517 * \text{HSR} + .00145 * \text{SATV} + .19972 * \text{CURR} \\ &-.06634 * \text{ENTRY} - .22422 * \text{MARITAL} + .15233 * \text{SEX} \\ &+.00073 * \text{SATM} + 1.80995 \end{aligned}$$

Table 8

REGRESSION Print-out Including Means and Standard Deviations For 1978-1979 Schools of Arts and Sciences or Science and Technology Data Using All Variables

VARIABLE	MEAN	STANDARD DEV	CASES
HSIZE	11.0000	5.8844	148
SEX	1.3649	0.4830	148
MARITAL	1.9392	0.2398	148
RACE	2.9392	0.3345	148
ENTRY	5.1892	1.6917	148
HSR	2.8378	1.6498	148
YRGHS	74.3243	1.6546	148
SATV	412.5000	84.5225	148
SATM	444.0541	85.4586	148
CUMGPA	2.9501	0.4665	148
HSS	6.9595	0.9958	148
CURR	5.1757	0.5680	148
FA	1.5743	0.4961	148
HOUSING	2.1554	1.5853	148
RELIGION	1.6689	0.4722	148
HSCURR	1.2162	0.6755	148
BIRTH	56.3919	0.8778	148

Table 9

REGRESSION Print-out of Matrix of Correlation Coefficients
Schools of Arts and Sciences or Science and Technology
Using All variables

	HSIZE	SEX	MARITAL	RACE	ENTRY	HSR	YRGHS	SATV	SATM
HSIZE	1.00000	-0.05265	-0.05303	0.04838	-0.08610	0.02312	-0.15232	0.02804	0.00501
SEX	-0.05265	1.00000	-0.04206	-0.07225	-0.06007	-0.24110	-0.04693	-0.03916	-0.13331
MARITAL	-0.05303	-0.04206	1.00000	-0.04641	-0.00499	0.04369	0.11863	0.04112	-0.08748
RACE	0.04838	-0.07225	-0.04641	1.00000	0.10460	-0.17822	-0.02558	0.27726	0.27279
ENTRY	-0.08610	-0.06007	-0.00499	0.10460	1.00000	0.15244	-0.23108	0.00618	0.02477
HSR	0.02312	-0.24110	0.04369	-0.17822	0.15244	1.00000	-0.09524	-0.31515	-0.42087
YRGHS	-0.15232	-0.04693	0.11863	-0.02558	-0.23108	-0.09524	1.00000	0.02043	0.03153
SATV	0.02804	-0.03916	0.04112	0.27726	0.00618	-0.31515	0.02043	1.00000	0.53654
SATM	0.00501	-0.13331	-0.08748	0.27279	0.02477	-0.42087	0.03153	0.53654	1.00000
CUMGPA	-0.05772	0.26094	-0.13981	0.19011	-0.28865	-0.58985	0.06808	0.45041	0.41273
HSS	0.00813	0.10168	-0.03888	0.13549	-0.12060	-0.59204	0.04932	0.56134	0.64147
CURR	-0.05291	0.16149	-0.02092	0.05660	0.00765	-0.28879	0.04030	0.14098	0.11976
FA	-0.01631	-0.11393	0.12402	0.00692	-0.17897	0.01483	0.05331	-0.04096	-0.08898
HOUSING	0.04448	0.03205	0.13240	-0.02054	-0.01357	0.21778	-0.11271	0.04430	-0.02878
RELIGION	0.04652	-0.09310	0.00122	0.00087	-0.10840	-0.14798	-0.01836	-0.07968	0.04529
HSCURR	0.10782	-0.01409	-0.00227	0.05857	-0.05985	0.23921	-0.02665	-0.12629	-0.21561
BIRTH	-0.11853	0.10971	0.24326	-0.03412	-0.54501	-0.21887	0.41774	0.05364	0.07843

	CUMGPA	HSS	CURR	FA	HOUSING	RELIGION	HSCURR	BIRTH
HSIZE	-0.05772	0.00813	-0.05291	-0.01631	0.04448	0.04652	0.10782	-0.11853
SEX	0.26094	0.10168	0.16149	-0.11393	0.03205	-0.09310	-0.01409	0.10971
MARITAL	-0.13981	-0.03888	-0.02092	0.12402	0.13240	0.00122	-0.00227	0.24326
RACE	0.19011	0.13549	0.05660	0.00692	-0.02054	0.00087	0.05857	-0.03412
ENTRY	-0.28865	-0.12060	0.00765	-0.17897	-0.01357	-0.10840	-0.05985	-0.54501
HSR	-0.58985	-0.59204	-0.28879	0.01483	0.21778	-0.14798	0.23921	-0.21887
YRGHS	0.06808	0.04932	0.04030	0.05331	-0.11271	-0.01836	-0.02665	0.41774
SATV	0.45041	0.56134	0.14098	-0.04096	0.04430	-0.07968	-0.12629	0.05364
SATM	0.41273	0.64147	0.11976	-0.08898	-0.02878	0.04529	-0.21561	0.07843
CUMGPA	1.00000	0.44627	0.40915	0.01201	-0.10812	0.05487	-0.07609	0.25838
HSS	0.44627	1.00000	0.10889	-0.02140	-0.10803	0.10147	-0.15880	0.18952
CURR	0.40915	0.10889	1.00000	-0.02251	-0.13629	-0.08602	-0.09966	0.02470
FA	0.01201	-0.02140	-0.02251	1.00000	0.03279	0.03316	-0.04828	0.24507
HOUSING	-0.10812	-0.10803	-0.13629	0.03279	1.00000	-0.02168	-0.01253	-0.01473
RELIGION	0.05487	0.10147	-0.08602	0.03316	-0.02168	1.00000	-0.00865	0.08539
HSCURR	-0.07609	-0.15880	-0.09966	-0.04828	-0.01253	-0.00865	1.00000	-0.08651
BIRTH	0.25838	0.18952	0.02470	0.24507	-0.01473	0.08539	-0.08651	1.00000

Calculation of Predicted Grade Point Average for Arts and Sciences or Science and Technology Data

The equation determined by the SPSS REGRESSION procedure as applied to 1978-1979 School of Arts and Sciences or Science and Technology Data was then used to calculate the predicted Grade Point Average for 187 School of Arts and Sciences or Science and Technology students of the 1979-1980 graduating class. Again both actual and predicted Grade Point Average values were written to a computer disk file.

Correlation of Predicted vs. Actual Grade Point Averages for Arts and Sciences or Science and Technology Data

The following Table 10 is the result of the SPSS Pearson Correlation procedure. The correlation produced a correlation coefficient of .5947 for 187 cases which is statistically significant at the .001 level.

Table 10

PEARSON CORRELATION Print-out of
Actual vs. Predicted Values
1979-1980 Entire Class

VARIABLE	CASES	MEAN	STD DEV
CUMGPA	187	2.8888	0.4327
PGPA	187	3.1905	0.3511

VARIABLES	CASES	CROSS-PROD DEV	VARIANCE-COVAR
CUMGPA PGPA	187	16.8059	0.0904

PEARSON CORRELATION COEFFICIENTS

	ACTGPA	PGPA
CUMGPA	1.0000	0.5947
	(0)	(187)
	S=0.001	S=0.001
PGPA	0.5947	1.0000
	(187)	(0)
	S=0.001	S=0.001

Repetition of Statistical Procedures For Selected Majors

The three statistical procedures elaborated on previously for the entire college and for the school level were then extended to selected Majors. The three procedures are recapped as follows:

1. The SMR procedure is run on the subset of 1978-1979 graduating class using all sixteen independent variables. This determines the most significant variables from the entire list of independent variables.

2. SMR is run again using only the variables determined to be significant from step 1. The Standard Error of the coefficient and the F level developed for each variable in step 1 is used to make the choice cut-off.

3. Using the regression coefficients developed in step 2, a computer program is then run that takes in the data of 1979-1980 graduates in the Major being studied. This program then computes the Grade Point Average according to the equation determined for the Major from the 1978-1979 data. The predicted Grade Point Average as well as the actual Grade Point Average of the 1979-1980 subset is then written to a file. These pairs of values are then entered into the Pearson Correlation procedure.

The following tables illustrate the results of these three

procedures for selected Majors. Only those Majors in which the sample size was large enough were considered. In no case was a group considered if there were less than 25 graduates in the group. For the sake of brevity these results are presented only in summary form.

CHAPTER 5

FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS

Purpose of The Study

The purpose of this study was to determine the feasibility of predicting a student's success at Gulf State College. Three steps were taken for several subsets of the graduating class of 1978-1979. These steps were: (1) Stepwise Multiple Regression on the admissions data to determine a predictor equation, with cumulative Grade Point Average at the time of graduation being the dependent variable; (2) the development of a computer program to apply the equation to a second set of data, the class of 1979-1980, to test and assess the validity of the equation; (3) Pearson Correlation on the predicted and actual Grade Point Averages to measure the strength of the relationship between predicted and actual values.

Findings

The following are findings on the basis of the analyses of the data using the statistical procedures of Stepwise Multiple Regression and Pearson Correlation.

1. The six variables, of the sixteen tested, that seem to contribute the most to the prediction of cumulative Grade Point Average for the entire graduating class are, in the order of their importance, as follows:

High School Rank

SAT Verbal Scores

Year and Term of Entry

Sex

Marital Status

Type of Housing

2. The seven variables of the sixteen tested that seem to contribute the most to the prediction of cumulative Grade Point Average for the student majoring in the School of Education are, in order of their importance, as follows:

High School Rank

Year and Term of Entry

SAT Verbal Score

Curriculum within the School of Education

Type of Housing

Race

High School Stanine

3. The seven variables of the sixteen tested that seem to contribute the most to the prediction of the cumulative Grade Point Average for the students majoring in the Schools of Arts and Sciences or Science and Technology , in order of their importance, are as follows:

High School Rank

SAT Verbal Score

Curriculum within Schools

Year and Term of Entry

Marital Status

Sex

SAT Math Score

4. The equation developed for the data of the entire class was significant at the .01 level and produced an R-Squared value of .49174.

5. The equation developed for the data of the School of Education Student was significant at the .01 level and produced an R-Squared value of .53870.

6. The equation developed for the data of the Schools of Arts and Sciences or Science and Technology was significant at the .01 level and produced an R-Squared value of .57693.

7. The SAT Math Score contributed only to the equation of the Schools of Arts and Sciences or Science and Technology.

8. High School Rank was the most important single factor in all subgroups considered.

9. The length of time in school as measured by the variable ENTRY was significant in all three equations.

10. Race seemed to be a factor only in the non-education equation.

11. Correlations of predicted versus actual Grade Point Average values of the test group were significant at the .001 level for all equations developed.

Conclusions

On the basis of the material in this study, the following

conclusions appear warranted:

1. There was a significant correlation between predicted Grade Point Average and actual Grade Point Average using the equation developed for the entire 1978-1979 population when tested against the 1979-1980 population. Apparently, a prediction equation can be developed for predicting success as measured by cumulative Grade Point Average at the time of graduation for students entering Gulf State College in general. Therefore it appears warranted to conclude that objective one of this study has been met and that the results indicate that a significant college-wide prediction equation can be developed.

2. There was a significant correlation between predicted Grade Point Average and actual Grade Point Average using the equation developed for the 1978-1979 School of Education subset of the population when tested against the School of Education subset of the 1979-1980 population. Apparently, a prediction equation can be developed for a specific school of the college. Since this level of significance was also reached when testing the data of the Schools of Arts and Sciences or Science and Technology it seems apparent that a significant equation can be developed at the school level for Gulf State College entering freshmen. Therefore it appears warranted to conclude that objective three of this study has been met and that the results indicate that a significant prediction equation can be developed at the level of School within Gulf State College.

3. The findings of this study indicated that six variables of the 16 considered are most significant in predicting student

success at Gulf State College. Therefore it appears warrented to conclude that objective two of this study has been met and that the most significant variables can be determined for all students in a graduating class at Gulf State College.

4. The results of the REGRESSION procedure when applied to the data at the school level produced different variables that were significant at F levels greater than four. Therefore it appears warranted to conclude that objective five has been met and that the results indicate that there is a difference in variables at the School level when compared to the entire College.

5. The results of the REGRESSION procedure when applied to the data at the major level also resulted in significant prediction equations when the minimum number of data elements was held at 25. Therefore it appears warranted to conclude that objectives four and six have been met and that the results of the study indicate that a regression equation can be developed at the major level if sufficient data are available and that the variables that are significant may be different from those at the School or entire College level.

6. The technique tested in this study produced viable results at levels of significance that indicate that regression equations can be developed which will predict at a significant level the success a student will achieve at Gulf State College. Therefore, it is reasonable to accept the Null hypothesis.

7. Contrary to the research done by Perrone (1978), at Gulf State College the SAT scores are valid predictors of academic success beyond the first year of college.

8. In support of the results summarized by Pristo (1979), some variables effectively predict success in one environment and are not significant in another environment. SATV was significant for some Schools and Majors while SATM was an effective predictor in some other School or Major.

