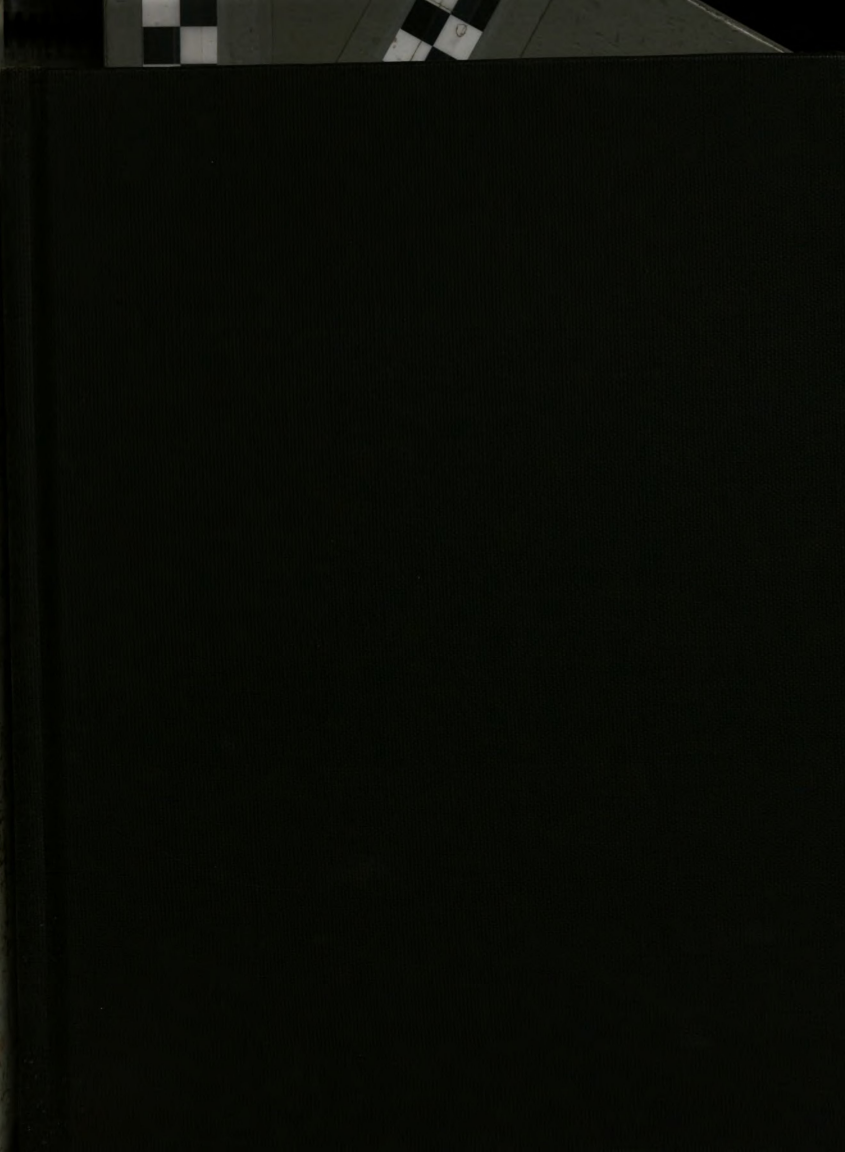




THESIS



This is to certify that the

thesis entitled

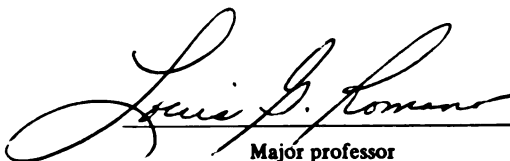
A PREDICTION MODEL FOR
DETERMINING STUDENT ENROLLMENT
AT GENEVA COLLEGE

presented by

Robert E. Armstrong, III

has been accepted towards fulfillment
of the requirements for

Ph.D. degree in Administration &
Higher Education


Major professor

Date 4/21/79



OVERDUE FINES ARE 25¢ PER DAY
PER ITEM

Return to book drop to remove
this checkout from your record.

|

|

A PREDICTION MODEL FOR DETERMINING STUDENT
ENROLLMENT AT GENEVA COLLEGE

By

Robert E. Armstrong, III

A DISSERTATION

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

DOCTOR OF PHILOSOPHY

College of Education

1979

ABSTRACT

A PREDICTION MODEL FOR DETERMINING STUDENT ENROLLMENT AT GENEVA COLLEGE

By

Robert E. Armstrong, III

As private church-related institutions of higher education look to the future in the 1980's and 1990's, the financial crises precipitated by increasing costs and declining enrollments becomes more of a reality.

The purpose of the study was to develop a body of knowledge, including a prediction model that would help Geneva College predict the probability of a student enrolling at the institution.

The study was based on data derived from a sample consisting of the 673 students who applied for admission to Geneva College during the 1976-77 school year. A comparison with those students who confirmed their intentions of enrolling at Geneva College was made with those students who withdrew from the admissions process and did not enroll at the College. The study consists of two parts.

The first part was the development of a prediction model which used 13 independent variables to predict the two dependent variables. The Enrollment Prediction Model developed in the study was defined as follows:

$$Y = A + \sum_j B_j X_j + e$$

where:

Y = the criterion measure;

A = a constant term;

B = the net regression weight that determines the relative effect on Y on a specific X value;

X = the specific predictor variable;

e = an error term.

This model is used to describe the effect that various specific predictor variables have on the dependent variable being examined. The prediction model in the study indicates that status, specifically, confirmed status, can be statistically predicted at a significance level of .05. There were three statistically significant variables developed in the study.

The second part consisted of a series of tests for significant difference between the dependent variables defined in terms of each independent variable. It was determined that six variables were statistically significant while the remaining seven variables were not significant at the .05 level. This determination was based on the examination of each independent variable using the appropriate statistic. It was further determined that the statistically significant predictors were also operationally significant in the Geneva College Admissions program.

The data were analyzed on the Michigan State computer system using the Statistical Package for Social Science

Robert E. Armstrong, III

(SPSS). The evaluation of the data uses Pearson Product Moment correlation, multiple regression analysis, t-Tests, and chi-squared techniques. The .05 level was used in all tests as the level of acceptable statistical significance.

The Enrollment Prediction Model developed in the study, although specifically related to and based upon data from Geneva College may be applicable to other church-related institutions.

ACKNOWLEDGEMENTS

I wish to express my sincere appreciation to Dr. Louis G. Romano, my Chairman, and to Dr. Vandel C. Johnson, Dr. Lawrence Borosage, and Dr. John W. Allen for serving on my committee. Their comments and suggestions have been invaluable and necessary in the completion of this task.

A special thanks to Geneva College, and particularly to Paul Arnold of that institutions for his assistance in the statistical analysis of the data.

A personal thanks to Herrell DeGraff, Jack Allen, and George Farah whose direct and indirect encouragement enabled me to finish a task first inspired by Marian W. Armstrong.

And finally, a debt of gratitude to Sandy for her understanding support throughout the process.

TABLE OF CONTENTS

	<u>Page</u>
 CHAPTER 1 - INTRODUCTION	
Financial Crisis in Private Higher Education	1
Enrollments	2
The Changing Role of the Admissions Department	4
The Role of the Christian College and the Need for Prediction	10
Statement of the Problem	12
Statement of Purpose	12
Objectives	13
Design of the Study	14
Related Work	15
Scope and Limitations	15
Definition of Terms	17
Assumptions	18
Hypotheses and Variables	19
Hypotheses	19
Variables: A List of General Predictor Variables	20
Method of Presentation	20
 CHAPTER 2 - RELATED LITERATURE	
Forward	22
Methodology	22
Enrollment Patterns	26

	<u>Page</u>
Overall Enrollment Trends	26
Private Church-Related Institutions	30
Prediction and Prediction Models: A General Background	41
 CHAPTER 3 - PLANNING AND DEVELOPING THE STUDY	
Population	53
Procedures and Instruments	54
Methodology and Analysis of Data	59
The Model	61
Limitations	62
Summary	62
 CHAPTER 4 - ANALYSIS OF DATA	
Forward	64
Part I: Hypothesis 1 - The Model	64
Part II: Hypotheses 2 through 14 - Tests of Independent Variables	72
Part III: Comparative Analysis and Operational Application	101
Comparative Analysis	101
Operational Applications	105
Summary	107
 CHAPTER 5 - SUMMARY AND RECOMMENDATIONS	
Summary	108
The Study	110
Review of Literature	111
Related Work	112

	<u>Page</u>
Conclusions	112
Recommendations for Further Study	114
Reflections	115
 APPENDICES	
Appendix A - Admissions Apple File	117
Appendix B - Applicant File Map	120
Appendix C - A Review of the Methodology of Models and Methods of Forecasting	

LIST OF TABLES

	<u>Page</u>
Table 1-1 Survey of 372 Church-Related, Four-Year Liberal Arts Colleges and Universities in the United States with 1975 FTE Enrollments of 250 to 2900 Students	5
Table 1-2	6
Table 2-1 Experience of Private Colleges and Universities in the Recruitment and Admission of Undergraduate Students, 1969-70 through 1975-76	31
Table 2-2 Statistical Summary	35
Table 4-1 Variables in the Final Regression Equation	66
Table 4-2 Variables Not in the Final Regression Equation	67
Table 4-3 Multiple Regression Variables Affecting Predictability of Status	68
Table 4-4 Correlation Coefficients for Variables in the Multiple Regression Analysis Independent Variables Affecting Status	70
Table 4-5 The Effect of Anticipated Term of Matriculation on Status--Confirmed vs. Withdrawals	73
Table 4-6 The Effect of Date of Campus Visit on Status--Confirmed vs. Withdrawals	75
Table 4-7 The Effect of Date of Acceptance on Status--Confirmed vs. Withdrawals	77
Table 4-8 The Effect of Indicated First Major on Status--Confirmed vs. Withdrawals	80
Table 4-9 The Effect of Source of Contact with College on Status--Confirmed vs. Withdrawals	83
Table 4-10 The Effect of Type of Student on Status--Confirmed vs. Withdrawals	86

Table 4-11	The Effect of Church Affiliation on Status-- Confirmed vs. Withdrawals	88
Table 4-12	The Effect of Location of Hometown on Status--Confirmed vs. Withdrawals	90
Table 4-13	The Effect of Scholarship Aid on Status-- Confirmed vs. Withdrawals	94
Table 4-14	The Effect of High School Class Rank on Status--Confirmed vs. Withdrawals	97
Table 4-15	The Effect of High School Class Size on Status--Confirmed vs. Withdrawals	98
Table 4-16	The Effect of SAT Verbal Scores on Status-- Confirmed vs. Withdrawals	99
Table 4-17	The Effect of SAT Math Scores on Status-- Confirmed vs. Withdrawals	100

LIST OF FIGURES

	<u>Page</u>
Figure 1-1	7
Figure 1-2	8

CHAPTER 1
INTRODUCTION

Financial Crisis in Private Higher Education

Between the years 1957 and 1962, the birth rate in the United States dropped from twenty-three births per thousand of population to fifteen births per thousand of population, and finally leveled off during the 1960's to approximately thirteen births per thousand where it has held ever since. During this same period, American higher education was in the midst of the largest expansion of physical plant in its history. Twenty years later, it is now faced with "excess capacity" and a "decreasing demand" for the services rendered.