9. Stepwise Multiple Regression can be used as an effective tool in predicting academic success and can be used to attempt to increase the retention rate at Gulf State College. In light of the future outlook for higher education as reported by the Carnegie Council (1980), colleges must look toward keeping the internal market of students on campus due to the prospects of a declining market of new students. Any tool which promises help in this area must be considered.

Recommendations

On the basis of the material contained in this study, the following recommendations appear warranted.

Development of Additional Equations

1. The data from the class of 1979-1980 should be merged with the class of 1978-1979.

2. The data of the class of 1980-1981 should be added to this data base as soon as available.

3. All additional data from future graduating classes should

be added to this data base once each year.

4. A time frame for purging old data should be determined, to keep the data base relevant.

5. With the combination of three years of data it would then be reasonable to generate separate equations for the School of Arts and Sciences and the emerging School of Science and Technology, and this should be done.

6. This larger data base will permit predictor equations to be generated for many of the Majors presently in existence. They should be generated.

7. A service should be provided to prospective students, who are undecided as to major, which would forecast their cumulative Grade Point Average in various Schools and majors.

8. This same service should be offered to students who are being academically dismissed from one major and wish to consider a new one.

Future Studies

As a result of the findings of this study that seem to support the feasibility of predicting success in Gulf State College students according to certain intellectual and demographic variables, a future study should deal with the students who do not graduate or who do not enter as freshmen.

1. A study should be conducted to determine the predictor equation for students who are academically dismissed. Significant

variables should be studied.

2. A study should be conducted to determine the predictor equation for students who simply drop out even though their Grade Point Average is satisfactory. Significant variables should be studied.

3. A study should be conducted to determine predictor equations for students who transferred into Gulf State College instead of starting as first-time freshmen.

4. A study should be conducted after this system is in place for several years to determine if the attrition rate has been altered due to the use of this technique as a counseling tool. This study could begin sooner if an entering class was divided into two groups and one group was given the use of predictor equations in their counseling and the other was not. A comparison of the success of the test and control group could then be made.

5. A study should be conducted to determine if there is a significant difference in the success of part-time students as opposed to students who attend full-time.

6. In this study the size of the high school was nearly homogeneous. In any future study, some measure other than high school size to assess the effect of the high school background should be considered.

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APPENDIX A

CORRELLATION AND REGRESSION ANALYSIS PROCEDURES

The statistical techniques which were used in the study were the following:

1. One-way analysis procedure
2. Pearson Product-Moment Correlation
3. Stepwise Multiple Regression

Correlation Analysis provides a method of describing the strength of association or relationship between two variables. This relationship is described by a single summary statistic called the correlation coefficient. The researcher will consider in this study only correlation coefficients which measure association between two variables which are linearly related and at least interval in scale.

If the variables are of a data type which is at least interval in scale, the Pearson Correlation procedure may be used. By interval in scale, we mean that the variables are measured in established units. The researcher shall use Pearson Correlation when we are dealing with variables such as the cumulative Grade Point Average, which is measured on a scale of 0 to 4.

When we use Pearson Correlation with correlation coefficient "r" we will be measuring the strength of association between two linear variables. One variable may be treated as independent and the other as dependent or they both may belong to a set of independent or to a set of dependent variables. In any case, the correlation coefficient "r" may vary from -1 to +1. A coefficient of zero indicates that there is no linear association or relationship between the variables; a +1 value of r or rho indicates "perfect" positive correlation (i.e. an increase in one variable is always accompanied by a relative

increase in the other variable); a correlation coefficient of -1 indicates a "perfect" negative relationship (i.e. an increase in one variable is always associated with the same relative decrease in the other variable).

Multiple Regression is a statistical procedure which extends the use of the two-variable linear correlation procedure to the case of three or more variables. These variables may be higher order transformations of linear variables. Generally, the basic goal of Multiple Regression is to produce a combination of independent variables which will give the highest possible measure of association with some dependent variable. This combination of independent variables written in the form

$$c+b(1)I(1)+b(2)I(2)+...+b(N)I(N)$$

is a function of the independent variables I(k), k=1 to n. Each independent variable is multiplied by the regression coefficient b(k) and the regression constant c is then added. The procedure known as Multiple Regression produces a set of coefficients and constant c which are optimum. By optimum we mean the set of coefficients b and constant c which will minimize the differences between the actual values of the dependent variable and the values calculated or predicted by the regression equation. The difference for any predicted and actual value is called the residual. Stated in equation form we have the following:

$$D=c+b(1)I(1)+b(2)I(2)+ \ldots +b(N)I(N)+R$$

The actual value of the dependent variable D is equal to the value predicted by the function plus the residual R. Multiple Regression

Analysis attempts to choose the set of coefficients b and constant c which minimizes the sum of the squares of the residuals R. Stated in another manner, R has mean zero and the smallest possible standard deviation for any function of the independent variables. Based upon this optimization of function in terms of error (size of residuals) the regression equation offers the best (in the sense of least expected error) prediction of the value of the dependent variable for a given set of values of the independent variables.

Once the regression equation is developed, each of the coefficients of the independent variables gives information about the relationship between the dependent variables and the particular independent variable whose coefficient is being examined. A positive coefficient implies that all other things being equal, the larger the value of the independent variable, the larger the value of the dependent variable. Similiarly, a negative coefficient implies that the larger the value of the independent variable, the smaller the value of the dependent variable. In addition to the signs of the coefficients, an important consideration is their size. Generally speaking, the larger the magnitude of the coefficient, the more important the variable is in predicting the value of the dependent variable. However, if the units of the independent variables are different, this relationship may not hold true. To insure that the size of the coefficients have the same meaning, the regression equation is normalized. In a normalized regression equation, all variables are expressed in standard units. The coefficients in the normalized equation reflect the strength of the relationships as well

as the direction which is indicated by their signs.

Thus far we have considered only the case where each independent variable has been linear (i.e. raised only to the first power). By considering independent variables which are transformations of these linear variables (i.e. squares,cubes, and other powers), the regression equation may become a polynomial. Again the coefficients may be examined in the manner outlined above to explain the relationships between the independent and dependent variables.

Finally let us consider the procedure known as Stepwise Multiple Regression which is a variation of Multiple Regression. This procedure provides a means of selecting the best possible equation with the fewest number of independent variables. As an example of this procedure consider a hypothetical case in which one desires to construct a prediction equation based upon 15 independent variables. For ease of use, it is also desirable to limit the number of variables to 6 or fewer. A solution could be found by constructing all possible equations using any combination of 6 of the 15 variables. This would require the construction of as many equations as there are combinations of 15 items taken 6 at a time. This would mean that over 5000 equations would have to be constructed and compared for effectiveness. This is obviously not a practical solution, although it must be acknowledged that this method would lead to the optimum solution. The procedure known as Stepwise Multiple Regression offers an efficient method of arriving at a solution which is nearly optimum. That is to say that the solution is close enough to the optimum solution to be useful in most cases.

The method proceeds in this manner. The independent variable is found which explains the most variance in the dependent variable. In other words, the best predictor variable is found. The second variable is added to the equation by choosing the best predictor given that the first variable is already in the equation. Variables are added in this manner, step by step, until the desired number of variables are entered into the equation, or until no additional variables are significant in explaining the variance in the dependent variable (i.e. they do not add to the equation's ability to predict the value of the dependent variable). At each step the optimum variable is selected, given the other variables already selected. Before a variable is added to the regression equation, the size of its normalized coefficient is tested to determine if it will make a significant contribution to the equation. If it will not contribute significantly, it is not added to the equation. Since all other variables not yet added will contribute even less, the process is terminated at this point. The equation may then be used as a predictor equation for the dependent variable for given values of the independent variables.

The output of the SPSS procedure REGRESSION includes a statistical summary of the total prediction equation. This includes multiple r, r-square and the standard error. The standard error can be interpreted as the typical size of a residual. The r-square statistic is the fraction of the variable in the dependent variable explained by the regression equation. Among the options available to the SPSS user are the options to plot the standardized residuals and

to compute the Durban-Watson statistic for the residuals. The Durban-Watson statistic is based upon the differences between the residuals for consecutive cases in the file and is used to test for first order auto-correlation. Most frequently when used with regression techniques, the primary use of this statistic is to test the customary assumption of serial uncorrelatedness of residuals.

APPENDIX B

SELECTED ADDITIONAL TABLES

Table 11

Control Statement Setup For SPSS
REGRESSION Procedure

```
.STATISTICAL PACKAGE FOR THE SOCIAL SCIENCES SPSSH - VERSION 5.01                    PAGE    1

     RUN NAME        CERULLO: STEPWISE MULTIPLE REGRESSION RUN USING ALL VARIABLES
     FILE NAME       $1978-1979 GRADUATES OF GSC WHO ENTERED AS FIRST TIME FRESHMEN
     # OF CASES      411
     INPUT MEDIUM    CARD
     VARIABLE LIST   HSIZE,SEX,MARITAL,RACE,ENTRY,HSR,YRGHS,
                     SATV,SATM,CUMGPA,HSS,CURR,FA,HOUSING,RELIGION,HSCURR,
                     BIRTH
     INPUT FORMAT    FIXED(32X,F2.0,4X,2A1,F1.0,2X,F3.0,2X,F1.0,F2.0,1X,2F3.0,F3.2,
    ACCORDING TO YOUR INPUT FORMAT, VARIABLES ARE TO BE READ AS FOLLOWS
    VARIABLE  FORMAT  RECORD    COLUMNS

    HSIZE     F 2. 0      1    33- 34
    SEX         A 1       1    39- 39
    MARITAL     A 1       1    40- 40
    RACE      F 1. 0      1    41- 41
    ENTRY     F 3. 0      1    44- 46
    HSR       F 1. 0      1    49- 49
    YRGHS     F 2. 0      1    50- 51
    SATV      F 3. 0      1    53- 55
    SATM      F 3. 0      1    56- 58
    CUMGPA    F 3. 2      1    59- 61
                    2F1.0,3X,2F1.0,A4,F1.0,2X,F2.0)
    HSS       F 1. 0      1    62- 62
    CURR      F 1. 0      1    63- 63
    FA        F 1. 0      1    67- 67
    HOUSING   F 1. 0      1    68- 68
    RELIGION    A 4       1    69- 72
    HSCURR    F 1. 0      1    73- 73
    BIRTH     F 2. 0      1    76- 77
```

Table 12

Stepwise Multiple Regression Procedure
Variable 1 Added To Equation
High School Rank

********** MULTIPLE REGRESSION ********** VARIABLE LIST 1
REGRESSION LIST 1

DEPENDENT VARIABLE.. CUMGPA CUMULATIVE G.P.A.

VARIABLE(S) ENTERED ON STEP NUMBER 1.. HSR HIGH SCHOOL RANK

MULTIPLE R	0.58937	ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE	F
R SQUARE	0.34735	REGRESSION	1.	20.89208	20.89208	168.18252
STANDARD ERROR	0.35245	RESIDUAL	316.	39.25436	0.12422	

VARIABLES IN THE EQUATION

VARIABLE	B	BETA	STD ERROR B	F
HSR	-0.16242	-0.58937	0.01252	168.183
(CONSTANT)	3.40979			

VARIABLES NOT IN THE EQUATION

VARIABLE	BETA IN	PARTIAL	TOLERANCE	F
HSIZE	-0.03466	-0.04252	0.98240	0.571
SEX	0.12603	0.15301	0.96204	7.552
MARITAL	-0.07041	-0.08692	0.99447	2.398
RACE	0.11747	0.14321	0.97008	6.596
ENTRY	-0.23264	-0.28367	0.97044	27.567
YRGHS	0.06637	0.08146	0.98319	2.104
SATV	0.27438	0.32325	0.90582	36.754
SATM	0.16793	0.19051	0.83993	11.863
HSS	0.20000	0.21380	0.74589	15.089
CURR	-0.00033	-0.00040	0.98502	0.000
FA	0.02381	0.02942	0.99636	0.273
HOUSING	-0.04944	-0.05980	0.95492	1.131
RELIGION	-0.02990	-0.03683	0.99030	0.428
HSCURR	-0.00679	-0.00825	0.96296	0.021
BIRTH	0.16792	0.20327	0.95636	13.576

Table 13

Stepwise Multiple Regression Procedure
Variable 2 Added To Equation
SAT Score - Verbal

********** MULTIPLE REGRESSION ********** VARIABLE LIST 1
REGRESSION LIST 1

DEPENDENT VARIABLE.. CUMGPA CUMULATIVE G.P.A.

VARIABLE(S) ENTERED ON STEP NUMBER 2.. SATV SAT VERBAL

MULTIPLE R	0.64463		ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE	F
R SQUARE	0.41555		REGRESSION	2.	24.99371	12.49685	111.98304
STANDARD ERROR	0.33406		RESIDUAL	315.	35.15273	0.11160	

VARIABLES IN THE EQUATION

VARIABLE	B	BETA	STD ERROR B	F
HSR	-0.13922	-0.30516	0.01247	124.585
SATV	0.00143	0.27438	0.00024	36.754
(CONSTANT)	2.77942			

VARIABLES NOT IN THE EQUATION

VARIABLE	BETA IN	PARTIAL	TOLERANCE	F
HSIZE	-0.03530	-0.04577	0.98239	0.659
SEX	0.13705	0.17568	0.96046	10.000
MARITAL	-0.07436	-0.09698	0.99424	2.981
RACE	0.07834	0.09972	0.94689	3.154
ENTRY	-0.25607	-0.32886	0.96392	38.077
YRGHS	0.07668	0.09939	0.98172	3.132
SATM	0.04318	0.04565	0.65319	0.656
HSS	0.05413	0.05173	0.53372	0.842
CURR	-0.05793	-0.07354	0.94187	1.708
FA	0.03238	0.04225	0.99530	0.562
HOUSING	-0.09687	-0.12208	0.92818	4.750
RELIGION	-0.00372	-0.00481	0.98041	0.007
HSCURR	0.01634	0.02089	0.95576	0.137
BIRTH	0.17214	0.22018	0.95612	15.997

Table 14

Stepwise Multiple Regression Procedure
Variable 3 Added To Equation
Year and Term of Entry

* MULTIPLE REGRESSION * * * * * * * * * * * * * VARIABLE LIST 1
REGRESSION LIST 1

DEPENDENT VARIABLE.. CUMGPA CUMULATIVE G.P.A.

VARIABLE(S) ENTERED ON STEP NUMBER 3.. ENTRY ENTRY -YR-TERM

MULTIPLE R	0.69192		ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE	F
R SQUARE	0.47876		REGRESSION	3.	28.79543	9.59848	96.13478
STANDARD ERROR	0.31598		RESIDUAL	314.	31.35100	0.09984	

VARIABLES IN THE EQUATION

VARIABLE	B	BETA	STD ERROR B	F
HSR	-0.12525	-0.45447	0.01201	108.701
SATV	0.00154	0.29610	0.00022	47.519
ENTRY	-0.06621	-0.25607	0.01073	38.077
(CONSTANT)	3.02763			

VARIABLES NOT IN THE EQUATION

VARIABLE	BETA IN	PARTIAL	TOLERANCE	F
HSIZE	-0.05025	-0.06887	0.97905	1.492
SEX	0.10569	0.14227	0.94446	6.467
MARITAL	-0.10006	-0.13752	0.98467	6.034
RACE	0.05580	0.07491	0.93939	1.766
YRGHS	-0.01869	-0.02387	0.85021	0.178
SATM	0.06263	0.06998	0.65070	1.540
HSS	0.01683	0.01693	0.52739	0.090
CURR	-0.06882	-0.09243	0.94025	2.697
FA	-0.02856	-0.03835	0.94009	0.461
HOUSING	-0.08669	-0.11559	0.92673	4.239
RELIGION	-0.02550	-0.03484	0.97332	0.380
HSCURR	0.00470	0.00635	0.95380	0.013
BIRTH	0.03415	0.03762	0.63267	0.444

Table 15

Stepwise Multiple Regression Procedure
Variable 4 Added To Equation
Sex

********** MULTIPLE REGRESSION ********** VARIABLE LIST 1
REGRESSION LIST 1

DEPENDENT VARIABLE.. CUMGPA CUMULATIVE G.P.A.

VARIABLE(S) ENTERED ON STEP NUMBER 4.. SEX SEX

MULTIPLE R	0.69950
R SQUARE	0.48931
STANDARD ERROR	0.31327

ANALYSIS OF VARIANCE

	DF	SUM OF SQUARES	MEAN SQUARE	F
REGRESSION	4.	29.43003	7.35751	74.97295
RESIDUAL	313.	30.71641	0.09814	

VARIABLES IN THE EQUATION

VARIABLE	B	BETA	STD ERROR B	F
HSR	-0.11994	-0.43522	0.01209	98.402
SATV	0.00155	0.29936	0.00022	49.372
ENTRY	-0.06269	-0.24246	0.01073	34.150
SEX	0.09194	0.10569	0.03615	6.467
(CONSTANT)	2.84971			

VARIABLES NOT IN THE EQUATION

VARIABLE	BETA IN	PARTIAL	TOLERANCE	F
HSIZE	-0.04629	-0.06404	0.97758	1.285
MARITAL	-0.09910	-0.13760	0.98459	6.022
RACE	0.05901	0.08000	0.93855	2.010
YRGHS	-0.02008	-0.02591	0.85008	0.210
SATM	0.10327	0.11247	0.60567	3.997
HSS	0.00802	0.00814	0.52533	0.021
CURR	-0.05431	-0.07288	0.91958	1.666
FA	-0.02206	-0.02987	0.93646	0.279
HOUSING	-0.08896	-0.11981	0.92632	4.544
RELIGION	-0.02377	-0.03282	0.97305	0.336
HSCURR	0.00426	0.00582	0.95378	0.011
BIRTH	0.01455	0.01600	0.61758	0.080

Table 16

Stepwise Multiple Regression Procedure
Variable 5 Added To Equation
Marital Status

************************* MULTIPLE REGRESSION *************** VARIABLE LIST 1
REGRESSION LIST 1

DEPENDENT VARIABLE.. CUMGPA CUMULATIVE G.P.A.

VARIABLE(S) ENTERED ON STEP NUMBER 5.. MARITAL MARITAL STATUS -AT TIME OF GRAD

		ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE	F
MULTIPLE R	0.70638					
R SQUARE	0.49898	REGRESSION	5.	30.01164	6.00233	62.14500
STANDARD ERROR	0.31078	RESIDUAL	312.	30.13479	0.09659	

VARIABLES IN THE EQUATION

VARIABLE	B	BETA	STD ERROR B	F
HSR	-0.11729	-0.42558	0.01204	94.831
SATV	0.00157	0.30172	0.00022	50.934
ENTRY	-0.06527	-0.25245	0.01069	37.253
SEX	0.09112	0.10475	0.03587	6.453
MARITAL	-0.18184	-0.09910	0.07410	6.022
(CONSTANT)	3.20424			

VARIABLES NOT IN THE EQUATION

VARIABLE	BETA IN	PARTIAL	TOLERANCE	F
HSIZE	-0.05027	-0.07016	0.97607	1.539
RACE	0.05458	0.07463	0.93668	1.742
YRGHS	-0.00385	-0.00496	0.83018	0.008
SATH	0.09172	0.10035	0.59979	3.164
HSS	0.00860	0.00880	0.52532	0.024
CURR	-0.05578	-0.07556	0.91939	1.786
FA	-0.01633	-0.02230	0.93344	0.155
HOUSING	-0.08293	-0.11254	0.92275	3.990
RELIGION	-0.01929	-0.02686	0.97105	0.224
HSCURR	0.00387	0.00534	0.95377	0.009
BIRTH	0.04888	0.05255	0.57899	0.861

Table 17

Stepwise Multiple Regression Procedure
Variable 6 Added To Equation
Housing - Last Term

************************* MULTIPLE REGRESSION ************** VARIABLE LIST 1
REGRESSION LIST 1

DEPENDENT VARIABLE.. CUMGPA CUMULATIVE G.P.A.

VARIABLE(S) ENTERED ON STEP NUMBER 6.. HOUSING HOUSING -LAST TERM

MULTIPLE R	0.71086		ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE	F
R SQUARE	0.50532		REGRESSION	6.	30.39334	5.06556	52.94872
STANDARD ERROR	0.30930		RESIDUAL	311.	29.75309	0.09567	

VARIABLES IN THE EQUATION

VARIABLE	B	BETA	STD ERROR B	F
HSR	-0.11145	-0.40441	0.01234	81.606
SATV	0.00164	0.31563	0.00022	54.772
ENTRY	-0.06425	-0.24851	0.01066	36.362
SEX	0.09265	0.10651	0.03571	6.733
MARITAL	-0.17267	-0.09411	0.07389	5.461
HOUSING	-0.02404	-0.08293	0.01204	3.990
(CONSTANT)	3.17959			

VARIABLES NOT IN THE EQUATION

VARIABLE	BETA IN	PARTIAL	TOLERANCE	F
HSIZE	-0.04887	-0.06864	0.97577	1.468
RACE	0.05698	0.07838	0.93591	1.916
YRGHS	-0.01218	-0.01571	0.82285	0.076
SATM	0.09631	0.10595	0.59868	3.519
HSS	0.00434	0.00446	0.52452	0.006
CURR	-0.05012	-0.06816	0.91473	1.447
FA	-0.00768	-0.01049	0.92295	0.034
RELIGION	-0.02243	-0.03141	0.96961	0.306
HSCURR	0.00063	0.00088	0.95227	0.000
BIRTH	0.04681	0.05063	0.57876	0.797

Table 18

Stepwise Multiple Regression Procedure
Variable 7 Added To Equation
Sat - Mathematical

********** MULTIPLE REGRESSION ********** VARIABLE LIST 1
REGRESSION LIST 1

DEPENDENT VARIABLE.. CUMGPA CUMULATIVE G.P.A.

VARIABLE(S) ENTERED ON STEP NUMBER 7.. SATM SAT MATH

MULTIPLE R	0.71476	ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE	F
R SQUARE	0.51088	REGRESSION	7.	30.72733	4.38962	46.25503
STANDARD ERROR	0.30806	RESIDUAL	310.	29.41911	0.09490	

VARIABLES IN THE EQUATION

VARIABLE	B	BETA	STD ERROR B	F
HSR	-0.10317	-0.37437	0.01306	62.447
SATV	0.00142	0.27335	0.00025	32.314
ENTRY	-0.06459	-0.24979	0.01061	37.024
SEX	0.11106	0.12769	0.03689	9.063
MARITAL	-0.15865	-0.08646	0.07397	4.600
HOUSING	-0.02501	-0.08626	0.01200	4.344
SATM	0.00048	0.09631	0.00026	3.519
(CONSTANT)	2.98447			

VARIABLES NOT IN THE EQUATION

VARIABLE	BETA IN	PARTIAL	TOLERANCE	F
HSIZE	-0.04798	-0.06777	0.97563	1.426
RACE	0.05036	0.06936	0.92808	1.494
YRGHS	-0.01307	-0.01695	0.82275	0.089
HSS	-0.03096	-0.03044	0.47298	0.287
CURR	-0.05302	-0.07246	0.91353	1.631
FA	-0.00359	-0.00492	0.92037	0.007
RELIGION	-0.01229	-0.01715	0.95140	0.091
HSCURR	0.00792	0.01100	0.94377	0.037
BIRTH	0.03800	0.04115	0.57372	0.524

Table 19

Stepwise Multiple Regression Procedure
Variable 8 Added To Equation
School At GSC

************************** MULTIPLE REGRESSION ************** VARIABLE LIST 1
REGRESSION LIST 1

DEPENDENT VARIABLE.. CUMGPA CUMULATIVE G.P.A.

VARIABLE(S) ENTERED ON STEP NUMBER 8.. CURR SCHOOL AT CSC

MULTIPLE R	0.71655		ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE	F
R SQUARE	0.51344		REGRESSION	8.	30.88178	3.86022	40.75935
STANDARD ERROR	0.30775		RESIDUAL	309.	29.26466	0.09471	

VARIABLES IN THE EQUATION

VARIABLE	B	BETA	STD ERROR B	F
HSR	-0.10430	-0.37846	0.01307	63.656
SATV	0.00147	0.28320	0.00025	33.882
ENTRY	-0.06548	-0.25326	0.01063	37.971
SEX	0.10462	0.12028	0.03720	7.910
MARITAL	-0.16006	-0.08723	0.07391	4.690
HOUSING	-0.02394	-0.08258	0.01202	3.969
SATM	0.00049	0.09869	0.00026	3.698
CURR	-0.01074	-0.05302	0.00841	1.631
(CONSTANT)	3.02174			

VARIABLES NOT IN THE EQUATION

VARIABLE	BETA IN	PARTIAL	TOLERANCE	F
HSIZE	-0.05031	-0.07117	0.97379	1.568
RACE	0.05257	0.07255	0.92655	1.630
YRGHS	-0.01469	-0.01909	0.82207	0.112
HSS	-0.02443	-0.02399	0.46904	0.177
FA	-0.00325	-0.00447	0.92033	0.006
RELIGION	-0.01609	-0.02245	0.94653	0.155
HSCURR	0.00231	0.00320	0.93275	0.003
BIRTH	0.03942	0.04280	0.57347	0.565

Table 20

Stepwise Multiple Regression Procedure
Variable 9 Added To Equation
Race

************************* MULTIPLE REGRESSION ************** VARIABLE LIST 1
REGRESSION LIST 1

DEPENDENT VARIABLE.. CUMGPA CUMULATIVE G.P.A.