This situation means different things to different institutions. At the large, publicly-supported universities or the heavily endowed private institutions, it means a re-evaluation and probable curtailment of programs. At the community college, it perhaps will spell the end of proliferation of programs, particularly as local tax payers become more resistant to increasing demands for funds.

At the small, private college, the implications are much more serious because student enrollment is either directly or indirectly the primary source of revenue. A

relatively small decrease in enrollment, coupled with a high level of fixed costs, can mean financial disaster and the ultimate closing of the institution.

The potential financial crisis is now well documented; in his article, "Colleges in the Red," Jack Magarrell reports that "The American Council on Education estimates that thirty-four percent of our nation's colleges and universities operated in the red in the past fiscal year."¹ This issue becomes even more relevant for the private colleges, as reflected in an article from The Chronical of Higher Education: "A report of the financial health of private colleges and universities has found more than a fourth of them in serious distress with their survival in doubt."²

Since most private institutions view the majority of their operating costs as fixed or at least semi-fixed, this shifts the emphasis to the revenue side of the financial equation. The burden of survival is therefore shouldered by the Admissions Department who is usually responsible for generating the necessary revenues from enrollment.

Enrollments

Just as certainly as the period between 1957 and 1962 saw a sharp drop in the birth rate, so the period of 1977-1979 is most certain to see a marked decrease in college enrollments. The impending financial crisis brought about by these reduced enrollments has been a foregone conclusion

for the last three to five years as reflected by the analysis of high school enrollments; nevertheless, the college community seems to be playing ostrich in an attempt to avoid the issue. Projections such as the one developed by Frankel and Beamer have been available since 1974 and indicate the problem higher education will face as a result of declining high school enrollments:

The latest USOES estimates indicate that 1976-77 will be the peak year for total number of high school graduates, with 3,199,000 projected. Thereafter, high school graduates are expected to decline each year, so that by 1982-83 the estimated number will be 2,835,000 or a decrease of about 11.3% over the figure for 1976-77.³

This information is validated by a number of other governmental agencies including the Department of Health, Education and Welfare, which indicates that the potential number of college students will be down by 25-30 percent by the year 1990.⁴ Again, the information was specifically directed to college administrators by none other than Garland Parker of the University of Cincinnati, in his report of 1976 in which he observed the following:

Indeed, this writer has predicted all along that overall enrollments would increase through the 1976-77 period of the 1970's, begin to level off in the late 1970's, peak at the end of the decade or the beginning of the 1980's, and then, probably, start a slow decline that would accelerate throughout the 1980's.⁵

Although there is some discrepancy as to the specific timing of Parker's projected decline in enrollments, apparently they are coming sooner rather than later, the trend and the

difficulties resulting from that trend are extremely apparent. A comparative analysis of Table 1-1 and 1-2 indicates that declining enrollments were becoming a problem not only for higher education in general, but for church-related institutions specifically.

Figures 1-1 and 1-2 reflect the fact that Geneva College (controlled by the Reformed Presbyterian Church-North America) was one of the 122 schools reporting losses during the 1965-75 period, as well as a slight increase in 1976 over 1975. The tables and figures depict a rather erratic enrollment picture reflecting the difficult time that Geneva has been having attracting the students that will generate the necessary revenue for the survival of the institution. The changing enrollment picture has affected the role played by the Admissions Department as they face their new and increasingly important responsibility.

The Changing Role of the Admissions Department

The role of the Admissions Officer has changed most drastically over the last twenty years, so much so that the function at most institutions is not of admissions, but now one of recruitment and promotion. Again, this reflects the change in the capacity of the higher educational system to

Table 1-1

**Survey of 372 Church-Related, Four-Year Liberal Arts Colleges and
Universities in the United States with 1975 FTE Enrollments
of 250 to 2900 Students:**

Aggregate full-time-equivalent (FTE) enrollment 1965 compared to 1975:

1965	1975	#	%*	(n) number of institutions reporting
287,052	324,124	+37,144	+13	327 (88% of 372)

FTE enrollment 1965 compared to 1975 according to religious affiliation:

	1965	1975	#	%*	n	#gaining	#losing
Protestant Episcopal	2404	4094	+ 1690	+70	4	4	0
Assemblies of God	1916	2810	+ 894	+47	4	4	0
Baptists	7050	9745	+ 2695	+38	9	8	1
Southern Baptists	30554	39941	+ 9387	+31	30	25	5
Seventh-Day Adventists	5913	7474	+ 1561	+26	7	5	2
Mennonite Church	2325	2782	+ 457	+20	3	3	0
Roman Catholic	73069	86120	+13051	+18	95	55	40
Free Methodist	1940	2227	+ 287	+15	3	2	1
American Lutheran	8891	10095	+ 1204	+14	6	5	1
Christian Church Disciples of Christ	2818	3112	+ 294	+10	3	2	1
Lutheran Church in America	14683	15672	+ 989	+ 7	12	7	5
Presbyterian, U.S.	7677	8116	+ 439	+ 6	11	7	4
Friends	4678	4939	+ 261	+ 6	6	4	2
Church of the Brethren	3839	3853	+ 14	0	4	2	2
United Methodist	57826	57561	- 265	0	57	26	31
United Church of Christ	3617	3524	- 93	- 3	5	2	3
American Baptist	3881	3643	- 238	- 6	5	2	3
United Presbyterian, U.S.A.	19279	18020	- 1259	- 7	19	8	11
Church of the Nazarene	6622	5950	- 672	-10	6	3	3**
Others	28070	34446	+ 6376	+23	38	29	9

Source: McGrath, Earl J. and Richard C. Neese. "Are Church-Related Colleges Losing Students?" Arizona University, Tucson-College of Education, Topical Paper #6.

*Percentages rounded to the nearest whole number.

**If two Nazarene colleges founded in the late '60s were included for the ten-year period, aggregate enrollment for the Nazarene colleges would have increased by 660 for a nine percent gain.

Table 1-2

Aggregate full-time-equivalent (FTE) enrollment 1975 compared to 1976:

1975	1976	#	%*	(n) number of institutions reporting
338,365	345,717	+7,352	+2	343 (92% of 372)

FTE enrollment 1975 compared to 1976 according to religious affiliation:

	1975	1976	#	%*	n	#gaining	#losing
Church of the Nazarene	5950	6812	+ 862	+14	6	5	1
American Baptist	3643	3906	+ 263	+ 7	5	2	3
Seventh-Day Adventists	7474	7811	+ 337	+ 4	7	5	2
Roman Catholic	87471	90833	+ 3362	+ 4	97	57	39**
Church of the Brethren	3853	3963	+ 110	+ 3	4	3	1
United Presbyterian, U.S.A.	19632	20106	+ 474	+ 2	22	8	14
United Methodist	58665	60039	+ 1374	+ 2	58	39	19
Lutheran Church in America	16361	16680	+ 319	+ 2	13	4	9
Friends	4939	4992	+ 53	+ 1	6	3	2**
Free Methodists	2227	2249	+ 22	+ 1	3	2	1
Assemblies of God	2810	2831	+ 21	+ 1	4	2	2
Southern Baptist	44403	44729	+ 326	+ 1	34	20	13**
Christian Church Disciples of Christ	3497	3501	+ 4	0	4	2	2
Baptists	9745	9684	- 61	- 1	9	6	3
Presbyterian, U.S.	9386	9326	- 60	- 1	12	5	7
American Lutheran	11278	11205	- 73	- 1	7	3	4
Protestant Episcopal	4094	4055	- 39	- 1	4	2	2
United Church of Christ	4518	4436	- 82	- 2	6	4	2
Mennonite Church	2782	2680	- 102	- 4	3	1	2
Others***	35637	35879	+ 242	+ 1	39	24	14**

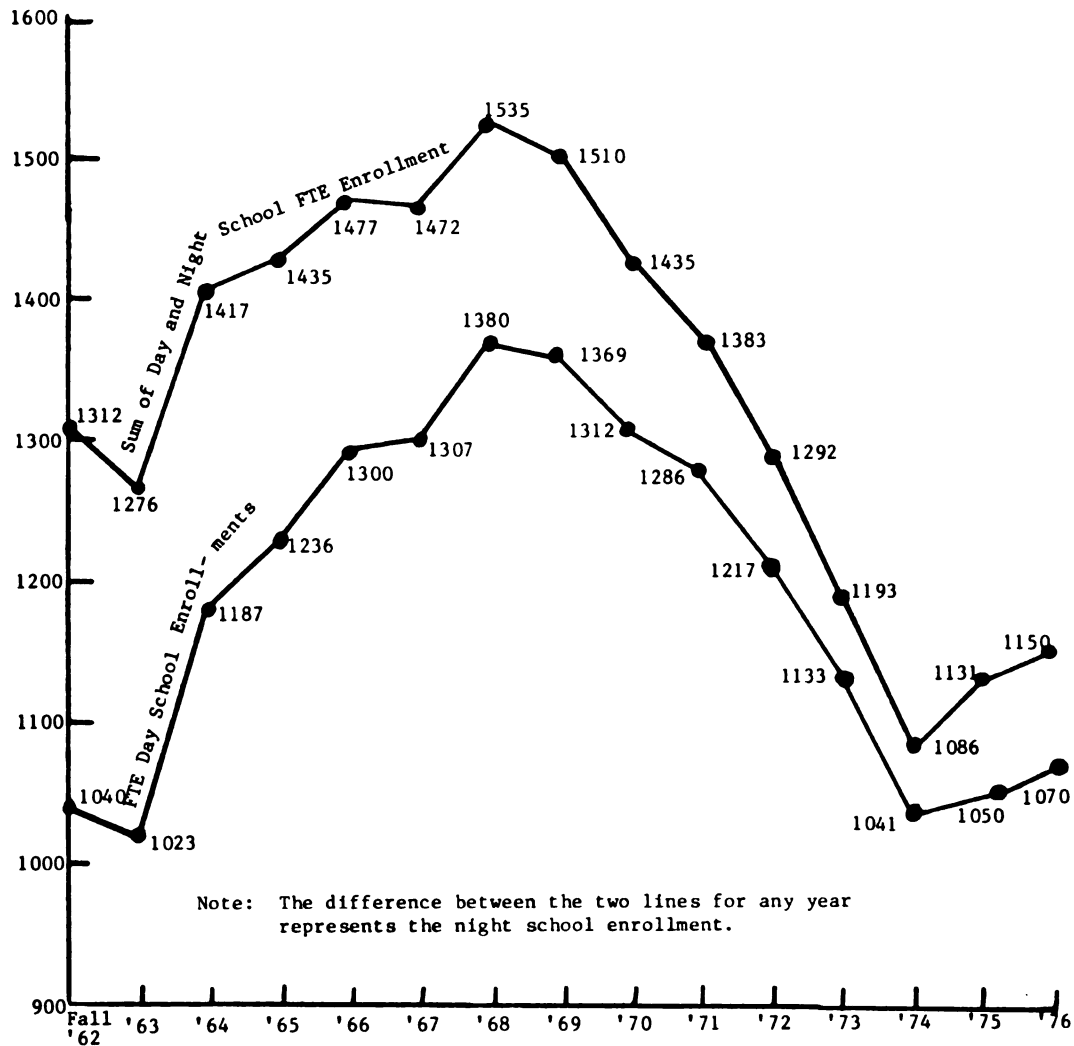
Source: McGrath, Earl J. and Richard C. Neese. "Are Church-Related Colleges Losing Students?" Arizona University, Tucson-College of Education, Topical Paper #6.