VARIABLE(S) ENTERED ON STEP NUMBER 9.. RACE RACE

MULTIPLE R	0.71833	ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE	F
R SQUARE	0.51600	REGRESSION	9.	31.03580	3.44842	36.48543
STANDARD ERROR	0.30743	RESIDUAL	308.	29.11063	0.09452	

VARIABLES IN THE EQUATION

VARIABLE	B	BETA	STD ERROR B	F
HSR	-0.10320	-0.37446	0.01309	62.172
SATV	0.00144	0.27768	0.00025	32.385
ENTRY	-0.06417	-0.24818	0.01067	36.197
SEX	0.10462	0.12028	0.03716	7.926
MARITAL	-0.15661	-0.08535	0.07388	4.494
HOUSING	-0.02428	-0.08374	0.01201	4.088
SATM	0.00047	0.09277	0.00026	3.248
CURR	-0.01117	-0.05516	0.00841	1.766
RACE	0.06808	0.05257	0.05333	1.630
(CONSTANT)	2.83156			

VARIABLES NOT IN THE EQUATION

VARIABLE	BETA IN	PARTIAL	TOLERANCE	F
HSIZE	-0.04474	-0.06299	0.95943	1.223
YRGHS	-0.01591	-0.02072	0.82168	0.132
HSS	-0.01919	-0.01884	0.46658	0.109
FA	-0.00532	-0.00733	0.91892	0.017
RELIGION	-0.01597	-0.02233	0.94652	0.153
HSCURR	0.00464	0.00644	0.93092	0.013
BIRTH	0.03534	0.03839	0.57117	0.453

Table 21

Stepwise Multiple Regression Procedure
Variable 10 Added To Equation
High School Size

********** MULTIPLE REGRESSION ********** VARIABLE LIST 1
REGRESSION LIST 1

DEPENDENT VARIABLE.. CUMGPA CUMULATIVE G.P.A.

VARIABLE(S) ENTERED ON STEP NUMBER 10.. HSIZE HIGH SCHOOL SIZE X 100

MULTIPLE R	0.71967	ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE	F
R SQUARE	0.51792	REGRESSION	10.	31.15129	3.11513	32.98292
STANDARD ERROR	0.30732	RESIDUAL	307.	28.99514	0.09445	

VARIABLES IN THE EQUATION

VARIABLE	B	BETA	STD ERROR B	F
HSR	-0.10172	-0.36911	0.01315	59.834
SATV	0.00145	0.27913	0.00025	32.723
ENTRY	-0.06514	-0.25192	0.01070	37.073
SEX	0.10268	0.11804	0.03719	7.623
MARITAL	-0.16043	-0.08743	0.07393	4.708
HOUSING	-0.02396	-0.08264	0.01201	3.983
SATM	0.00047	0.09281	0.00026	3.253
CURR	-0.01153	-0.05694	0.00841	1.880
RACE	0.06087	0.04700	0.05371	1.284
HSIZE	-0.00292	-0.04474	0.00264	1.223
(CONSTANT)	2.89632			

VARIABLES NOT IN THE EQUATION

VARIABLE	BETA IN	PARTIAL	TOLERANCE	F
YRGHS	-0.02033	-0.02644	0.81529	0.214
HSS	-0.02375	-0.02331	0.46434	0.166
FA	-0.00462	-0.00637	0.91870	0.012
RELIGION	-0.01296	-0.01812	0.94213	0.100
HSCURR	0.00718	0.00996	0.92807	0.030
BIRTH	0.02971	0.03217	0.56519	0.317

Table 22

Stepwise Multiple Regression Procedure
Variable 11 Added To Equation
Year Of Birth

********** MULTIPLE REGRESSION ********** VARIABLE LIST 1
REGRESSION LIST 1

DEPENDENT VARIABLE.. CUMGPA CUMULATIVE G.P.A.

VARIABLE(S) ENTERED ON STEP NUMBER 11.. BIRTH YEAR OF BIRTH

			DF	SUM OF SQUARES	MEAN SQUARE	F
MULTIPLE R	0.72002	ANALYSIS OF VARIANCE				
R SQUARE	0.51842	REGRESSION	11.	31.18130	2.83466	29.94660
STANDARD ERROR	0.30766	RESIDUAL	306.	28.96513	0.09466	

VARIABLES IN THE EQUATION

VARIABLE	B	BETA	STD ERROR B	F
HSR	-0.10133	-0.36768	0.01318	59.071
SATV	0.00145	0.27946	0.00025	32.723
ENTRY	-0.06095	-0.23575	0.01303	21.879
SEX	0.09887	0.11367	0.03784	6.828
MARITAL	-0.17158	-0.09351	0.07662	5.015
HOUSING	-0.02379	-0.08207	0.01202	3.916
SATM	0.00045	0.09027	0.00026	3.047
CURR	-0.01160	-0.05728	0.00842	1.898
RACE	0.05933	0.04581	0.05384	1.214
HSIZE	-0.00276	-0.04239	0.00265	1.084
BIRTH	0.01426	0.02971	0.02532	0.317
(CONSTANT)	2.10380			

VARIABLES NOT IN THE EQUATION

VARIABLE	BETA IN	PARTIAL	TOLERANCE	F
YRGHS	-0.03747	-0.04419	0.66971	0.597
HGS	-0.02530	-0.02481	0.46338	0.188
FA	-0.00810	-0.01108	0.90004	0.037
RELIGION	-0.01404	-0.01962	0.94015	0.117
HSCURR	0.00792	0.01099	0.92714	0.037

Table 23

Stepwise Multiple Regression Procedure
Variable 12 Added To Equation
Year Graduated High School

************************** MULTIPLE REGRESSION *************** VARIABLE LIST 1
REGRESSION LIST 1

DEPENDENT VARIABLE.. CUMGPA CUMULATIVE G.P.A.

VARIABLE(S) ENTERED ON STEP NUMBER 12.. YRGHS YR GRAD HIGH SCHOOL

MULTIPLE R	0.72067	ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE	F
R SQUARE	0.51936	REGRESSION	12.	31.23786	2.60316	27.46460
STANDARD ERROR	0.30787	RESIDUAL	305.	28.90857	0.09478	

VARIABLES IN THE EQUATION

VARIABLE	B	BETA	STD ERROR B	F
HSR	-0.10154	-0.36844	0.01320	59.211
SATV	0.00145	0.27978	0.00025	32.753
ENTRY	-0.06173	-0.23874	0.01308	22.277
SEX	0.09676	0.11124	0.03796	6.497
MARITAL	-0.16875	-0.09197	0.07676	4.833
HOUSING	-0.02462	-0.08493	0.01208	4.156
SATM	0.00045	0.08908	0.00026	2.961
CURR	-0.01188	-0.05868	0.00843	1.986
RACE	0.05834	0.04544	0.05388	1.193
HSIZE	-0.00286	-0.04395	0.00266	1.161
BIRTH	0.02338	0.04873	0.02795	0.700
YRGHS	-0.01275	-0.03747	0.01651	0.597
(CONSTANT)	2.54774			

VARIABLES NOT IN THE EQUATION

VARIABLE	BETA IN	PARTIAL	TOLERANCE	F
HSS	-0.02749	-0.02696	0.46234	0.221
FA	-0.00880	-0.01204	0.89963	0.044
RELIGION	-0.01504	-0.02102	0.93925	0.134
HSCURR	0.00792	0.01101	0.92714	0.037

Table 24

Stepwise Multiple Regression Procedure
Variable 13 Added To Equation
High School Stanine

************************* MULTIPLE REGRESSION ************** VARIABLE LIST 1
REGRESSION LIST 1

DEPENDENT VARIABLE.. CUMGPA CUMULATIVE G.P.A.

VARIABLE(S) ENTERED ON STEP NUMBER 13.. HSS HIGH SCHOOL STANINE

MULTIPLE R	0.72091	ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE	F
R SQUARE	0.51971	REGRESSION	13.	31.25888	2.40453	25.30422
STANDARD ERROR	0.30826	RESIDUAL	304.	28.88755	0.09502	

VARIABLES IN THE EQUATION

VARIABLE	B	BETA	STD ERROR B	F
HSR	-0.10324	-0.37460	0.01370	56.807
SATV	0.00151	0.28979	0.00028	29.481
ENTRY	-0.06217	-0.24046	0.01313	22.425
SEX	0.09939	0.11427	0.03842	6.693
MARITAL	-0.16783	-0.09147	0.07688	4.765
HOUSING	-0.02497	-0.08614	0.01212	4.248
SATM	0.00049	0.09709	0.00027	3.166
CURR	-0.01153	-0.05692	0.00848	1.849
RACE	0.05672	0.04380	0.05413	1.098
HSIZE	-0.00295	-0.04523	0.00267	1.221
BIRTH	0.02419	0.05041	0.02804	0.744
YRGHS	-0.01312	-0.03856	0.01655	0.629
HSS	-0.01206	-0.02749	0.02565	0.221
(CONSTANT)	2.58252			

VARIABLES NOT IN THE EQUATION

VARIABLE	BETA IN	PARTIAL	TOLERANCE	F
FA	-0.00964	-0.01318	0.89805	0.053
RELIGION	-0.01380	-0.01925	0.93494	0.112
HSCURR	0.00832	0.01156	0.92676	0.041

Table 25

Stepwise Multiple Regression Procedure
Variable 14 Added To Equation
Religion

* MULTIPLE REGRESSION * * * * * * * * * * * * * VARIABLE LIST 1
REGRESSION LIST 1

DEPENDENT VARIABLE.. CUMGPA CUMULATIVE G.P.A.

VARIABLE(S) ENTERED ON STEP NUMBER 14.. RELIGION RELIGION

MULTIPLE R	0.72103	ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE	F
R SQUARE	0.51989	REGRESSION	14.	31.26959	2.23354	23.43619
STANDARD ERROR	0.30871	RESIDUAL	303.	28.87685	0.09530	

VARIABLES IN THE EQUATION

VARIABLE	B	BETA	STD ERROR B	F
HSR	-0.10383	-0.37675	0.01383	56.359
SATV	0.00150	0.28926	0.00028	29.264
ENTRY	-0.06233	-0.24106	0.01316	22.443
SEX	0.09840	0.11313	0.03859	6.503
MARITAL	-0.16724	-0.09114	0.07702	4.715
HOUSING	-0.02508	-0.08652	0.01214	4.269
SATM	0.00047	0.09426	0.00028	2.906
CURR	-0.01175	-0.05800	0.00852	1.903
RACE	0.05688	0.04393	0.05422	1.101
HSIZE	-0.00288	-0.04419	0.00268	1.156
BIRTH	0.02467	0.05141	0.02812	0.769
YRGHS	-0.01328	-0.03901	0.01658	0.641
HSS	-0.01148	-0.02616	0.02574	0.199
RELIGION	-0.01323	-0.01380	0.03948	0.112
(CONSTANT)	2.59561			

VARIABLES NOT IN THE EQUATION

VARIABLE	BETA IN	PARTIAL	TOLERANCE	F
FA	-0.01019	-0.01392	0.89676	0.059
HSCURR	0.00790	0.01097	0.92586	0.036

Table 26

Stepwise Multiple Regression Procedure
Variable 15 Added To Equation
Financial Aid

************************* MULTIPLE REGRESSION ************** VARIABLE LIST 1
REGRESSION LIST 1

DEPENDENT VARIABLE.. CUMGPA CUMULATIVE G.P.A.

VARIABLE(S) ENTERED ON STEP NUMBER 15.. FA FINANCIAL AID

MULTIPLE R	0.72110		ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE	F
R SQUARE	0.51998		REGRESSION	15.	31.27519	2.08501	21.80972
STANDARD ERROR	0.30919		RESIDUAL	302.	28.87125	0.09560	

VARIABLES IN THE EQUATION

VARIABLE	B	BETA	STD ERROR B	F
HSR	-0.10376	-0.37650	0.01385	56.089
SATV	0.00150	0.28937	0.00028	29.192
ENTRY	-0.06272	-0.24258	0.01328	22.318
SEX	0.09750	0.11209	0.03883	6.306
MARITAL	-0.16702	-0.09102	0.07714	4.688
HOUSING	-0.02477	-0.08544	0.01223	4.105
SATM	0.00047	0.09347	0.00028	2.839
CURR	-0.01174	-0.05797	0.00853	1.895
RACE	0.05728	0.04423	0.05433	1.112
HSIZE	-0.00286	-0.04390	0.00268	1.136
BIRTH	0.02565	0.05345	0.02845	0.812
YRGHS	-0.01338	-0.03930	0.01661	0.648
HSS	-0.01172	-0.02672	0.02580	0.206
RELIGION	-0.01360	-0.01418	0.03957	0.118
FA	-0.00898	-0.01019	0.03712	0.059
(CONSTANT)	2.56623			

VARIABLES NOT IN THE EQUATION

VARIABLE	BETA IN	PARTIAL	TOLERANCE	F
HSCURR	0.00740	0.01027	0.92344	0.032

Table 27

Stepwise Multiple Regression Procedure
Variable 16 Added To Equation
High School Curriculum

************************ MULTIPLE REGRESSION ************** VARIABLE LIST 1
REGRESSION LIST 1

DEPENDENT VARIABLE.. CUMGPA CUMULATIVE G.P.A.