*Percentages rounded to the nearest whole number.

**The enrollment in one college remained unchanged.

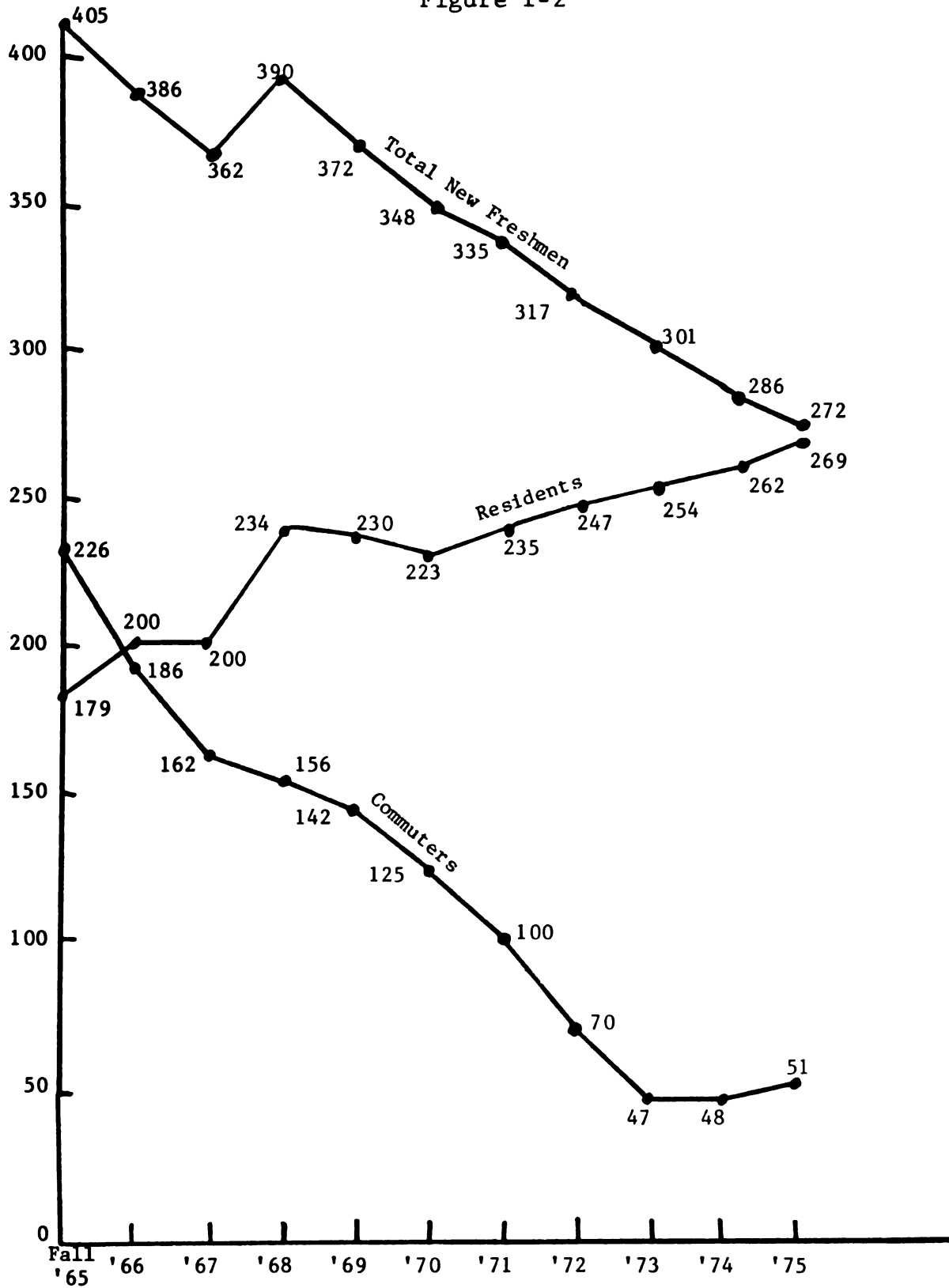
***Others (religious groups with two colleges or less reporting) include: African Methodist Episcopal, African Methodist Episcopal Zion Church, Brethren Church, Bretheren in Christ Church, Christian Methodist Episcopal, Christian Missionary Alliance, Christian Reformed Church, Church of Christ, Church of God (Anderson, IN; Cleveland, TN; Findlay, OH), Evangelical Covenant Church of America, Friends United Meeting, General Conference Mennonite Church, Mennonite Brethren, Moravian Church, Reformed Church in America, Reformed Presbyterian, Reorganized Latter-Day Saints, United Brethren Church, Wesleyan, Interdenominational, Multiple Protestant Denominations.

Figure 1-1



Source: Office of Institutional Research and Planning,
Geneva College.

Figure 1-2



Source: Office of Institutional Research and Planning,
Geneva College.

supply a service in comparison to the demand for that service reflected by the society. As Thomas LaBaugh comments in his recent Michigan State University dissertation:

Nicoll identifies a shift during that decade (1960's) as the admissions structure moves away from the role of counseling students seeking a suitable college, to a role of "recruiter of students for the college they represent."

In October of 1970, L. Richard Meeth describes the function of the admissions office in business terms when he asks: "Does the college have a clear and realistic understanding of its market?" This is the first time in the review of the literature that the term "market" arises.⁶

A good case could be built for observing that the "educational industry" has gone through the same stages of development as most other industries. In the early stages of the cycle the need for education stimulated a demand for the service, which was met by increased capacity. As capacity increased, the services supplied met the demand and we reached a short period of comparative balance during the sixties. As we moved into the later stages of the cycle the demand declined, leaving the many problems typical of an industry in the more advanced stages of the product growth cycle.

As indicated by the quotation from LaBaugh's dissertation, higher education has reacted similarly to any other industry with excess production capacity. The result has been a whole series of articles, chapters, and even books dealing with the role of the "Admissions Officer."^{7,8,9}

As the actual pressure for survival increased, with continuing decrease in demand, coupled with a fixed supply

and no viable "substitution function" or "ease of exit", the tendency was to "sell the product."

Again, the results of this kind of activity brought on all sorts of editorial comments as to the differentiation between "sales" and "marketing" and the ethical behavior associated with each.^{10,11,12}

Again the behavior can be explained in terms of the marketing functions of a product life cycle and the shift to what McCarthy and others refer to as "market orientation" rather than "product orientation."¹³ Those institutions in the education industry who start to adopt a market orientation in an attempt to identify and satisfy student needs will not only be supplying a valid and ethical service, but will also have a much better chance of survival. The key to a market-oriented organization is the identification of a market segment which can best be met by that particular institution.

The Role of the Christian College and the Need for Prediction

The preceeding section suggests that there is a specific place for the church-related college, provided it can satisfy the need of a particular market segment; the conclusion of a study by McGrath and Neese completed in 1977 validates this position:

It appears that the present condition and future prospects of these institutions is not as

precarious as some observers have asserted, and that the educational and fiscal health of the church-related colleges will in large part depend on their tenacity in holding to the basic religious, spiritual, and moral principles that animated their establishment. Church support and government financial aid to students who choose these colleges and universities will also be important in assuring their survival and educational quality. But the schools will have to represent an attractive option to young people in order to compete successfully.¹⁴

The last sentence reflects what McCarthy refers to as "market segmentation."¹⁵ One of the starting points of market segmentation is an analysis of present "customers," i.e., enrolled students, and those that were interested at one point, but at the last minute changed their mind (withdrawals). It is with this purpose in mind that a prediction model for Geneva College is being examined.

The grim facts are these: a 25 to 30 percent decrease in the national pool of potential students during the next fifteen years; a 50 percent decrease in the Western Pennsylvania area; 80 percent of the decrease in most cases coming in the middle income class; a trend away from the four-year liberal arts colleges, and a trend to the community colleges and vocational training in general.

If Geneva College is to survive and prosper in the face of these changing market conditions, adequate market data and the tools to analyze it becomes increasingly important. Considering the obvious seriousness of the problem and the importance of student enrollment, the objectives of this study as they relate to Geneva College become quite specific.

Statement of the Problem

The preceeding observations lead to a specific problem statement: to identify those students who are most likely to enroll at Geneva College. Student enrollment represents 85 percent of total revenues for Geneva and is thus one-half of the financial equation.

Given the high percentage of fixed costs, the overriding problem for Geneva College is quite simply "where are the students going to come from," or in terms of marketing "who is going to buy our product," in this case "a service" called college education.

The study of the development of a prediction model is therefore being undertaken due to the declining enrollments of Geneva College as reflected in Figures 1-1 and 1 - 2.

The problem is compounded by the fact that enrollment at other "Christian or church-related" colleges has not declined as severely as has the enrollments at Geneva (Tables 1-1 and 1-2).

Statement of Purpose

A thorough review of the literature reveals that there are no prodiction models for enrollment at private, church-related institutions of higher education. The purpose of this study is to develop a body of knowledge, including the development of a prediction model which would:

- 1) Identify at the time of application those students who are most likely to finally enroll at Geneva.
- 2) Identify those who will probably not enroll at Geneva, even if accepted.
- 3) Concentrate the recruitment efforts on those students who are most likely to ultimately enroll.
- 4) Examine the difference to see if anything can be done to increase the number of students who enroll.

Objectives

As a result of the proposed investigation of the problems suggested by the preceeding Statement of Purpose, it is hoped that the findings will aid Geneva College to identify the kinds of students whose educational needs are met by the institution, and thereby maintain sufficient enrollment so as to continue to be a viable church-related liberal arts college. The major objectives are:

- 1) To determine the characteristics of the confirmed students.
- 2) To determine the characteristics of the "withdrawals" as defined by Geneva College.
- 3) To compare the characteristics of the confirmed students with the characteristics of the "withdrawals."
- 4) To determine if there are significant differences between the two groups.
- 5) To examine the possible differences between the groups in an attempt to build a model which helps predict the students who are most likely to enroll.

Design of the Study

The study uses a sample made up of the total number of students who applied to Geneva College during the 1976-1977 school year for admission in the Fall of 1977. The total population was broken into three segments: those who were not accepted by Geneva; those who were accepted and "confirmed" their intentions of enrolling, and; those who were accepted and "withdrew" (i.e., those who did not enroll).

The data were collected by members of the Admissions Department of Geneva College using an "Admissions Apple File" form to record the data on each applicant (Appendix A). These data were stored in an "applicant file" (Appendix B) on the I.B.M. computer at Geneva College, which is part of the standard data bank kept on each Geneva College student.

An examination was made of the data that was available on each student for the school year 1977-78 and pertinent data was key-punched on Fortran Computer cards by the Geneva College Data Processing Center personnel. The data from these cards were then used in testing hypotheses of the study. The Multiple Regression Model, available from the Statistical Package for the Social Science (SPSS) on the Michigan State University's Control Data Corporation 3600 Computer, was used to test the first hypothesis, while the remaining hypotheses were tested by use of chi-square technique and t-Tests.