VARIABLE(S) ENTERED ON STEP NUMBER 16.. HSCURR HIGH SCHOOL CURR

MULTIPLE R	0.72113	ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE	F
R SQUARE	0.52003	REGRESSION	16.	31.27823	1.95489	20.38304
STANDARD ERROR	0.30969	RESIDUAL	301.	28.86820	0.09591	

VARIABLES IN THE EQUATION

VARIABLE	B	BETA	STD ERROR B	F
HSR	-0.10403	-0.37747	0.01396	55.550
SATV	0.00150	0.20947	0.00028	29.116
ENTRY	-0.06257	-0.24200	0.01332	22.055
SEX	0.09775	0.11238	0.03891	6.310
MARITAL	-0.16699	-0.09101	0.07726	4.671
HOUSING	-0.02472	-0.08527	0.01225	4.073
SATM	0.00047	0.09439	0.00028	2.861
CURR	-0.01158	-0.05716	0.00859	1.815
RACE	0.05759	0.04447	0.05444	1.119
HSIZE	-0.00289	-0.04432	0.00269	1.150
BIRTH	0.02575	0.05367	0.02851	0.816
YRGHS	-0.01337	-0.03929	0.01664	0.646
HSS	-0.01182	-0.02693	0.02585	0.209
RELIGION	-0.01336	-0.01393	0.03966	0.114
FA	-0.00864	-0.00980	0.03723	0.054
HSCURR	0.00458	0.00740	0.02569	0.032
(CONSTANT)	2.55007			

MAXIMUM STEP REACHED

VARIABLES NOT IN THE EQUATION

VARIABLE	BETA IN	PARTIAL	TOLERANCE	F

Table 28

Stepwise Multiple Regression Procedure
Summary Table

************************** MULTIPLE REGRESSION *************** VARIABLE LIST 1
REGRESSION LIST 1

DEPENDENT VARIABLE.. CUMGPA CUMULATIVE G.P.A.

SUMMARY TABLE

VARIABLE		MULTIPLE R	R SQUARE	RSQ CHANGE	SIMPLE R	B	BETA
HSR	HIGH SCHOOL RANK	0.58937	0.34735	0.34735	-0.58937	-0.10403	-0.37747
SATV	SAT VERBAL	0.64463	0.41555	0.06819	0.42941	0.00150	0.28947
ENTRY	ENTRY -YR-TERM	0.69192	0.47876	0.06321	-0.32709	-0.06257	-0.24200
SEX	SEX	0.69950	0.48931	0.01055	0.23607	0.09775	0.11238
MARITAL	MARITAL STATUS -AT TIME OF GRAD	0.70638	0.49898	0.00967	-0.11387	-0.16699	-0.09101
HOUSING	HOUSING -LAST TERM	0.71086	0.50532	0.00635	-0.17235	-0.02472	-0.08527
SATM	SAT MATH	0.71476	0.51088	0.00555	0.37685	0.00047	0.09439
CURR	SCHOOL AT CSC	0.71655	0.51344	0.00257	0.07181	-0.01158	-0.05716
RACE	RACE	0.71833	0.51600	0.00256	0.21590	0.05759	0.04447
HSIZE	HIGH SCHOOL SIZE X 100	0.71967	0.51792	0.00192	-0.11225	-0.00289	-0.04432
BIRTH	YEAR OF BIRTH	0.72002	0.51842	0.00050	0.28371	0.02575	0.05367
YRGHS	YR GRAD HIGH SCHOOL	0.72067	0.51936	0.00094	0.14167	-0.01337	-0.03929
HSS	HIGH SCHOOL STANINE	0.72091	0.51971	0.00035	0.44627	-0.01182	-0.02693
RELIGION	RELIGION	0.72103	0.51989	0.00018	0.02845	-0.01336	-0.01393
FA	FINANCIAL AID	0.72110	0.51998	0.00009	-0.01185	-0.00864	-0.00980
HSCURR	HIGH SCHOOL CURR	0.72113	0.52003	0.00005	-0.11997	0.00458	0.00740
(CONSTANT)						2.55007	

Table 29

Stepwise Multiple Regression Procedure
Plot Of Standardized Residuals

**************************** MULTIPLE REGRESSION ******************

DEPENDENT VARIABLE: CUMGPA FROM VARIABLE LIST 1
REGRESSION LIST 1

SEQNUM	OBSERVED CUMGPA	PREDICTED CUMGPA	RESIDUAL	PLOT OF STANDARDIZED RESIDUAL -2.0 -1.0 0.0 1.0 2.0
1	2.870000	3.000686	-0.1306867	
2	3.320000	3.012087	0.3079120	
3	2.790000	MISSING**	MISSING**	
4	2.740000	3.112466	-0.3724664	
5	3.629999	3.281686	0.3483130	
6	3.620000	MISSING**	MISSING**	
7	2.429999	2.831387	-0.4013875	
8	3.020000	2.642263	0.3777356	
9	3.360000	3.114183	0.2458159	
10	2.790000	2.853679	-0.6367880E-01	
11	3.820000	3.661777	0.1582219	
12	2.459999	2.642780	-0.1827815	
13	3.089999	MISSING**	MISSING**	
14	2.870000	MISSING**	MISSING**	
15	2.790000	2.847102	-0.5710224E-01	
16	3.129999	2.725303	0.4046956	
17	2.570000	2.571303	-0.1304465E-02	
18	3.200000	3.322286	-0.1222866	
19	2.120000	MISSING**	MISSING**	
20	2.780000	2.530435	0.2495645	
21	2.280000	2.561108	-0.2811088	
22	2.959999	3.295297	-0.3352981	
23	3.500000	3.164077	0.3359231	
24	3.330000	3.095854	0.2341451	
25	2.580000	2.777139	-0.1971395	
26	2.459999	2.513627	-0.5362870E-01	
27	2.959999	2.536795	0.4232043	
28	2.820000	MISSING**	MISSING**	
29	2.839999	3.047646	-0.2076470	
30	3.410000	3.139149	0.2708504	
31	2.820000	3.111282	-0.2912834	
32	3.900000	MISSING**	MISSING**	
33	3.750000	MISSING**	MISSING**	
34	2.410000	2.542583	-0.1325843	
35	3.599999	MISSING**	MISSING**	
36	3.219999	3.017685	0.2023138	
37	3.559999	MISSING**	MISSING**	

Table 29 (Continued)

Stepwise Multiple Regression Procedure
Plot Of Standardized Residuals

38	3.049999	3.083326	-0.3332806E-01	
39	3.129999	3.380224	-0.2502260	
40	3.110000	2.444173	0.6658267	
41	2.500000	2.625748	-0.1257480	
42	2.900000	3.038086	-0.1380872	
43	2.839999	2.666770	0.1732285	
44	3.889999	3.597756	0.2922419	
45	2.990000	3.014267	-0.2426784E-01	
46	3.830000	3.755139	0.7456052E-01	
47	3.299999	MISSING**	MISSING**	
48	2.339999	2.629210	-0.2892105	
49	2.780000	MISSING**	MISSING**	
50	3.030000	3.047422	-0.1742361E-01	
51	2.139999	2.461506	-0.3215072	
52	3.030000	MISSING**	MISSING**	
53	2.799999	3.149230	-0.3492309	
54	3.250000	2.971470	0.2785295	
55	2.400000	3.039360	-0.6393609	
56	2.480000	3.486069	-1.006069	X
57	2.889999	2.889246	0.7531305E-03	
58	2.650000	MISSING**	MISSING**	
59	3.040000	MISSING**	MISSING**	
60	2.200000	2.304372	-0.1043720	
61	3.099999	2.972454	0.1275453	
62	3.290000	3.448462	-0.1584625	
63	2.889999	2.681006	0.2089927	
64	2.099999	2.303826	-0.2038268	
65	3.459999	2.968200	0.4917985	
66	3.120000	2.993666	0.1263337	
67	2.629999	2.500178	0.1298208	
68	3.469999	3.032314	0.4376842	
69	3.190000	MISSING**	MISSING**	
70	3.020000	MISSING**	MISSING**	
71	2.969999	2.691882	0.2781164	
72	3.709999	3.527372	0.1826258	
73	3.089999	3.028755	0.6124398E-01	
74	2.940000	2.521669	0.4183298	
75	2.679999	3.214254	-0.5342551	
76	3.799999	MISSING**	MISSING**	
77	3.500000	3.279593	0.2204062	
78	2.620000	2.882756	-0.2627566	
79	3.450000	3.604814	-0.1548145	

Table 29 (Continued)

Stepwise Multiple Regression Procedure
Plot Of Standardized Residuals

80	2.509999	2.695309	-0.1853096	* I
81	3.059999	2.937949	0.1220495	I *
82	2.639999	2.860607	-0.2206078	* I
83	3.299999	MISSING**	MISSING**	I
84	3.099999	MISSING**	MISSING**	I
85	2.580000	2.499096	0.8090335E-01	I *
86	2.959999	2.906212	0.5378637E-01	I*
87	2.520000	MISSING**	MISSING**	I
88	3.110000	3.344524	-0.2345253	* I
89	3.219999	3.151711	0.6828696E-01	I *
90	3.089999	3.212677	-0.1226785	* I
91	2.389999	2.215579	0.1744205	I *
92	2.589999	3.092546	-0.5025471	* I
93	3.080000	3.160597	-0.8059776E-01	* I
94	3.790000	3.161840	0.6281590	I *
95	2.929999	2.924940	0.5058970E-02	*
96	3.270000	MISSING**	MISSING**	I
97	3.160000	2.641178	0.5188210	I *
98	2.469999	2.630583	-0.1605837	* I
99	2.730000	2.942290	-0.2122908	* I
100	3.209999	3.128371	0.8162695E-01	I *
101	3.400000	3.108835	0.2911635	I *
102	3.099999	3.132754	-0.3275468E-01	*I
103	2.759999	2.972243	-0.2122441	* I
104	3.320000	3.008245	0.3117536	I *
105	2.790000	3.078239	-0.2882395	* I
106	3.020000	2.977768	0.4223080E-01	I*
107	3.270000	3.145367	0.1246326	I *
108	2.900000	3.339725	-0.4397259	* I
109	2.389999	MISSING**	MISSING**	I
110	3.450000	2.834429	0.6155705	I *
111	3.589999	MISSING**	MISSING**	I
112	3.730000	3.153651	0.5763479	I *
113	2.759999	2.678287	0.8171242E-01	I *
114	2.750000	2.829926	-0.7992733E-01	* I
115	3.530000	MISSING**	MISSING**	I
116	3.000000	2.867360	0.1326396	I *
117	3.559999	MISSING**	MISSING**	I
118	2.709999	MISSING**	MISSING**	I
119	2.179999	2.135795	0.4420434E-01	I*
120	3.629999	3.187139	0.4428603	I *
121	3.679999	MISSING**	MISSING**	I

Table 29 (Continued)

Stepwise Multiple Regression Procedure
Plot Of Standardized Residuals

122	2.669999	2.610282	0.3971701E-01	I*
123	2.629999	2.552136	0.7786191E-01	I *
124	2.709999	3.249698	-0.5396991	* I
125	2.429999	2.693317	-0.2633181	* I
126	2.919999	3.119912	-0.1999139	* I
127	2.000000	MISSING**	MISSING**	I
128	2.709999	2.539827	0.1701710	I *
129	2.469999	2.509847	-0.3984752E-01	*I
130	2.780000	2.984996	-0.2349967	* I
131	2.530000	2.865464	-0.3354651	* I
132	2.469999	2.855115	-0.3851161	* I
133	2.379999	2.903948	-0.5239468	* I
134	2.559999	2.413980	0.1460188	I *
135	3.839999	MISSING**	MISSING**	I
136	2.660000	2.617515	0.4248468E-01	I*
137	2.730000	MISSING**	MISSING**	I
138	2.610000	MISSING**	MISSING**	I
139	3.280000	2.816309	0.4636906	I *
140	3.750000	3.257024	0.4929755	I *
141	3.179999	3.152197	0.2780166E-01	I*
142	3.309999	3.278443	0.3155600E-01	I*
143	3.089999	3.086824	0.3173869E-02	*
144	2.919999	3.067813	-0.1478140	* I
145	2.450000	2.625058	-0.1750592	* I
146	3.459999	3.480943	-0.2094426E-01	*
147	2.770000	2.732709	0.3729044E-01	I*
148	3.339999	3.436473	-0.9647447E-01	* I
149	2.490000	2.714693	-0.2246936	* I
150	3.480000	3.350246	0.1297529	I *
151	3.230000	MISSING**	MISSING**	I
152	2.870000	2.953478	-0.8347815E-01	* I
153	2.889999	2.943440	-0.5344178E-01	*I
154	2.950000	2.931360	0.1863909E-01	*
155	3.049999	2.798449	0.2515502	I *
156	3.209999	2.688672	0.5213268	I *
157	2.280000	2.206042	0.7395679E-01	I *
158	3.080000	3.017877	0.6212306E-01	I*
159	2.639999	2.638892	0.1107102E-02	*
160	2.830000	2.864997	-0.3499760E-01	*I
161	2.589999	3.004660	-0.4146608	* I
162	2.740000	3.100982	-0.3609824	* I
163	2.919999	2.497148	0.4228508	I *

Table 29 (Continued)