Related Work

Aid in the design of the study was obtained from Dr. Billie Rader of the Department of Vocational Education, College of Education, Michigan State University, Mr. William Brown, Research Assistant for SPSS, Michigan State University's Computer Center, and from Dr. Paul Arnold, Professor of Statistics, Geneva College.

Scope and Limitations

The findings of this study will be limited to and based upon a sample defined as those students applying to and accepted by Geneva College during the 1976-77 school year for admission in the Fall of 1977. The total population for that year therefore represents a sample of all students that will apply to Geneva College in the future. The students that applied to Geneva College and were rejected by the college, although originally included as part of the total population, were eliminated from the data base due to the fact that this information was of no value in predicting the students that would eventually enroll at the college. A much larger group of students that were eliminated from the study, due to a lack of data as well as financial and time constraints, were those students who requested information about the college but who never actually applied to Geneva. By defining the sample in this manner the total population was used as a basis for the study.

As a result of this restricted data base, the predictions derived from the study will be directly generalized to future enrollments of Geneva College. On the other hand, the prediction model itself may well be generalized to other institutions which are interested in a similar church-related market segment. This group would include some five-hundred institutions of higher learning.

Due to the fact that the external variables are changing rather rapidly, the results of this study will be valid only for that period of time during which those external variables remain relatively constant. A case in point might result from such things as a severe recession or an acute energy shortage. A more difficult problem might conceivably result from a shift in the way that the potential market perceives the educational services offered by Geneva College. In such a case, the shifts or changes in the external variables are very difficult to determine.

Finally, the study has been limited to Geneva College data to gain maximum results from the analysis in an attempt to offset Geneva's specific enrollment problems. By restricting the study of a sample consisting of the most recent group of accepted applicants, an attempt will be made to determine accurately those characteristics which identify students who will most likely enroll at the institution. This, in turn, will allow for the highest degree of accuracy from the prediction model.

Definition of Terms

In order that the reader will be able to understand some particular and peculiar terms used in the study, they are listed and defined below:

Acceptance Data--date student was notified by Geneva that he/she was accepted.

Confirmation Date--date student paid his deposit indicating he/she would enroll.

"Confirmed"--refers to those students who have applied, been accepted, and have indicated their intention to enroll at Geneva by payment of a deposit.

Demographic Characteristics--includes all those characteristics used to describe a "student."

Denomination--indicates broad denominational grouping, such as Evangelical, Protestant, Catholic and all others.

First Major--area of study given by student as his/her preferred choice.

Geographic Location--identification of student's home town broken into Beaver County, three-county area, Pennsylvania, Ohio, and all others.

Model--an equation or set of equations depicting the causal relationships that are believed to generate observed data. Also, the expression of a theory by means of mathematical symbols or diagrams.

P.C.S. in Date--date when Geneva received the "Parents Confidential Statement" which is the basis for financial assistance.

Source of Contact--the way the student found out about Geneva.

Special Scholarship Eligibility--indicates student is eligible for a special scholarship.

Student--refers to high school or transfer students involved in the admissions process.

Type of Student--indicates whether the student is full- or part-time, day school or night school, commuter or resident.

Visit--means the student has actually visited the college.

"Withdrawals"--those students who have been accepted but have decided not to enroll at Geneva.

Assumptions

Due to the fact that the extensive review of the literature shows no similar studies have been conducted, the following assumptions are offered:

- 1) The information on the student's application form is unbiased and accurate.
- 2) The information transferred and stored on the computer memory is also accurate.
- 3) The same information will be available in the future; thereby enabling the prediction model to be annually updated.
- 4) The information and the prediction model will help in the decision-making process at Geneva College so that the necessarily limited resources of the Admissions Department can best be used to offset the problem of declining enrollment.

Hypotheses and Variables

Based on the review of the literature and the assumptions of the study, the following hypotheses and list of variables are offered.

Hypotheses

- 1) The confirmed students can be predicted significantly from a set of variables.
- 2) There are no significant differences in the Term of Matriculation between confirmed and withdrawals.
- 3) There are no significant differences in the Dates of the First Campus Visit between confirmed and withdrawals.
- 4) There is no significant difference in the Acceptance Date between confirmed and withdrawals.
- 5) There is no significant difference in First Majors between confirmed and withdrawals.
- 6) There is no significant difference in Source of Contact between confirmed and withdrawals.
- 7) There is no significant difference in Type of Student between confirmed and withdrawals.
- 8) There is no significant difference in Denomination between confirmed and withdrawals.
- 9) There is no significant difference in the Distance from Home between confirmed and withdrawals.
- 10) There is no significant difference in Type of Scholarship Aid between confirmed and withdrawals.
- 11) There is no significant difference in Class Rank between confirmed and withdrawals.
- 12) There is no significant difference in Class Size between confirmed and withdrawals.

- 13) There is no significant difference in the S.A.T. Verbal Test Scores between confirmed and withdrawals.
- 14) There is no significant difference in the S.A.T. Math Scores between confirmed and withdrawals.

Variables: A List of General Predictor Variables

VAR002	Term of Matriculation
VAR003	Date of First Visit
VAR004	Acceptance Date
VAR005	First Major
VAR006	Source of Contact
VAR007	Type of Student
VAR008	Denomination
VAR009	Zip Code
VAR010	Type of Scholarship Aid
VAR011	Class Rank
VAR012	Class Size
VAR013	S.A.T. Verbal
VAR014	S.A.T. Math

Method of Presentation

Chapter 1 has been comprised of a general introduction to the dissertation, a statement of the problem, the general purpose of study, its design, definition of terms and hypotheses, as well as its limitations.

Chapter 2 will deal with the related literature which gives support for the need to develop such a study. This chapter will be somewhat more general than might be the case due to the fact that there have been no prediction models developed for private, church-related institutions of higher education.

Chapter 3 will deal with the planning and development of the study. It will include some comments on the need for this study, the decision to use the specific sample chosen, the advantages of the techniques involved, and the type of statistical analysis employed.

Chapter 4 will present an analysis of the data, and Chapter 5 will draw conclusions and make suggested recommendations.

CHAPTER 2

RELATED LITERATURE

Forward

If, as the Carnegie Commission Report has indicated in its now famous quote "the golden years of higher education" were during the sixties; and if, as a number of people have suggested, we are now in a period of ever-increasing crisis, the study of a prediction model for a college such as Geneva is all the more necessary. The study would, of course, not be complete without an examination of the related literature. This is the topic of this chapter, and the discussion will be broken into four basic parts:

1. The general description of the methodology.
2. The literature related to overall decreasing enrollments.
3. The general use of prediction models.
4. The limited use of the specific enrollment prediction model.

Methodology

One of the relatively recent and certainly most efficient research tool which has been developed is the Educational Resources Information Center, better known as ERIC. By

definition ERIC is

. . . a national information network for acquiring, selecting, abstracting, indexing, storing, retrieving, and disseminating significant and timely education related reports. It consists of a coordinating staff in Washington, D.C. and 16 clearing houses located at universities or professional organizations across the country. These clearing houses, each responsible for a particular educational area, are an integral part of the ERIC system.¹⁶

ERIC was started in 1964 under the guidance of the U.S. Office of Education which maintained this system through July of 1972. Beginning in August of 1972, ERIC has been under the governance of the National Institute of Education (NIE). An integral part of the ERIC system, Research in Education, or since 1975 renamed Resources in Education (RIE), is a reference publication which provides access to the various report literature in the field of education. Because of the difficulty in covering journal articles, an additional index has been developed by the ERIC system, called the Current Index to Journals in Education (CIJE). This new publication makes available those periodicals that are of particular interest to practitioners in the field of education. It presently covers more than 700 publications which represent the core periodical literature in the field. All of these articles, along with the educational documents previously listed, are covered by one of the 16 ERIC clearing houses. The heart of the ERIC system is the group of ERIC descriptors that are identified in the thesaurus of ERIC descriptors which is

really a vocabulary developed by specialists at the ERIC clearing houses. It uses an indexing system for the various documents, projects, and journal articles which are entered into the ERIC information system. These descriptors are based upon documents or journal articles previously indexed and currently included in the system. If one is interested in a particular topic, he or she would develop a search based on likely descriptors that might have been used in previous articles to describe the topic. This group of descriptors would then be used in what is referred to as an on-line computer search of the ERIC files. At the Michigan State University library, there are two experts who specialize in the development of on-line computer search techniques of the ERIC system. Linda DeWitt is one of these experts and was of great assistance in this study as she helped the author develop the basic search mode which is described as follows.

After careful examination of the various descriptors that were being used to describe the general area, it was decided that some twenty different descriptors be used for the broad-based search. These were divided into three major categories. In the first grouping the following descriptors were included: prediction, predictive measurement, predictor variables, multiple regression analysis, cohort analysis, simulation trend analysis, mathematical model, and models. As a result of this sort, some 9,189 possible articles and documents were identified by the computer search. The

second group of descriptors which yielded 4,170 possible sources included: enrollment, enrollment influences, college admission, enrollment projections, enrollment trends, and enrollment rate. The third group which yielded an unbelievable 45,382 possible sources included the following descriptors: higher education, post-secondary education, colleges, universities, church-related colleges, and private colleges. From this potential of some 58,000 sources, the methodology was simply to identify a relatively wide scope and then a relatively narrow scope literature search. By combining the three groups previously listed, it was possible to identify and later investigate a combination of 212 articles, which in essence had to include at least one descriptor from each of the three categories. This search then gave a much broader background than would necessarily be needed. The next step was to restrict the search to those works which would be most directly related. It was decided to confine the search by restricting the third group of descriptors so that it included only studies dealing with private colleges and/or church-related colleges. Of those two descriptors, 970 specific references were identified and examined; and when combined with the descriptors in groups one and two above, the identification of 18 references was developed.

It is of great interest to the author to realize that in addition to the other search techniques such as the examination of dissertations and related articles, that it is possible to develop through the ERIC system a methodology

which would include some 58,000 sources as a potential base of references and then restrict that to a very workable 200 references. As a result of this system, then, the information in the literature search seems to be much more thoroughly covered than would ever be possible through the more traditional system of sorting through various card indexes and journal topical indexes.

Enrollment Patterns

As suggested by the descriptors discussed in the development of the methodology and outlined in the preceeding section, a major portion of the related literature deals with the overall enrollment trends for higher education during the last 15-20 years. Four different perspectives can be specifically related to this study: first, the shifts in general overall enrollment for higher education; second, changes in enrollments for a private, church-related institution; third, the variations and similarities between general enrollment patterns and those for church-related institutions; and fourth, the anticipated effects on specific church-related colleges.

Overall Enrollment Trends

One of the most thorough and most recent articles relating to the first general heading was published in January, 1978, by the Library of Congress. It was entitled, "Future

of Higher Educational Enrollments: An Analysis of Enrollment Projections," and was done by James Stedman.¹⁷ In the study, Stedman examined three recent demographically based enrollment projection studies. The first of these projections was prepared by the National Center of Educational Statistics (NCES). The second set of projections was the one developed by the Carnegie Council on Policy Studies in Higher Education, while the third set was based on the work of Allen Cartter. Stedman's comparative analysis of these three studies is particularly important as it gives some indications of the necessity of being aware of the enrollment projections, and also points out the degree of difficulty of interpretation of these enrollment projections. The synopsis of these various studies, as Stedman sees them, are as follows: the NCES study projects that total enrollments will grow by some 22 percent from 1975 to 1983 when they peak, and that by 1985 those same enrollments will have dropped by 2.1 percent from that 1983 peak. On the other hand, the Carnegie projections show a slightly different pattern with head count enrollments projected to grow 2.8 percent between 1980 and 1985 and then fall 4.1 percent before 1990. Enrollments would then, according to Carnegie projections, grow during the last decade of the century by some 6 percent. The projections developed by Cartter, while he was at the University of California, indicate an increase in undergraduate enrollments up to 1982 when a decline period will begin which will shrink 7.2 percent by 1990 and continue to decline

through 1993 when a recovery period begins.

James Stedman begins with a word of warning for the academic administrator as he attempts to analyze these projections.

At the outset, it should be noted that strict comparisons of these projections is particularly difficult. . . we would argue that only the trends described by the numbers should be directly compared, and then, only if care is taken to assess the assumptions used in the type of enrollment being measured.¹⁸

Stedman points out that the NCES projections are based on the assumption that the 1974 percentage of full-time undergraduate enrollment of 18 to 21 year-olds will follow the same pattern that was established between 1965 and 1975; this is in contrast with the assumptions made as a basis for the Carnegie estimate of head count. The author goes on to suggest that the Carnegie projection shows that the decline will occur in the second half of the next decade rather than during the first half. Although this is perhaps significant, it is probably a result of a different treatment of that 18 to 21 year-old cohort which is examined in each instance. As a result then of a comparison of the first two sets of projections, the author stresses that both of these projections are based on assumptions which do not include a relationship to the labor market for college-educated individuals so that in the direct sense, they are both demographically based studies. In contrast to the Carnegie projection and the NCES projection, the work done by Cartter is influenced by changing demands for undergraduate enrollment in the labor

market. As a result of injecting the influence of the demand, Cartter's enrollment projections tend to be slightly different from those of the preceeding analyses.¹⁹

The message pointed out by Stedman's concluding paragraph is painfully clear. He suggests that no single projection of enrollment will supply all the answers for every institution, but it is apparent that those institutions who have depended on the traditional source of 18 to 21 year-old students will have to compete with other institutions for their share of that shrinking market. He observes that,

. . . in final analysis, many institutions will probably find themselves fighting the battle between maintaining traditional methods and traditional missions and instituting change which may constitute substantial redirection of those basic purposes.²⁰

In his final word of warning, Stedman points out two things:

The projections of change in enrollments do not give individual institutions much more than a warning that planning and analysis are in order. Demographic change, such as the decline in the 18 to 21 year-olds in the next two decades constitute only one of the many forces influencing higher education enrollments.²¹

The kinds of forces that will influence higher education enrollments in the coming years is suggested by a recent Bureau of the Census publication enrirled, "School Enrollments, Social and Economic Characteristics of Students."²² As a result of this analysis, the Bureau of the Census indicates that there are a number of forces that are influencing changes in college enrollments including shifts in family income, the changing size of the armed forces, the variations in the means of obtaining high school diplomas, the types of

degrees being sought by college students, and the availability of income generated through the "G.I. Bill." The concluding results of this study and of similar studies points out that it is not sufficient to analyze the demographic changes in the 18 to 21 year-old cohort without taking into consideration numerous other social and economic influences that are presently affecting enrollments in higher education.

Private Church-Related Institutions

The next relevant group of related literature suggests that the changing enrollment picture is one which is affecting the private church-related institution just as certainly as it is affecting the overall enrollment pattern. An examination of the enrollment and admissions picture as reflected in the private sector, particularly the church-related sector, is perhaps best introduced by the following quotation from an article by Bowen and Minter.

Perhaps the most conspicuous mark of a healthy college or university is its capacity to attract and hold students and among the most important indicators signaling impending or actual distress are declining numbers and qualifications of applicants, increasing student attrition, and declining enrollment.²³

Although the enrollment and admissions patterns seem to be somewhat mixed as to interpretation and trends, Table 2-1 reflects rather specifically the plight of the private colleges and universities from the period 1969-70 through 1975-1976. The indication is that the numbers of completed

Table 2-1

**EXPERIENCE OF PRIVATE COLLEGES AND UNIVERSITIES IN THE RECRUITMENT AND
ADMISSION OF UNDERGRADUATE STUDENTS, 1969-70 THROUGH 1975-76¹**

	Autumn of Each Year						
	1969- 1970	1970- 1971	1971- 1972	1972- 1973	1973- 1974	1974- 1975	1975- 1976
1. Number of completed applications received for admission to freshmen class ¹	100	102	98	96	91	91	92
2. Number of applicants offered admission to the freshman class ¹	100	102	102	97	95	94	95
3. Number of full-time equivalent students admitted to the freshman class ¹	100	98	96	92	90	90	94
4. Number of full-time equivalent undergraduate transfer students admitted ¹	100	115	131	134	135	134	127
5. Number of full-time equivalent undergraduate students, freshman and transfer, admitted ¹	100	100	101	101	98	98	100
6. Offers of admission to the freshman class as percentage of completed applications received	70%	72%	73%	73%	75%	76%	73%
7. Entering freshmen as percentage of admissions offered	53%	51%	50%	50%	51%	51%	51%
8. Average Combined Scholastic Aptitude Test (SAT) Scores of entering freshmen ²	1063	1054	1046	1033	1023	1010	1005
9. Percentage of entering freshmen by rank in high school class:							
Top fifth	51%	49%	49%	51%	53%	51%	50%
Second fifth	27	27	25	26	24	25	25
Third fifth	15	15	16	14	15	15	15
Lowest two-fifths	7	9	10	9	8	9	10

¹Index numbers: 1969-70 = 100.

²In interpreting these figures, it should be noted that the average SAT scores declined for all students taking the test.

¹Howard R. Bowen and W. John Minter, Private Higher Education, (Washington, D.C.: Association of American Colleges, May, 1976), p. 13.

applications are down along with the numbers of applicants offered admission to freshman class, while the number of full-time undergraduate transfer students has markedly increased. The observations can be summed up by suggesting that the trend-line is a declining one and that the mix of students in the student body is changing. Again Howard Bowen reflected the same kinds of conclusions in his position paper a year previous when he observed that the position in private colleges has changed little but that the projections are mixed with "the student body being somewhat less prepared, faculty salaries being somewhat hurt by inflation, student-faculty ratios remaining constant and enrollments up slightly in overall numbers."²⁴

Continuing with the same line of reasoning, the article published by the American Council on Education suggests the following:

Public and private education share many of the same problems . . . the private sector, however, is especially vulnerable to certain pressures because tuition is a primary source of its revenue.²⁵

The report examines the profiles of eight types of institutions as an attempt to offer a summary of the important differences between private and public institutions. In the report, important functional aspects are considered as they affect these differences and they include special roles such as church affiliation, differences in student clientele, and differences in academic character such as particular educational viewpoints. The examinations of these functional

differences tend to highlight the variation in the roles played by public and private higher educational institutions.

A further examination of the importance of tuition as a source of revenue for the private sector leads Richard Anderson to the following conclusion.

Examination of the financial problems of private institutions must go beyond the readily available statistics on enrollments and surpluses or deficits into how private colleges compete and what is happening to that competitive position vis-a-vis public institutions.²⁶

At this juncture, it would therefore seem valid to observe that although the base problem of admissions and enrollments are the same for the public, the private, and the private church-related segments of higher education, there are some specific differences that should be examined.

"Are church-related colleges losing students?"²⁷ The question is, perhaps, directly answered in the opening comments of this study.

Frequent statements in the public press suggest that institutions which continue to abide by their founding religious purpose offer programs and lifestyles less and less attractive to today's American youth. These opinions have often led the general public to conclude that the church-related college has become a disappearing academic species. Facts related to enrollment permit no such generalization. These prognostications fail to take into consideration the significant fact that though the rate of growth in attendance in private institutions has slowed in relation to public sector since 1950, the number of enrollees has increased considerably.²⁸

This rather extensive study conducted by McGrath and Neese analyzes the basic question of the relative position of the church-related colleges. They concur with Bowen and Miller

that the privately supported colleges are not in nearly as precarious a position as some professional analysts would suggest.²⁹ The authors point out that private colleges and universities as a group do receive great quantities of state and federal funds and that there is a broad base of overall support for these institutions by the affiliated churches that control or influence their existence. Another major observation is the fact that some institutions have been able to survive and flourish even without increasing enrollments and have instead intentionally remained relatively small, concentrating on superior academic performance. Even though this is the general finding of the report, it is necessary to examine the enrollment trends in church-related colleges. An examination of Table 2-2 would suggest that 201 presidents reported an increase in the number of full-time equivalent students from the year 1965-66 through the year 1975-76, while 122 schools reported a drop in full-time equivalent enrollments for that same ten-year period of time. Even though this was a long-term positive upward trend, the 2.2 percent decline reflected for the 1975-76 year suggests enrollments are moving into that leveling off period suggested by the preceeding sources of data. Even with this apparent declining trend starting in the Fall of 1976 or 1977, the reasons for the enrollment growth of some church-related schools are complex. It was the opinion of McGrath and Neese that the chief administrators of these various colleges could provide valuable information on the topic of

Table 2-2

Statistical Summary*

Number of church-related senior colleges and universities with enrollments of 250-2900 surveyed: 372

FTE Enrollment:

Fall 1965	Fall 1975	#	%*	(n)	number of institu- tions reporting
287,052	324,124	+37,144	+13	327	(88% of 372)
Fall 1975	Fall 1976	#	%*	(n)	number of institu- tions reporting
338,365	345,717	+7,352	+2	343	(92% of 372)

Of the 327 colleges reporting for the 1965-1975 period, 201 (61% of 327) gained students, 122 (37% of 327) lost students, and 4 (1% of 327) remained unchanged.

Taken by themselves, the 201 colleges reported an aggregate enrollment increase of 35 percent (+57,937 students) over the ten-year period from 165,924 students for Fall 1965 to 223,861 students for Fall 1975.

On the other hand, the 122 schools reported an aggregate enrollment loss of 18 percent (-20,893 students) over the ten-year period from 118,383 students for Fall 1965 to 97,490 students for Fall 1975.

Of the 122 colleges reporting a loss of students, 81 (66% of 122 or 25% of 327) sustained enrollment losses of 10 percent or more from 74,557 students for Fall 1965 to 58,202 students for Fall 1975; an aggregate loss of 16,355 students (22%).

Of the 343 colleges reporting for the 1975-1976 period, 197 (57% of 343) gained students. 142 (41% of 343) lost students, and 4 (1% of 343) remained unchanged.

Taken by themselves, the 197 colleges reported an aggregate enrollment increase of 7 percent (+13,251 students) during the one-year period from 195,672 students for Fall 1975 to 208,923 students for Fall 1976.

On the other hand, the 142 schools reported an aggregate enrollment loss of 4 percent (-5,799 students) during the one-year period from 139,378 students for Fall 1975 to 133,579 students for Fall 1976.

*Percentages rounded to the nearest whole number.