Stepwise Multiple Regression Procedure
Plot Of Standardized Residuals

164	2.500000	2.795105	-0.2951059	* I
165	3.549999	MISSING**	MISSING**	I
166	2.429999	2.463075	-0.3307530E-01	*I
167	2.540000	2.891413	-0.3514135	* I
168	3.599999	MISSING**	MISSING**	I
169	2.759999	MISSING**	MISSING**	I
170	2.549999	2.354232	0.1957671	I *
171	2.650000	2.730368	-0.8036864E-01	* I
172	2.429999	MISSING**	MISSING**	I
173	2.209999	2.844456	-0.6344569	* I
174	2.650000	MISSING**	MISSING**	I
175	3.009999	MISSING**	MISSING**	I
176	2.370000	2.673880	-0.3038800	* I
177	3.780000	MISSING**	MISSING**	I
178	2.879999	3.121751	-0.2417524	* I
179	3.339999	MISSING**	MISSING**	I
180	2.759999	MISSING**	MISSING**	I
181	2.160000	MISSING**	MISSING**	I
182	3.669999	3.207901	0.4620977	I *
183	2.730000	2.900516	-0.1705196	* I
184	2.480000	2.689879	-0.2098804	* I
185	3.330000	3.425959	-0.9595937E-01	* I
186	3.240000	2.983175	0.2568237	I *
187	3.349999	3.160673	0.1893253	I *
188	2.719999	3.129809	-0.4098107	* I
189	2.629999	2.649342	-0.1934285E-01	*
190	2.429999	2.744928	-0.3149293	* I
191	2.360000	2.623712	-0.2637123	* I
192	2.339999	MISSING**	MISSING**	I
193	2.419999	2.567417	-0.1474182	* I
194	3.870000	3.249068	0.6209315	I *
195	2.599999	2.869049	-0.2690502	* I
196	3.389999	MISSING**	MISSING**	I
197	3.629999	2.843066	0.7869327	I *
198	3.480000	MISSING**	MISSING**	I
199	3.120000	MISSING**	MISSING**	I
200	3.759999	3.197956	0.5620431	I *
201	2.650000	2.655938	-0.5939443E-02	*
202	3.150000	3.307630	-0.1576306	* I
203	2.719999	3.336817	-0.6168181	* I
204	2.500000	2.456516	0.4348378E-01	I*
205	3.879999	3.110247	0.7697521	I *

Table 29 (Continued)

Stepwise Multiple Regression Procedure
Plot Of Standardized Residuals

206	2.559999	2.546448	0.1355087E-01	* I
207	2.759999	MISSING**	MISSING**	I
208	2.809999	2.808084	0.1914908E-02	* I
209	3.129999	2.927430	0.2025688	I *
210	2.520000	2.922572	-0.4025726	* I
211	2.400000	2.711704	-0.3117051	* I
212	2.919999	2.667377	0.2526208	I *
213	2.540000	2.359754	0.1802460	I *
214	3.400000	3.366722	0.3327673E-01	I*
215	2.490000	MISSING**	MISSING**	I
216	2.540000	3.264564	-0.7245642	* I
217	3.870000	3.593769	0.2762302	I *
218	3.770000	MISSING**	MISSING**	I
219	3.200000	2.877124	0.3228756	I *
220	2.790000	3.032037	-0.2420374	* I
221	3.209999	2.879212	0.3307861	I *
222	3.509999	3.025771	0.4842273	I *
223	2.179999	2.773214	-0.5932134	* I
224	3.620000	3.485405	0.1345943	I *
225	2.780000	2.525777	0.2542219	I *
226	2.820000	MISSING**	MISSING**	I
227	2.200000	2.322452	-0.1224516	* I
228	3.299999	MISSING**	MISSING**	I
229	2.599999	MISSING**	MISSING**	I
230	2.750000	MISSING**	MISSING**	I
231	3.770000	3.215232	0.5547667	I *
232	2.879999	3.106274	-0.2262746	* I
233	2.469999	2.876187	-0.4061884	* I
234	2.860000	2.899888	-0.3988894E-01	*I
235	3.379999	3.349587	0.3041101E-01	I*
236	2.900000	3.171076	-0.2710769	* I
237	3.309999	3.041137	0.2688624	I *
238	2.799999	2.748395	0.5160405E-01	I*
239	3.020000	MISSING**	MISSING**	I
240	3.320000	MISSING**	MISSING**	I
241	3.490000	3.312813	0.1771868	I *
242	3.400000	MISSING**	MISSING**	I
243	2.919999	MISSING**	MISSING**	I
244	3.809999	3.275431	0.5345683	I *
245	2.490000	MISSING**	MISSING**	I
246	2.750000	2.730502	0.1949780E-01	*
247	2.219999	2.335357	-0.1153570	* I

Table 29 (Continued)

Stepwise Multiple Regression Procedure
Plot Of Standardized Residuals

248	2.650000	2.940603	-0.2906040	* I
249	2.559999	2.668883	-0.1088842	* I
250	3.139999	3.107648	0.3235132E-01	I*
251	2.839999	MISSING**	MISSING**	I
252	3.429999	3.232025	0.1979737	I *
253	3.030000	2.412251	0.6177486	I *
254	2.730000	2.690262	0.3973756E-01	I*
255	3.309999	3.180067	0.1299317	I *
256	3.620000	3.213115	0.4068842	I *
257	3.290000	2.881600	0.4083991	I *
258	2.849999	MISSING**	MISSING**	I
259	3.580000	3.583262	-0.3263371E-02	*
260	3.700000	MISSING**	MISSING**	I
261	3.570000	2.819205	0.7507935	I *
262	2.419999	2.746415	-0.3264168	* I
263	2.759999	2.571599	0.1883993	I *
264	2.599999	2.215986	0.3840130	I *
265	3.690000	3.132195	0.5578039	I *
266	2.559999	2.833255	-0.2732555	* I
267	2.839999	2.957429	-0.1174302	* I
268	3.419999	3.274755	0.1452428	I *
269	2.730000	MISSING**	MISSING**	I
270	2.480000	MISSING**	MISSING**	I
271	3.520000	MISSING**	MISSING**	I
272	3.040000	2.848210	0.1917892	I *
273	2.549999	2.640525	-0.9052640E-01	* I
274	3.440000	3.346221	0.9377766E-01	I *
275	3.500000	3.178190	0.3218094	I *
276	3.839999	MISSING**	MISSING**	I
277	3.459999	3.125169	0.3348294	I *
278	3.160000	3.217885	-0.5788606E-01	*I
279	3.169999	2.763573	0.4064257	I *
280	2.379999	2.583329	-0.2033305	* I
281	2.730000	2.657879	0.7211971E-01	I *
282	3.309999	MISSING**	MISSING**	I
283	2.879999	2.941057	-0.6105806E-01	*I
284	3.030000	2.839631	0.1903685	I *
285	3.480000	3.436070	0.4392806E-01	I*
286	3.830000	3.572052	0.2579477	I *
287	2.969999	MISSING**	MISSING**	I
288	2.820000	MISSING**	MISSING**	I
289	3.150000	MISSING**	MISSING**	I

Table 29 (Continued)

Stepwise Multiple Regression Procedure
Plot Of Standardized Residuals

290	2.120000	2.408938	-0.2889390	* I
291	2.160000	MISSING**	MISSING**	I
292	3.360000	3.444946	-0.8494717E-01	* I
293	2.500000	2.941989	-0.4419896	* I
294	2.669999	3.281078	-0.6110792	* I
295	2.740000	3.079019	-0.3390191	* I
296	2.950000	MISSING**	MISSING**	I
297	2.839999	2.946353	-0.1063544	* I
298	2.520000	3.001307	-0.4813076	* I
299	3.419999	3.382423	0.3757449E-01	I*
300	3.139999	2.595971	0.5440279	I *
301	3.089999	MISSING**	MISSING**	I
302	3.339999	3.329661	0.1033695E-01	*
303	3.879999	3.589080	0.2909188	I *
304	3.370000	3.139565	0.2304347	I *
305	2.879999	2.958825	-0.7882679E-01	* I
306	3.020000	3.059888	-0.3988888E-01	*I
307	2.250000	2.420444	-0.1704438	* I
308	2.990000	MISSING**	MISSING**	I
309	2.120000	2.236929	-0.1169294	* I
310	2.870000	2.937611	-0.6761098E-01	* I
311	3.049999	3.200480	-0.1504810	* I
312	3.049999	3.086973	-0.3697427E-01	*I
313	3.200000	3.272286	-0.7228678E-01	* I
314	3.299999	3.240260	0.5973878E-01	I*
315	2.709999	3.255128	-0.5451294	* I
316	2.599999	2.770505	-0.1705059	* I
317	2.540000	2.889456	-0.3494560	* I
318	3.780000	3.819633	-0.3963331E-01	*I
319	3.400000	MISSING**	MISSING**	I
320	2.750000	2.892920	-0.1429207	* I
321	2.679999	2.821772	-0.1417724	* I
322	2.700000	3.030118	-0.3301191	* I
323	2.580000	3.124232	-0.5442324	* I
324	2.759999	MISSING**	MISSING**	I
325	2.839999	3.204146	-0.3641478	* I
326	3.750000	3.314183	0.4358160	I *
327	2.389999	2.871525	-0.4815261	* I
328	2.240000	2.679840	-0.4398411	* I
329	3.089999	3.118321	-0.2832247E-01	*I
330	3.110000	2.983095	0.1269039	I *
331	3.740000	3.184884	0.5551152	I *

Table 29 (Continued)

Stepwise Multiple Regression Procedure
Plot Of Standardized Residuals

332	3.520000	3.378928	0.1410711	I *
333	2.849999	MISSING**	MISSING**	I
334	2.500000	2.838573	-0.3385742	* I
335	3.190000	3.247081	-0.5708205E-01	*I
336	2.320000	MISSING**	MISSING**	I
337	2.770000	2.825546	-0.5554752E-01	*I
338	3.209999	3.090735	0.1192632	I *
339	2.959999	3.104083	-0.1440843	* I
340	2.490000	2.701468	-0.2114682	* I
341	3.059999	MISSING**	MISSING**	I
342	2.730000	2.888243	-0.1582439	* I
343	3.530000	3.309669	0.2203310	I *
344	2.120000	MISSING**	MISSING**	I
345	2.929999	2.711821	0.2181786	I *
346	2.809999	MISSING**	MISSING**	I
347	2.429999	2.423840	0.6159093E-02	*
348	2.879999	2.726980	0.1530187	I *
349	3.480000	3.304313	0.1756864	I *
350	2.700000	2.885620	-0.1856208	* I
351	2.059999	2.866702	-0.8067030	* I
352	3.879999	3.618181	0.2618169	I *
353	2.679999	2.386747	0.2932513	I *
354	3.150000	3.264941	-0.1149417	* I
355	3.889999	3.120244	0.7697551	I *
356	2.660000	2.807293	-0.1472939	* I
357	2.459999	2.737513	-0.2775135	* I
358	2.610000	3.057791	-0.4477915	* I
359	2.650000	2.870625	-0.2206256	* I
360	3.440000	MISSING**	MISSING**	I
361	2.709999	2.747919	-0.3792019E-01	*I
362	2.589999	2.718554	-0.1285554	* I
363	3.150000	3.241301	-0.9130138E-01	* I
364	3.110000	3.043365	0.6663501E-01	I *
365	3.129999	3.107338	0.2266075E-01	I*
366	3.259999	2.852797	0.4072027	I *
367	3.070000	3.190423	-0.1204233	* I
368	2.250000	2.639152	-0.3891522	* I
369	2.900000	2.813982	0.8601725E-01	I *
370	2.500000	2.673184	-0.1731853	* I
371	2.900000	2.767670	0.1323292	I *
372	2.389999	2.516304	-0.1263047	* I
373	2.879999	MISSING**	MISSING**	I

Table 29 (Continued)