Source: McGrath, Earl J. and Richard C. Neese. "Are Church-Related Colleges Losing Students?" Arizona University, Tucson-College of Education, Topical Paper #6.

continued growth. A representative series of quotations from college presidents reflects the fact that such items as vigorous recruiting programs and new courses of study have increased their attractiveness to students; but most of these college presidents attribute the growth of their institutions to their religious affiliation and its corresponding moral and spiritual values.

Perhaps the position of most of the college presidents is best summed up by Clark Kurr, as he writes the introduction to "A Profile of Christian Colleges," done for the Carnegie Commission by Robert Pace.

Pace finds the evangelical fundamentalist college in some ways outside the mainstream of social change, at least as it is understood by students in the nation's colleges and universities. Yet, because of the strong assistance they receive from those who financially and spiritually support their educational philosophies, their future looks secure. So, ironically, does the future of the colleges with very loose ties to their supporting church, and which are in some ways, more liberal than the avowedly non-sectarian liberal arts colleges. Perhaps in greatest difficulty are those main-line denominational colleges that do not now seem committed to either a strong religious philosophy or a strong academic program.³⁰

It was the opinion of McGrath and Neese as they drew to a close their observations about church-related colleges that "a large number of the institutions included in this study reflect the soundness of Pace's conclusion that evangelical colleges' future looks secure."³¹ They do offer a word of warning and some observations concerning those colleges and universities in the study which dropped considerably in enrollment over the past decade, and suggest that these

institutions should focus on their particular difficulties as they see them. They suggest that there are a number of possible problems which these institutions might be facing including

. . . ineffective administrative leadership, poor recruiting efforts, ineffective marketing practices, the failure of administration and staff to envision new programs appealing to today's high school graduates, and their own possible strained³² relationships with their respective church bodies.

If this reflects the general position of the church-related institutions, it would be useful to examine the specific positions of two major denominations that have been actively involved in post-secondary education.

One of the most recent and certainly most encompassing studies conducted by a major denomination has been done under the auspices of the Lutheran Educational Conference of North America, entitled, "Trends in Higher Education (A Review of the Literature)."³³ It includes six monographs encompassing some 335 pages of text with extensive notes for reference. The overall position taken in the concluding monograph, "Implications for Undergraduate Colleges," suggests that the role and position of private higher education will be a vital part of this nation's educational system for many years to come. The issue of the future of private and church-affiliated institutions of higher education is examined from a number of different perspectives in the various monographs and summarized finally by the observation that:

. . . if one were to base conclusions regarding the present importance and future possibilities of private higher education solely on the relative proportion of enrollments these colleges maintain within higher educational institutions as a whole one could become rather pessimistic.³⁴

But as Carol Shulman observes, the role of private education in the United States makes two major contributions. First, it provides "variations in size, philosophy, curricula and communal feelings that are not generally available in public colleges"; and it provides a "preventative pressure against excessive governmental interference in the academic life of public colleges."³⁵ The Lutheran study pointed out that practically every survey of higher education conducted in recent years has stated the vitally important role of the private system. This point was reinforced most convincingly by the Carnegie Commission in "The Capital and the Campus."³⁶ If the basic conclusion drawn from this rather extensive study is that the independent, privately funded, church-related institutions will be a viable part of higher education, then they have a particular role that must be played. This role is perhaps best summarized by John Sibling, President of Boston University, when he said,

. . . the challenge to church-related colleges is to maintain a certain distinctiveness while still acknowledging the broader role which is that of preparing men and women to work for the greater public good.³⁷

It is this rather optimistic view that is the concluding position taken by the Lutheran denomination.

The year 1976 saw the publication of another similar document, edited by Michael Elliott and others, entitled "Toward 2000, Perspectives on the Environment for the United Methodists and Independent Higher Education, 1976."³⁸ This report reached a much more sobering conclusion as it examined the position that the United Methodist church found its institutions of higher education facing. The last part of this paper is, in the opinion of this author, worth quoting as follows:

With reasonable safety, it may be asserted that if higher education continues to deal only with the primary clientele it has served for the last two decades, its enrollments will no more than hold their own in the 1980's and may very well drop precipitously.³⁹

This is the starting point for this study which continues:

While a gray picture for higher education is generally painted in this paper, the picture is darker still for independent and especially United Methodists institutions, particularly in terms of enrollment outlooks. If past trends continue, the decline in the size of 18 - 24 populations in the 1980's will be a bad omen for higher education and worse still for the United Methodist higher education.⁴⁰

Even in light of this somewhat pessimistic outlook, the report makes some suggestions as to the role that church-related, higher educational institutions can play if they are to remain a viable part of the overall higher educational picture.

Successful institutions will likely be those that carefully and continuously review their own operations in order to select the most effective programs and staff for continuance and expansion . . . this concern for the internal process of the

institution must focus on the question of quality and efficiency and is especially essential for any process for institutional renewal.⁴¹

It concludes with the observation that,

. . . those institutions which can make a unique claim for their institutional purpose will likely find a market. Those institutions which can abandon the traditional views of institutional autonomy and join together with others to share resources and creative ways may cope with their economic and demographic environments. New models are possible.⁴²

Starting from what was then a somewhat pessimistic overall view of the future of church-related and, particularly, United Methodists' higher education institutions, the report builds to a final rather optimistic observation that,

. . . independent and church-related institutions must not just sit back and let the future happen to them; they must seize it and shape it. We must command the future if independent, church-related higher education is to continue to serve the vital social functions and church purposes which they have traditionally pursued.⁴³

The analysis of the general enrollment and admission literature would suggest private church-related institutions need to pursue an analysis of potential markets using all the possible tools that are available to them. It is from this position that the next section of this study is to be examined. It consists of a study of the work that has been done with prediction and prediction models in an attempt to anticipate shifts and changes in general enrollment patterns, as well as an examination of specific enrollment goals for particular institutions such as Geneva College.

Prediction and Prediction Models:
A General Background

Controversies over the extent and duration of projected enrollment declines have made the techniques involved in such predictions a matter of interest to everyone involved in educational planning.⁴⁴

This editorial comment introduces a very complete, yet relatively brief, article which surveys the current methodologies involved in modeling and enrollment forecasting. The authors identify and briefly describe forecasting methods including ratios, cohort survival, Markov models, regression, optimization, combination methods and guesstimations; these definitions are spelled out specifically in Appendix 2-1. The authors also discuss the use of different types of models being employed at national, state and institutional levels. The review of the development of models indicated by the authors identifies the fact that Markov models are presently being used at the national levels in Australia, Britain, and Norway. Lyell and Toole go on to point out the development of modeling at various state levels and suggest that the technique has progressed from simple ratio methods used in Michigan in the early years⁴⁵ to the more sophisticated Markov models presently being used in the State of Washington.⁴⁶

In more recent years, there have been a number of regression models developed to look at institutional problems such as the ones presently being used for student flow modeling by NCHEMS⁴⁷ and CAMPUS.⁴⁸ Another interesting variation,

that uses a constant work concept as a definition of a cohort model, has been developed by Marshall and Oliver at the University of California. This model will be examined in somewhat more detail later in this section. Perhaps the conclusion reached by Lyell and Toole that best summarizes the prediction model techniques is summarized by the following:

When it comes time to make a forecast that has to be lived with at the institutional level, model results must be tempered with insight and experience. Some of the methods may look well on paper but they are a waste of time and money unless they can provide an administrator with more accurate estimates than he could obtain intuitively.⁴⁹

With the work of Lyell and Toole as a general background, it is of interest to examine a few of the models presently being used at various institutions for various purposes and then suggest the reasoning for the development of a specific model for Geneva College. A report entitled, "Projecting Institutional Enrollments, 1974-1990,"⁵⁰ is typical of the type of projections being done by many state coordinating organizations. This one was conducted by the Minnesota Higher Education Coordinating Commission in St. Paul. It is part of the second stage of projections presently being carried out by that state and is described in the introduction section for the model as follows:

In the projection model, resident, post-secondary students are conceptualized as flowing out of each regional high school, graduate cohort, as new entering full-time and part-time freshmen, i.e. into each post-secondary institution in Minnesota.⁵¹

The reasoning and the approach to this type of projection is an attempt by the state of Minnesota to project a head count

of the number of students that are likely to be enrolled in Minnesota higher educational institutions for the period 1972-1990. It is an example of a very traditional type of cohort analysis and was used, and is still being used, by many state coordinating agencies.

Typical of the types of student flow models and projections that are being used across the country are the ones presently being employed in the state of Pennsylvania. An examination of two different studies indicates that the models are becoming more sophisticated as the problems facing administrators increase in intensity. The first study conducted in the state of Pennsylvania is reflected in a report published in July, 1973 and followed by an up-dated study in May, 1976. The 1973 report indicates the type of activity that was being conducted at the time and is reflected in the following quotation from the overall summary.

The patterns of movements of students in a multi-campus institution of higher education had a significant impact upon the magnitude and major program composition of the enrollment at any one location . . . It is of major importance that the institution be able to measure and predict these patterns of flow and to reflect them in their projections over the enrollments.⁵²

An examination of this study indicated the necessity for the development of a Marovian-type of model that would project the needs of the Pennsylvania State University System in anticipation of student enrollments. The model developed was an offshot of two previous models; but, as Tillman and Newton suggest, this newer model differed from its predecessors in that it had a higher level of what they referred

to as "disaggregation." This made it suitable not only for the state-wide system, but for a particular university campus. It did this by providing a relatively efficient way to project future enrollments as well as aiding in the data that would be necessary in anticipating various instructional loads at the institution. This model was interesting conceptually in that it was one of the earlier applications of the Marovian approach for enrollment projections, and led to the development of the model used in the report published in 1976. As patterns of college enrollment continue to become more complex, the changing composition and magnitude of student needs required new projection techniques.

By itself, the changing characteristics of our population indicate the need for a new and somewhat more complex model for projecting enrollments, one which recognizes a variety of different population sectors and their unique characterized patterns of participation in various educational experiences.⁵³

The preceeding quote indicates the reasoning for the establishment of a new, more sophisticated prediction model at Penn State University in an attempt to cope with the ever-more frustrating "what if" types of questions that were being asked by administrators as they attempted to accurately allocate resources and develop programs for this ever-shifting market. This was an attempt to develop a model which would differentiate among this wide variety of population sectors and, more accurately, project enrollment patterns that are a result of changes in population compositions.

The state of Maryland has been one of the more progressive states in attempting to project future enrollments based on a number of different models used over a considerable period of time. The development of these various projects is reflected in a document entitled, "Enrollment Projections."⁵⁴ This is a rather extensive study and includes the history of the development of projection models in the state of Maryland starting with the earliest model developed for the state by Peat, Marwick, Mitchel, and Company in 1968. Following that model, various other more sophisticated models were developed and utilized for prediction purposes. The present model is basically a cohort survival model but a rather sophisticated one that consists of three different modules which reflect various cohorts that are deemed important by the Maryland system. The document by Gustafson and Hample, in addition to an examination of the history of the model, is involved with more specific technical data including the logistic curve of the model and the description of the calculation procedures. It also includes a manual for the running of the model on facilities such as the Univac 1180 system.

An examination of related literature in the field of the development of prediction models would not be complete without reference to the work that has been done by the University of California which was started at a rather early date and reported in two publications in 1968 and 1969. The 1968 report, authored by R. M. Oliver, entitled, "Models for

Predicting Growth Enrollments at the University of California,"⁵⁵ published by the University of California, Berkeley, under a Ford Foundation Grant, is the first of the two reports which should be mentioned. It was an extensive program drawing on the best of the enrollment forecasting techniques that were available at the time and was one of the early adaptations of the Markov models developed by Gani in his work in Australia. This Australian model was completed in 1963, and Gani later adopted a revised model for use at Michigan State University in 1965. The specific model that was finally developed and used by the state of California has been referred to as the Grade Progression Ratio method (GPR). This model was considered to be a more sophisticated approach that accounted for a higher degree of accuracy when predicting growth enrollments for the system. The second model was developed by K. T. Marshall and Robert M. Oliver and is described in "A Constant Work Model for Student Attendance and Enrollment."⁵⁶ This model was developed by the authors in an attempt to predict undergraduate student attendance. It relies on five different parameters, one of which is referred to as a total work parameter which is really an analysis of the relationship between the amount of work previously completed and the likelihood of enrollment in the University of California. Marshall and Oliver found that they could rather accurately predict the probability of a student graduating based upon the total work completed toward the degree. In other words, the more work a student had

previously completed, the more likely he was to re-enter once he had dropped out of the institution. This is another indication of the degree of sophistication in the development of various modeling techniques.

In addition to using models to come up with enrollment estimates for state systems and universities, models have also been used in an attempt to predict certain shifts in seasonal demands. Two such attempts are identified in the literature and should be examined at this point. Federal City College in Washington, D.C., conducted a study in an attempt to develop a model which would help them predict the demand for required freshmen courses. This study was carried out by T. S. Chidasbaras and entitled, "Enrollment Forecasting in an Open Admissions Environment."⁵⁷ The paper discusses the utilization of a cohort survival model in an attempt to forecast the required number of sections that would be needed in various courses to meet the demands of freshman year enrollment. The last study to be examined under the general heading of enrollment models is one that was published in 1977. This study reflects the increasing complexities of enrollment predictions and the fact that they are becoming evermore important in establishing programs at various types of institutions. One of the more recent problems that administrators are facing is an attempt to differentiate between long-term trends and short-term variations that tend to break established trend lines. The misinterpretation of this data can cause the misallocation of resources,

space, and staff. The attempt by Georgia State University to deal with this was the reason for the development of a model discussed in the paper, "Helping Administrators Identify Shifts in Enrollment Patterns."⁵⁸ The model and the report that it generated dealt with the following types of problems: the identification of past seasonal, cyclical, and trend variations in enrollments; the correlation of cyclical enrollment variations with the business cycle; and the development of a simple regression model to predict short-run variations. This model is one that should be useful in helping administrators focus on long-range as well as short-term program demands.

Enrollment Versus Admissions

The literature search revealed limited amounts of information on decision models which attempted to deal with actual enrollment predictions for specific institutions. The review of enrollment models dealt primarily with large-scale aggregate figures rather than specific enrollment decisions of individual students considering a specific institution. The reason for the lack of information or the few number of prediction models dealing with actual enrollment decisions is suggested by Richard Spies.

Analytically, a student's choice of a college should be treated as two separate (but not independent) decisions. The first decision is where to apply. The second is which college to attend among all those to which he was admitted. A great deal of research has been done on the college

selection process but most of it has failed to distinguish between the application and the enrollment decision . . . The enrollment decision presents a number of complex analytical problems, the most serious of which is that a student's decision to enroll at a particular school depends heavily on his alternatives, the other schools to which he has been admitted. It would be very difficult to account for the presence of these alternatives in the empirical model. The application decision is much simpler.⁵⁹

Spies goes on to make some observations about the application decision in comparison with the enrollment decision. He suggests that the application decision is one that is quite different from the enrollment decision and suggests the following:

We have found that students in the higher ranges of academic ability generally select the type of school they wish to attend and then apply almost exclusively to schools in that category.⁶⁰

Given the position taken by Richard Spies, what the studies have in reality been examining are the results of the application process as a basis for the models. A cohort survival technique superimposing a given percentage of the students that have applied to an institution adds the "enrollment" dimension to the model. This, then, is a statistical tool defining enrollments. It must be pointed out that from Spies' point of view, this is a much different process than attempting to predict the actual "enrollment decision" as it is made by a particular student as he considers one or more academic institutions. It is this "enrollment decision" process which is the basis of the prediction model being developed in this study.

"The Carleton Application Pool: An Emperical Study"⁶¹ was conducted in an attempt to identify the variables which address the "enrollment decision" process and therefore lends credibility to the development of an enrollment prediction model for Geneva College. The introductory comments in the Carleton study are concluded with the following quote:

1. Given the fact that the Carleton Admissions Office receives approximately 7,000 inquiries each year from prospective students, why is it that less than 20 percent actually submit an application?
2. What affects an accepted applicant's decision to attend?⁶²

It is an examination of point number two in the Carleton study that is of particular interest and bearing on the Geneva prediction model.

The reason for examining what the Carleton study referred to as yield, i.e., the number of students that actually enroll compared to the number of students accepted, is the feeling that if the yield were increased, Carleton could be more secure in its recruiting position. It was also felt that the study of those factors which affect yield would aid in the evaluation of the admissions process. A similar set of reasons have been suggested by the administration of Geneva College. The methodology of the two studies, Carleton's and this study, is somewhat different. Carleton College used a questionnaire to identify the reasons given for the decision to either enroll or not to enroll while the Geneva prediction model is based on the actual historic results of comparing the confirmed students with the withdrawals.

Operationally, the two studies are really quite similar. In the analysis section of the Carleton study, the authors identify the following crucial question: "The question that needs answering, however, is: Do acceptances who differ on any of the above background factors enroll at Carleton in different proportions?"⁶³ The approach used to identify these variations is a series of hypotheses that attempt to find statistical differences between the enrollees and those that do not enroll. In answer the authors conclude, "Analysis shows that they do in a couple of ways; differences in SAT scores and in regions of residences produce different yield rates."⁶⁴ An examination of the data shows that Carleton did a better job of enrolling students from the Midwest and the South than they did from the geographically more removed Western regions and Eastern regions.

One of the hypothesis examined in both the Carleton study and in the Geneva prediction model concerned the influence of Admissions representatives. In the Carleton study there was a positive correlation between enrollments and contact by Admissions people. The result was that those students who were contacted were 29 percent more likely to enroll at Carleton. Another hypothesis that has been identified in both studies dealt with the influence of campus visits on student enrollments. It is significant to note that 65 percent of the acceptances who visited the campus enrolled at Carleton compared with only 41 percent of those who did not visit the campus. Another area that is of interest to

Admissions personnel is the area of financial aid. To quote from the Carleton study, "no study of yield would be complete without considering the impact of financial aid."⁶⁵ An examination of the information from the Carleton study suggested that Carleton's chance of enrolling a student was 26 percent higher when the college offered aid to that student. Another area that was examined in the Carleton study which has implications for the Geneva prediction model concerns the influence that parents have on students' enrollments at particular institutions. It was found in the Carleton study that the parents were often the first source of information about Carleton and had a positive effect on the student's decision to eventually enroll in the college.

The final conclusions of the Carleton study is particularly relevant to the Geneva study.

Further, it is obvious from the yield study that certain types of actions could increase Carleton's yield. Most would involve increasing the percentage of positive contacts students have with aspects of the Admissions process and decreasing the percentage of negative contacts. While this may sound like a trivial conclusion, the greatest value of the yield study lies in showing which of the many things that could affect yield actually do, how to change the things which affect yield for the better is not something which can be deduced from this particular research.⁶⁶

The Carleton study provides a very sound and valid conclusion to the literature search as it relates to the Geneva study.

CHAPTER 3

PLANNING AND DEVELOPING THE STUDY

Chapter 2 provided the background which will enable the reader to understand the need for the development of an "enrollment decision" prediction model rather than the more general projection models that are reflected in the review of the literature. Chapter 3 will examine the planning and development of this study.

Population

A sample, made up of and defined as those students who applied to Geneva College during the 1976-77 school year for admission in 1977, is used as a basis for this study. This population was chosen as a representative sample of those students that will be applying to Geneva College in future years.

The sample can be subdivided into various groups. The first group is those students who applied to Geneva College. The second group is those students who, having applied to the College, are accepted by the College. The third group is those students who, after being accepted by the College, decided to enroll and confirm their intentions to do so, hereinafter referred to as "confirmed." The fourth group is those students who, having been accepted by the College,

decide not to enroll and withdraw from the admission process, hereinafter referred to as "withdrawals." Another group that is not included in the analysis are those students who applied to the College and were denied admission. Of the total 673 students who applied to Geneva College during the 1976-77 year, 124 of them were declined admission. This left a total of 549 students who were accepted by the College. Of that group, 330 students confirmed their intention of enrolling at the College while 219 withdrew from the admissions process.

It is hoped that by examining and comparing the confirmed and withdrawals that a sufficient body of knowledge will be developed so as to enable the Admissions personnel to better determine those students who are most likely to fall into those particular categories in the coming years.

Procedures and Instruments

As indicated by the hypothesis and variables found on page 19 and 20 of Chapter 1, it was decided to develop a procedure made up of two different parts. The first part was the development of a prediction model which would use the 13 independent variables to predict the two dependent variables. This first part is implicit in Hypothesis 1. The second part consisted of a series of tests for significant difference between the dependent variables defined in terms of each independent variable, as implied by Hypotheses 2 through 14.

The examination of the specific hypotheses would suggest the following:

Hypothesis 1: That confirmed students can be predicted significantly from a set of variables.

This hypothesis simply attempts to determine whether or not the status of the student, confirmed or withdrawal, can be significantly predicted from the 13 independent variables. This hypothesis includes the development of the prediction model discussed in greater detail under the Methodology and Analysis of Data section of this chapter.

Hypothesis 2: There are no significant differences in the term of matriculation between confirmed and withdrawals.

In considering the term of matriculation as it relates to those students who are likely to enroll at the College, it is the general feeling of Admissions people that the students who apply for admissions in the fall term are the group that are most important simply because of sheer number of applicants.

Hypothesis 3: There is no significant difference in the dates of the first campus visit between confirmed and withdrawals.

The whole topic of campus visitations always seems to be of great interest to Admissions people. It is felt that if you can get the student to visit your campus, he or she

is much more likely to ultimately enroll at your school. It is also generally felt that the student who visits the campus when the campus looks its best is more likely to enroll.

Hypothesis 4: There is no significant difference in the acceptance date between confirmed and withdrawals.

There is always a great urgency in answering students' inquiries for information. There is also the feeling that the earlier a student is informed of his acceptance, the more likely it is he or she will enroll at a particular institution.

Hypothesis 5: There is no significant difference in first majors between confirmed and withdrawals.

Over a period of time, certain majors are more popular than others. These tend to follow cyclical patterns and the emphasis is always placed upon those majors that are most popular at the time. Again, the general consensus is that students applying in the popular majors are the most likely to enroll.

Hypothesis 6: There is no significant difference in the source of contact between confirmed and withdrawals.

With the decreasing demand for the services offered by a college, there has been an increasing emphasis placed on

recruitment procedures and practices. There is a general belief that personal contact is the best way to assure that a student will enroll at an institution. If this is the case, then there is justification for the increase in the importance being placed on recruitment, alumni departments and public relations.