Stepwise Multiple Regression Procedure
Plot Of Standardized Residuals

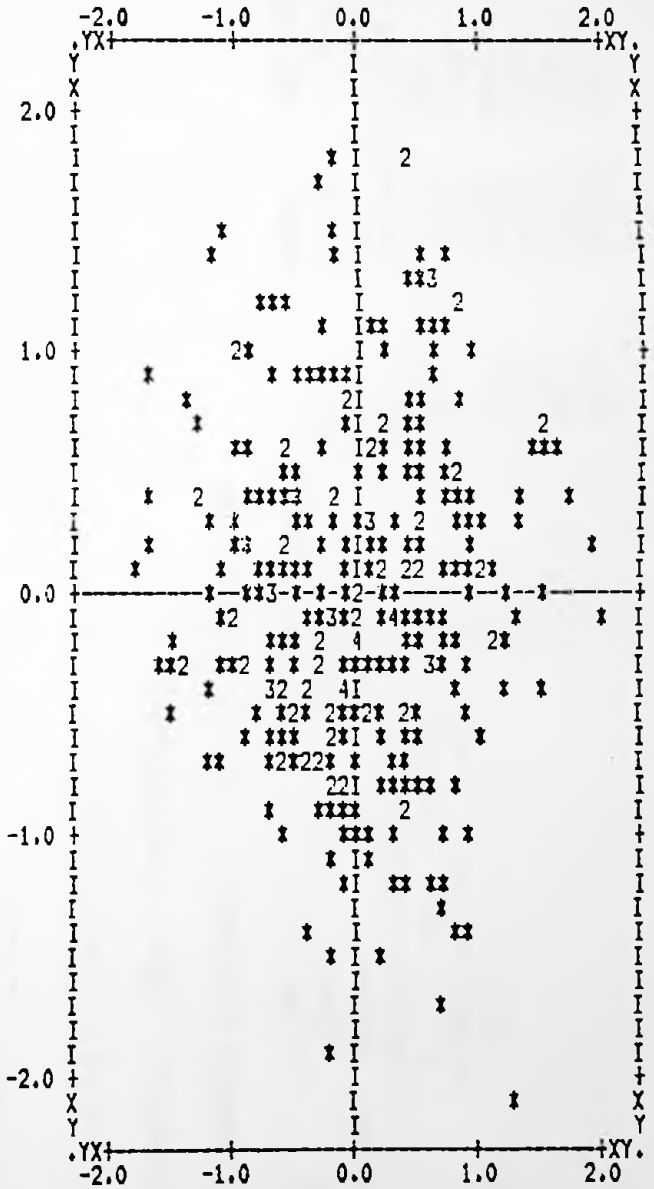
374	3.520000	2.859515	0.6604838	I *
375	3.169999	MISSING**	MISSING**	I
376	2.679999	2.879615	-0.1996158	* I
377	3.530000	3.258649	0.2713300	I *
378	2.969999	3.166922	-0.1969228	* I
379	2.830000	2.711467	0.1185322	I *
380	2.950000	MISSING**	MISSING**	I
381	3.179999	2.797526	0.3824722	I *
382	2.639999	2.310390	0.3296089	I *
383	2.469999	2.895268	-0.4252698	* I
384	3.299999	MISSING**	MISSING**	I
385	2.740000	2.813573	-0.7357359E-01	* I
386	2.580000	2.773940	-0.1939409	* I
387	2.780000	2.624591	0.1554084	I *
388	2.520000	2.817732	-0.2977324	* I
389	2.330000	2.478845	-0.1488454	* I
390	2.360000	MISSING**	MISSING**	I
391	3.419999	3.267360	0.1526389	I *
392	3.049999	2.966619	0.8338010E-01	I *
393	3.580000	MISSING**	MISSING**	I
394	3.070000	MISSING**	MISSING**	I
395	2.570000	2.853437	-0.2834378	* I
396	2.400000	2.698908	-0.2989083	* I
397	3.799999	3.293220	0.5067796	I *
398	3.969999	MISSING**	MISSING**	I
399	3.490000	3.523386	-0.3338719E-01	*I
400	3.190000	3.156369	0.3363010E-01	I*
401	3.030000	3.125885	-0.9588540E-01	* I
402	2.809999	3.232968	-0.4229696	* I
403	2.750000	2.908760	-0.1587603	* I
404	3.639999	3.165968	0.4740307	I *
405	2.990000	2.902681	0.8731818E-01	I *
406	3.740000	MISSING**	MISSING**	I
407	3.240000	2.912237	0.3277624	I *
408	3.009999	3.069526	-0.5952733E-01	*I
409	3.070000	MISSING**	MISSING**	I
410	2.770000	MISSING**	MISSING**	I
411	2.160000	2.283028	-0.1230278	* I

DURBIN-WATSON TEST OF RESIDUAL DIFFERENCES COMPARED BY CASE ORDER (SEQNUM).
VARIABLE LIST 1, REGRESSION LIST 1. DURBIN-WATSON TEST 1.95312

Table 30

Stepwise Multiple Regression Procedure
Scattergram Of Standardized
Residuals

* * * * * PLOT: STANDARDIZED RESIDUAL (DOWN) — PREDICTED STANDARDIZED DEPENDENT VARIABLE (ACROSS) * * * * * * *



ROWS,COLUMNS Y: VALUES OUTSIDE (-3.0,3.0) ROWS,COLUMNS X: VALUES IN (-3.0,-2.05) OR (2.05,3.0)

Table 31

Stepwise Multiple Regression Procedure - Best Six Variables
Variable 1 Added To Equation
High School Rank

********** MULTIPLE REGRESSION ********** VARIABLE LIST 1
REGRESSION LIST 1

DEPENDENT VARIABLE.. CUMGPA CUMULATIVE G.P.A.

VARIABLE(S) ENTERED ON STEP NUMBER 1.. HSR HIGH SCHOOL RANK

			DF	SUM OF SQUARES	MEAN SQUARE	F
MULTIPLE R	0.57396	ANALYSIS OF VARIANCE				
R SQUARE	0.32943	REGRESSION	1.	22.76639	22.76639	174.40210
STANDARD ERROR	0.36130	RESIDUAL	355.	46.34158	0.13054	

VARIABLES IN THE EQUATION

VARIABLE	B	BETA	STD ERROR B	F
HSR	-0.16072	-0.57396	0.01217	174.402
(CONSTANT)	3.42592			

VARIABLES NOT IN THE EQUATION

VARIABLE	BETA IN	PARTIAL	TOLERANCE	F
SEX	0.13349	0.15992	0.96250	9.292
MARITAL	-0.06161	-0.07511	0.99664	2.008
ENTRY	-0.21218	-0.25445	0.96442	24.507
SATV	0.29143	0.33679	0.89556	45.291
HOUSING	-0.07317	-0.08736	0.95577	2.722

Table 32

Stepwise Multiple Regression Procedure - Best Six Variables
Variable 2 Added To Equation
SAT Score - Verbal

VARIABLE(S) ENTERED ON STEP NUMBER 2.. SATV SAT VERBAL

MULTIPLE R	0.63678		ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE	F
R SQUARE	0.40549		REGRESSION	2.	28.02289	14.01144	120.72632
STANDARD ERROR	0.34068		RESIDUAL	354.	41.08508	0.11606	

VARIABLES IN THE EQUATION

VARIABLE	B	BETA	STD ERROR B	F
HSR	-0.13435	-0.47978	0.01213	122.751
SATV	0.00149	0.29143	0.00022	45.291
(CONSTANT)	2.75733			

VARIABLES NOT IN THE EQUATION

VARIABLE	BETA IN	PARTIAL	TOLERANCE	F
SEX	0.14552	0.18499	0.96081	12.509
MARITAL	-0.07074	-0.09155	0.99557	2.984
ENTRY	-0.23750	-0.30143	0.95758	35.278
HOUSING	-0.12422	-0.15526	0.92865	8.719

Table 33

Stepwise Multiple Regression Procedure - Best Six Variables
Variable 3 Added To Equation
Year and Term of Entry

************************* MULTIPLE REGRESSION ************** VARIABLE LIST 1
REGRESSION LIST 1

DEPENDENT VARIABLE.. CUMGPA CUMULATIVE G.P.A.

VARIABLE(S) ENTERED ON STEP NUMBER 3.. ENTRY ENTRY -YR-TERM

MULTIPLE R	0.67787	ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE	F
R SQUARE	0.45951	REGRESSION	3.	31.75577	10.58526	100.03681
STANDARD ERROR	0.32529	RESIDUAL	353.	37.35220	0.10581	

VARIABLES IN THE EQUATION

VARIABLE	B	BETA	STD ERROR B	F
HSR	-0.11993	-0.42827	0.01183	102.761
SATV	0.00159	0.31218	0.00021	56.599
ENTRY	-0.06327	-0.23750	0.01065	35.278
(CONSTANT)	2.99107			

VARIABLES NOT IN THE EQUATION

VARIABLE	BETA IN	PARTIAL	TOLERANCE	F
SEX	0.11630	0.15371	0.94413	8.518
MARITAL	-0.09745	-0.13146	0.98360	6.190
HOUSING	-0.11648	-0.15260	0.92766	8.392

Table 34

Stepwise Multiple Regression Procedure - Best Six Variables
Variable 4 Added To Equation
Sex

VARIABLE(S) ENTERED ON STEP NUMBER 4.. SEX SEX

MULTIPLE R	0.68723		ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE	F
R SQUARE	0.47228		REGRESSION	4.	32.63827	8.15957	78.75489
STANDARD ERROR	0.32188		RESIDUAL	352.	36.46970	0.10361	

VARIABLES IN THE EQUATION

VARIABLE	B	BETA	STD ERROR B	F
HSR	-0.11410	-0.40745	0.01188	92.302
SATV	0.00161	0.31589	0.00021	59.129
ENTRY	-0.05918	-0.22216	0.01063	30.976
SEX	0.10234	0.11630	0.03507	8.518
(CONSTANT)	2.79231			

VARIABLES NOT IN THE EQUATION

VARIABLE	BETA IN	PARTIAL	TOLERANCE	F
MARITAL	-0.09469	-0.12923	0.98300	5.961
HOUSING	-0.11398	-0.15108	0.92722	8.199

Table 35

Stepwise Multiple Regression Procedure
Variable 5 Added To Equation
Housing - Last Term

********** MULTIPLE REGRESSION ********** VARIABLE LIST 1
REGRESSION LIST 1

DEPENDENT VARIABLE.. CUMGPA CUMULATIVE G.P.A.

VARIABLE(S) ENTERED ON STEP NUMBER 5.. HOUSING HOUSING -LAST TERM

MULTIPLE R	0.69593	ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE	F
R SQUARE	0.48433	REGRESSION	5.	33.47074	6.69415	65.93233
STANDARD ERROR	0.31864	RESIDUAL	351.	35.63723	0.10153	

VARIABLES IN THE EQUATION

VARIABLE	B	BETA	STD ERROR B	F
HSR	-0.10593	-0.37830	0.01210	76.688
SATV	0.00171	0.33533	0.00021	66.150
ENTRY	-0.05829	-0.21882	0.01053	30.640
SEX	0.10018	0.11384	0.03472	8.325
HOUSING	-0.03307	-0.11398	0.01155	8.199
(CONSTANT)	2.79342			

VARIABLES NOT IN THE EQUATION

VARIABLE	BETA IN	PARTIAL	TOLERANCE	F
MARITAL	-0.08707	-0.11990	0.97777	5.105

Table 36

Stepwise Multiple Regression Procedure
Variable 6 Added To Equation
Marital Status

VARIABLE(S) ENTERED ON STEP NUMBER 6.. MARITAL MARITAL STATUS -AT TIME OF GRAD

MULTIPLE R	0.70124		ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE	F
R SQUARE	0.49174		REGRESSION	6.	33.98306	5.66384	56.43701
STANDARD ERROR	0.31679		RESIDUAL	350.	35.12491	0.10036	

VARIABLES IN THE EQUATION

VARIABLE	B	BETA	STD ERROR B	F
HSR	-0.10423	-0.37223	0.01205	74.824
SATV	0.00172	0.33801	0.00021	67.939
ENTRY	-0.06101	-0.22903	0.01054	33.517
SEX	0.09837	0.11178	0.03453	8.116
HOUSING	-0.03118	-0.10744	0.01151	7.331
MARITAL	-0.16659	-0.08707	0.07373	5.105
(CONSTANT)	3.11957			

MAXIMUM STEP REACHED

VARIABLES NOT IN THE EQUATION

VARIABLE	BETA IN	PARTIAL	TOLERANCE	F

Table 37

Stepwise Multiple Regression Procedure - Best Six Variables
Summary Table

********** MULTIPLE REGRESSION ********** VARIABLE LIST 1
REGRESSION LIST 1

DEPENDENT VARIABLE.. CUMGPA CUMULATIVE G.P.A.

SUMMARY TABLE

VARIABLE		MULTIPLE R	R SQUARE	RSQ CHANGE	SIMPLE R	B	BETA
HSR	HIGH SCHOOL RANK	0.57396	0.32943	0.32943	-0.57396	-0.10423	-0.37223
SATV	SAT VERBAL	0.63678	0.40549	0.07606	0.44648	0.00172	0.33801
ENTRY	ENTRY -YR-TERM	0.67787	0.45951	0.05402	-0.31289	-0.06101	-0.22903
SEX	SEX	0.68723	0.47228	0.01277	0.23963	0.09837	0.11178
HOUSING	HOUSING -LAST TERM	0.69593	0.48433	0.01205	-0.19064	-0.03118	-0.10744
MARITAL	MARITAL STATUS -AT TIME OF GRAD	0.70124	0.49174	0.00741	-0.09468	-0.16659	-0.08707
(CONSTANT)						3.11957	

Table 38

Stepwise Multiple Regression Procedure - School Of Education Data
Variable 15 Added To Equation
SAT - Mathematical

********** MULTIPLE REGRESSION ********** VARIABLE LIST 1
REGRESSION LIST 1

DEPENDENT VARIABLE.. CUMGPA CUMULATIVE G.P.A.

VARIABLE(S) ENTERED ON STEP NUMBER 15.. SATM SAT MATH

MULTIPLE R	0.74261	ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE	F
R SQUARE	0.55147	REGRESSION	15.	15.51718	1.03448	12.62288
STANDARD ERROR	0.28627	RESIDUAL	154.	12.62071	0.08195	

VARIABLES IN THE EQUATION

VARIABLE	B	BETA	STD ERROR B	F
HSR	-0.09728	-0.36269	0.01776	30.008
ENTRY	-0.06251	-0.25606	0.01952	10.259
SATV	0.00135	0.26709	0.00038	12.761
CURR	-0.02618	-0.16541	0.00918	8.142
HOUSING	-0.04212	-0.14419	0.01701	6.136
RACE	0.07219	0.05996	0.07149	1.020
HSS	0.03706	0.08957	0.03189	1.351
MARITAL	-0.13006	-0.07522	0.09993	1.694
HSCURR	-0.03364	-0.06016	0.03176	1.122
RELIGION	-0.04999	-0.05342	0.05391	0.860
BIRTH	0.01085	0.02474	0.05456	0.040
SEX	0.02374	0.02827	0.05168	0.211
FA	-0.01937	-0.02344	0.04859	0.159
YRGHS	0.01074	0.02132	0.06743	0.025
SATM	0.00005	0.01076	0.00035	0.022
(CONSTANT)	1.64121			

F-LEVEL OR TOLERANCE-LEVEL INSUFFICIENT FOR FURTHER COMPUTATION

VARIABLES NOT IN THE EQUATION

VARIABLE	BETA IN	PARTIAL	TOLERANCE	F
HSIZE	0.00182	0.00250	0.84506	0.001

Table 39

Stepwise Multiple Regression Procedure - School Of Education Data
Summary Table

************************* MULTIPLE REGRESSION ************** VARIABLE LIST 1
REGRESSION LIST 1

DEPENDENT VARIABLE.. CUMGPA CUMULATIVE G.P.A.

SUMMARY TABLE

VARIABLE		MULTIPLE R	R SQUARE	RSQ CHANGE	SIMPLE R	B	BETA
HSR	HIGH SCHOOL RANK	0.58884	0.34673	0.34673	-0.58884	-0.09728	-0.36269
ENTRY	ENTRY -YR-TERM	0.64458	0.41548	0.06875	-0.37316	-0.06251	-0.25606
SATV	SAT VERBAL	0.69968	0.48955	0.07407	0.41717	0.00135	0.26709
CURR	SCHOOL AT CSC	0.71381	0.50932	0.01998	0.01548	-0.02618	-0.16541
HOUSING	HOUSING -LAST TERM	0.72621	0.52738	0.01786	-0.25564	-0.04212	-0.14419
RACE	RACE	0.73020	0.53319	0.00580	0.24256	0.07219	0.05996
HSS	HIGH SCHOOL STANINE	0.73396	0.53870	0.00552	0.44809	0.03706	0.08957
MARITAL	MARITAL STATUS -AT TIME OF GRAD	0.73728	0.54359	0.00489	-0.08795	-0.13006	-0.07522
HSCURR	HIGH SCHOOL CURR	0.73939	0.54669	0.00310	-0.16027	-0.03364	-0.06016
RELIGION	RELIGION	0.74106	0.54917	0.00248	0.00379	-0.04999	-0.05342
BIRTH	YEAR OF BIRTH	0.74184	0.55032	0.00115	0.31516	0.01085	0.02474
SEX	SEX	0.74222	0.55088	0.00056	0.23977	0.02374	0.02827
FA	FINANCIAL AID	0.74252	0.55134	0.00045	-0.03520	-0.01937	-0.02344
YRGHS	YR GRAD HIGH SCHOOL	0.74257	0.55141	0.00007	0.31634	0.01074	0.02132
SATM	SAT MATH	0.74261	0.55147	0.00006	0.34790	0.00005	0.01076
(CONSTANT)						1.64121	

Table 40

Stepwise Multiple Regression Procedure - School Of Arts and Sciences
Or Science and Technology Data - Variable 16 Added To Equation
Housing - Last Term

********** MULTIPLE REGRESSION ********** VARIABLE LIST 1
REGRESSION LIST 1

DEPENDENT VARIABLE.. CUMGPA CUMULATIVE G.P.A.

VARIABLE(S) ENTERED ON STEP NUMBER 16.. HOUSING HOUSING -LAST TERM

MULTIPLE R	0.77478	ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE	F
R SQUARE	0.60029	REGRESSION	16.	19.20019	1.20001	12.29596
STANDARD ERROR	0.31240	RESIDUAL	131.	12.78481	0.09759	

VARIABLES IN THE EQUATION

VARIABLE	B	BETA	STD ERROR B	F
HSR	-0.09433	-0.33362	0.02223	18.013
SATV	0.00166	0.30093	0.00040	16.816
CURR	0.19628	0.23903	0.04878	16.193
ENTRY	-0.05881	-0.21329	0.01928	9.302
MARITAL	-0.25861	-0.13295	0.11574	4.993
SEX	0.16209	0.16785	0.06073	7.124
SATM	0.00099	0.18101	0.00045	4.887
HSCURR	0.06120	0.08862	0.04094	2.235
HSIZE	-0.00572	-0.07213	0.00455	1.577
HSS	-0.05468	-0.11673	0.04199	1.696
BIRTH	0.04121	0.07755	0.04126	0.998
YRGHS	-0.01349	-0.04784	0.01759	0.588
RELIGION	0.04112	0.04162	0.05733	0.514
FA	0.02937	0.03124	0.05524	0.283
RACE	0.03846	0.02758	0.08427	0.208
HOUSING	-0.00405	-0.01378	0.01739	0.054
(CONSTANT)	0.49189			

VARIABLES NOT IN THE EQUATION

VARIABLE	BETA IN	PARTIAL	TOLERANCE	F

MAXIMUM STEP REACHED

Table 41

Stepwise Multiple Regression Procedure - School Of Arts and Sciences
Or Science and Technology Data
Summary Table

********** MULTIPLE REGRESSION ********** VARIABLE LIST 1
REGRESSION LIST 1

DEPENDENT VARIABLE.. CUMGPA CUMULATIVE G.P.A.

SUMMARY TABLE

VARIABLE		MULTIPLE R	R SQUARE	RSQ CHANGE	SIMPLE R	B	BETA
HSR	HIGH SCHOOL RANK	0.58985	0.34792	0.34792	-0.58985	-0.09433	-0.33362
SATV	SAT VERBAL	0.65239	0.42561	0.07769	0.45041	0.00166	0.30093
CURR	SCHOOL AT CSC	0.69324	0.48058	0.05497	0.40915	0.19628	0.23903
ENTRY	ENTRY -YR-TERM	0.73039	0.53347	0.05289	-0.28865	-0.05881	-0.21329
MARITAL	MARITAL STATUS -AT TIME OF GRAD	0.74206	0.55065	0.01718	-0.13981	-0.25861	-0.13295
SEX	SEX	0.75263	0.56646	0.01581	0.26094	0.16209	0.16785
SATM	SAT MATH	0.75956	0.57693	0.01048	0.41273	0.00099	0.18101
HSCURR	HIGH SCHOOL CURR	0.76303	0.58221	0.00527	-0.07609	0.06120	0.08862
HSIZE	HIGH SCHOOL SIZE X 100	0.76647	0.58747	0.00527	-0.05772	-0.00572	-0.07213
HSS	HIGH SCHOOL STANINE	0.76948	0.59210	0.00462	0.44627	-0.05468	-0.11673
BIRTH	YEAR OF BIRTH	0.77124	0.59482	0.00272	0.25838	0.04121	0.07755
YRGHS	YR GRAD HIGH SCHOOL	0.77267	0.59702	0.00220	0.06808	-0.01349	-0.04784
RELIGION	RELIGION	0.77366	0.59855	0.00153	0.05487	0.04112	0.04162
FA	FINANCIAL AID	0.77427	0.59949	0.00094	0.01201	0.02937	0.03124
RACE	RACE	0.77463	0.60012	0.00063	0.19011	0.03846	0.02758
HOUSING	HOUSING -LAST TERM	0.77478	0.60029	0.00017	-0.10812	-0.00405	-0.01378
(CONSTANT)						0.49189	

Table 42

Table of Beta Coefficients from Regression on Data for Entire Class,
School of Arts and Sciences or Science and Technology,
Or School of Education

Entire Class		Education		Arts and Sciences Science and Technology	
HSR	-0.37747	HSR	-0.36269	HSR	-0.33362
SATV	0.28947	ENTRY	-0.25606	SATV	0.30093
ENTRY	-0.24200	SATV	0.26709	CURR	0.23903
SEX	0.11238	CURR	-0.16541	ENTRY	-0.21329
MARITAL	-0.09101	HOUSING	-0.14419	MARITAL	-0.13295
HOUSING	-0.08527	RACE	0.05996	SEX	0.16785
SATM	0.09439	HSS	0.08957	SATM	0.18101
CURR	-0.05716	MARITAL	-0.07522	HSCURR	0.08862
RACE	0.04447	HSCURR	-0.06016	HSIZE	-0.07213
HSIZE	-0.04432	RELIGION	-0.05342	HSS	-0.11673
BIRTH	0.05367	BIRTH	0.02474	BIRTH	0.07755
YRGHS	-0.03929	SEX	0.02827	YRGHS	-0.04784
HSS	-0.02693	FA	-0.02344	RELIGION	0.04162
RELIGION	-0.01393	YRGHS	0.02132	FA	0.03124
FA	-0.00980	SATM	0.01076	RACE	0.02758
HSCURR	0.00740	(CONSTANT)		HOUSING	-0.01378
(CONSTANT)				(CONSTANT)	

APPENDIX C

FORTRAN PROGRAM TO APPLY REGRESSION EQUATIONS

```
      DIMENSION A(18),ASX(2),AMR(4)
      REAL*4 MAR
      DATA ASX/1HM,1HF/
      DATA AMR/1HM,1HS,1HD,1HW/
      IGOOD=0
      DO 200 I=1,415
      READ (15,100)ASEX,RACE,ENTRY,HSR,SATV,CUMGPA,HSS,CURR,HOUS
      IF (SATV .EQ. 0) GOTO 200
      IF(CURR .NE. 5. .AND. CURR .NE. 7.) GO TO 50
      GO TO 200
 50   SEX=0
      MAR=0
      IF (ASEX .EQ. ASX(1)) SEX=1
      IF (ASEX .EQ. ASX(2)) SEX=2
      IF (ENTRY .GT.780) ENTRY=780-ENTRY
      IF (ENTRY .GT.770) ENTRY=771-ENTRY
      IF (ENTRY .GT. 760) ENTRY=764-ENTRY
      IF (ENTRY .GT. 750) ENTRY=757-ENTRY
      IF (ENTRY .GT. 740) ENTRY=750-ENTRY
      IF (ENTRY .GT. 730) ENTRY=743-ENTRY
      IF (ENTRY .GT. 30) ENTRY=0
      PGPA=-.10329*HSR-.06306*ENTRY+.00140*SATV-.02509*CURR
     A-.04243*HOUS+.09939*RACE+.04198*HSS+2.58759
      RES=CUMGPA-PGPA
      WRITE (2,102)SEX,RACE,ENTRY,HSR,SATV,SATM,CUMGPA,CURR,PGPA,RES,I
      WRITE(14,114)CUMGPA,PGPA
      IGOOD=IGOOD+1
114   FORMAT(2F10.2)
200   CONTINUE
100   FORMAT(T39,A1,1X,F1.0,T44,F3.0,T49,F1.0,T53,F3.0,T59,F3.2,T62,F1.
     A0,F1.0,T68,F1.0)
102   FORMAT(1X,F2.0,1X,F2.0,1X,F4.0,1X,F2.0,1X,2F4.0,1X,F4.2,1X,F2.0,2
     .X,F10.2,1X,F10.2,I6)
      WRITE(2,402) IGOOD
402   FORMAT('   THE NUMBER OF CASES PROCESSED = ',I5)
      STOP
      END
```

PREDICTING STUDENT SUCCESS IN COLLEGE
USING STEPWISE MULTIPLE REGRESSION
RICHARD EDWARD CERULLO

ABSTRACT

The problem was to determine the feasibility of predicting a student's success at a specific college, on the basis of data available at the time of the student's admission to the college. In addition to considering the development of a regression equation which could be applied to the data of any undergraduate entering the college, the feasibility of developing a statistically significant prediction equation at the school and major level was also examined.

The study was carried out in the following manner. Stepwise multiple regression was used on the admissions data of the graduating class of the 1978-1979 academic year. The cumulative grade point average at the time of graduation was used as the dependent variable and sixteen independent variables were considered in the development of the equation. This prediction equation was then developed a second time thru stepwise multiple regression allowing only the first six independent variables which were added in the first procedure to be considered in the second equation.

This six variable prediction equation was then used to predict the cumulative grade point average for the entire graduating class of 1979-1980 using admissions data for the six independent variables. Since the final grade point average was already available for this class, the predicted values were compared to the actual values.

This comparison was made by performing a correlation analysis

on the two sets of values, the predicted and observed grade point averages. The correlation analysis indicated a high level of correlation between the two sets of values. The correlation coefficient was .67 for 338 cases, indicating a significance at the .001 level.

The procedures outlined above which were used on the data for the entire graduating classes of the two periods were then repeated for certain subgroups of the 1978-1979 graduating class and then tested upon the corresponding subgroups of the 1979-1980 graduating class. These subgroups consisted of students in each school of the college and students in certain majors where the number of cases was high enough (greater than 24).

Based upon the results obtained, the following conclusion appears warranted. There was a significant correlation between actual grade point averages and predicted grade point averages using equations developed for the entire graduating class and also for subgroups consisting of students belonging to the same school of the college and even for subgroups consisting of students in the same major. It therefore appears that the development of prediction equations at the specific college tested in the study is feasible.

VITA

PERSONAL HISTORY

Name: Richard Edward Cerullo

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PROFESSIONAL EXPERIENCE

Instructor of Mathematics, Fairmont State College, 1963 to 1964

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