Hypothesis 7: There is no significant difference in type of student between confirmed and withdrawals.

An examination of the enrollment pattern at Geneva College would suggest that there is a marked change in the type of students that have enrolled at Geneva College over the past 10 years, with a decline in the commuting student and an increase in the resident student.

Hypothesis 8: There is no significant difference in denomination between confirmed and withdrawals.

As Geneva is a church-related liberal arts college particularly interested in students of reformed evangelical church affiliation, it is felt that those students who are most likely to attend Geneva College will come from that type of common background.

Hypothesis 9: There is no significant difference in distance from home between confirmed and withdrawals.

A college such as Geneva with a limited recruitment budget is naturally interested in the location of its "market". It is a great deal less expensive to recruit students that are relatively close to the campus than it is to recruit students at some distance from the campus.

Hypothesis 2 through 9 deal in general with non-academic demographic variables in that those independent variables examined in Hypotheses 2 through 9 are not directly related to academic achievement or institutional academic characteristics. On the other hand, Hypothesis 10 through 14 deal with, or are based upon, past academic characteristics; and therefore are somewhat different in this regard.

Hypothesis 10: There is no significant difference in type of scholarship aid between confirmed and withdrawals.

Hypothesis 10 examines the relationship between types of financial aid offered different groups of students and the probability that these students will enroll at Geneva College. Often one hears the comment that a college could recruit better students or more students if a specific scholarship were available for a particular purpose. The use of scholarship funds is of ever-increasing importance in recruitment. This hypothesis examines the most effective use of scholarship funds.

Hypothesis 11: There is no significant difference in class rank between confirmed and withdrawals.

Hypothesis 12: There is no significant difference in class size between confirmed and withdrawals.

Hypothesis 11 and 12 deal with factors that most institutions think are relatively important. There is some evidence that class size is an indicator of interest in a particular sized institution. Class rank is thought to indicate that a student would tend to enroll in an institution of particular academic quality. If there was a correlation in either case, it would be very helpful in the recruitment process.

Hypothesis 13: There is no significant difference in the SAT verbal scores between confirmed and withdrawals.

Hypothesis 14: There is no significant difference in the SAT math scores between confirmed and withdrawals.

Each institution would like to think it is capable of attracting students with good college board scores. It would be rewarding to any institution to find that their academic program satisfies the needs of those students with relatively high college board scores.

Methodology and Analysis of Data

The data used for the study are collected as a normal part of each applicant's record. These data are already

available at the institution and the only additional cost would be the cost of analysis. The information being readily available would suggest that it should be analyzed in an attempt to determine if there are any statistically significant differences between confirmed and withdrawals, and if those differences are predictable. The available data on each student that applied to Geneva College during the 1976-77 year for admission during the 1977 school year was key-punched on IBM cards by the Geneva College Computer personnel. The data were sorted into the necessary categories and grouped together so that it could be easily handled as it related to the various specific hypotheses. The data were analyzed on the Michigan State computer system using the Statistical Package for the Social Sciences (SPSS). The evaluation of the data uses Pierson Product Moment correlations, multiple regression analysis, t-Tests, chi-squared techniques and summary and percentage computations. The .05 level was used in all tests as the level of acceptance statistical significance. In Hypothesis 1 advantage is taken of the multiple regression analysis that is available on SPSS as a tool for development of the Enrollment Prediction Model.

For Hypotheses 2 through 10, chi-squared techniques will be employed to determine significant differences for validating the hypotheses. For Hypotheses 11 through 14, t-Tests will be used in a similar manner, and where appropriate, means and standard deviations will be included.

The Model

A model is: "An equation or set of equations depicting the causal relationships that are believed to generate observed data. Also, the expression of a theory by means of mathematical symbols or diagrams."⁶⁶

The Enrollment Prediction model developed in Hypothesis 1 and used in this study is defined as follows:

$$Y = A + \sum_j B_j X_j + e$$

Where:

Y = the criterion measure;

A = a constant term;

B = net regression weight that determines the relative effect on Y of a specific X value;

X = specific predictor variables;

e = an error term.

This model is used to describe the effect that various specific predictor variables have on the dependent variable being examined. The criterion measure, Y, would represent the dependent variable and has been given an arbitrary numerical value. The expression $\sum_j B_j X_j$ represents the effect that the independent variables have on the constant term A. As A is affected by the expression $\sum_j B_j X_j$ moves closer in value to Y the degree of predictability increases. When the value A equals the value Y, one has perfect prediction.

Limitations

Each private, church-related college is a unique institution and as such must develop Admissions programs which are suited to its own particular needs. The body of knowledge, including the enrollment prediction model, developed in this study was based upon data available from and specifically applicable to Geneva College.

The Enrollment Predictor Model developed for Geneva College may not meet the specific enrollment needs of another institution due to the variations in Admission goals. As a result of this study it is the opinion of this author that the Enrollment Prediction Model developed for Geneva College is applicable to the general needs of other private, church-related colleges attempting to meet the needs of the same or similar student market.

Summary

In this chapter the design of the research methodology was presented. The sources of data and the methods of analyzing that data were examined. The various hypotheses utilized in the study were identified.

Included in this chapter was the definition of the Enrollment Prediction Model developed in Hypothesis 1. The research instruments used in the study were discussed. The methods of statistical analysis used to develop the prediction model and to test the other hypotheses were outlined. The methods were multiple linear regression, Pierson's

Product Moment Correlation, chi-square techniques, and t-Test. The limitations of the study were also identified.

CHAPTER 4

ANALYSIS OF DATA

Forward

After the presentation of the importance of the problem in Chapter 1, the review of the past and current status of Admissions projection in Chapter 2, and the presentation of methodology of the study in Chapter 3, this chapter now turns to the analysis of the data. The chapter is divided into three parts:

Part I analyzes the results of the prediction model developed in the first hypothesis.

Part II analyzes the data as it relates to the remaining hypotheses, testing the significance of the independent variables in each case.

Part III analyzes the results of the prediction model and the information generated by the other hypotheses which give direction to Admissions Programs at Geneva College.

Part I

Hypothesis 1 - The Model

Hypothesis 1: The confirmed student can be predicted significantly from a set of variables

An examination of Tables 4-1, 4-2, 4-3 show that the confirmed student can be predicted with a level of statistical significance above the .05 level. Both forward and backward multiple linear regression techniques were used to test the hypothesis.

Using the general model:

$$Y = A + \sum_j B_j X_j + e,$$

data were analyzed and only statistically significant predictors were included in the final model, the results of which were:

$$Y = 10.008 - 0.490 X_1 - 0.507 X_2 - 0.531 X_3$$

Where,

Y = Predicted Y - the Criterion measure.

X_1 = Commuters: (Commuters as 1, 0 All others).

X_2 = Asummer: (Asummer as 1, 0 All others).

X_3 = Referrals: (Referrals as 1, 0 All others).

In descriptive terms this model suggests the following: that when "confirmed" status is given an arbitrary value of 9, and "withdrawal" status is given an arbitrary value of 11, the probability that a particular student would enroll at Geneva College merely by chance is reflected by the constant value 10.008.

Certain variables tend to move the constant value closer to 9 and further from 11 and would increase the probability that a student would confirm his intentions of enrolling at Geneva. It is those predictors that this study

Table 4-1

Variables in the Final Regression Equation

<u>Variable</u>	<u>Net Regression Weight</u>	<u>Significance</u>
Commuter	-.490	.000
Referls	-.531	.009
Asummer	-.507	.001
(Constant)	10.008	---
<u>Overall F</u> - 11.90039		<u>Significance</u> - 0.000

Table 4-2

Variables not in the Final Regression Equation

<u>Variable</u>	<u>Partial Regression Weight</u>	<u>Significance</u>
T.Fall	.02816	.600
T.Expm.	1.00000	1.000
T. Spring	-.04358	.416
T.Summer	.00031	.995
Visit	-.05497	.305
A.Fall	-.05475	.307
A.Winter	.06796	.205
A.Spring	-.02297	.668
Bible	.04187	.435
Business	-.05693	.288
Engineer	.06564	.221
Physci	.06482	.226
Soc.Sci.	-.04452	.406
Arts	-.01293	.810
Educ.	-.00253	.962
Other	-.03936	.463
Resident	.02675	.618
PartDay	-.02882	.591
Eve.Sch.	-.01492	.781
Protest	-.00920	.864
Evangel	-.00810	.880
Catholic	.02714	.613
Non.Demo.	-.00767	.886
Test	-.10038	.061
Noid	.06672	.213
Direct	.03337	.534
CampLife	-.03973	.459
Magazine	.07554	.159
Conferen	.08102	.130
Persons	.07374	.169
Rank	.07390	.168
Size	.03552	.508
Verbal	-.08117	.130
Math	.03933	.463
Zip	-.02121	.693

Table 4-3
Multiple Regression Variables Affecting Predictability of Status

<u>Variable</u>	<u>Significance</u>	<u>Multiple R</u>	<u>R Square</u>	<u>R Square Change</u>
T.Fall	.874	.10612	.01126	.01126
CampLife	.839	.10690	.01143	.00017
PartDay	.653	.11589	.01343	.00200
Size	.577	.11973	.01434	.00091
Phy.Sci.	.174	.13088	.01713	.00279
Magazine	.147	.15328	.02349	.00636
Visit	.310	.15498	.02402	.00052
Conferen	.100	.17674	.03124	.00722
Protest	.977	.17683	.03127	.00003
Eve.Sch.	.775	.22865	.05228	.00010
Bible	.229	.23376	.05464	.00236
Direct	.391	.24295	.05903	.00438
Math	.044	.25706	.06608	.00705
Persons	.272	.28507	.08126	.01518
Soc.Sci.	.870	.28611	.08186	.00060
Commuter	.001	.32784	.10748	.02562
Non.Demo.	.908	.32785	.10748	.00000
Referls	.046	.34535	.11927	.01179
Arts	.385	.34590	.11965	.00038
Other	.886	.34907	.12185	.00220
Test	.330	.35068	.12298	.00113
A.Fall	.994	.35302	.12462	.00164
A.Summer	.014	.37645	.14171	.01709
Catholic	.855	.37705	.14216	.00045
Verbal	.063	.39390	.15516	.01299
Engineer	.301	.39753	.15803	.00288
Zip	.388	.39979	.15983	.00180
T.Spring	.765	.40016	.16013	.00030
Rank	.468	.40188	.16151	.00138
Overall F - 1.92620			<u>Significance - .003</u>	

is attempting to identify.

In this study the three predictor variables, "Commuter", "Asummer" and "Referrals", all showed negative net regression weight factors which would thereby reduce the constant and move the value closer to 9, the numerical value assigned to the confirmed status. (Tables 4-1 and 4-4)

In summary it could be concluded from this study that a student who was (1) applying as a commuter, (2) accepted in the summer prior to fall term, and (3) referred to the College by an alumni, faculty, or other friend of the institution, would more likely fit into the "confirmed" status than a student who did not meet these criteria.

An extensive list of independent variables was examined, those identified in Table 4-1 and 4-2 showed significance in the prediction process. This list is an extension of the list of general predictor variables found on page 20 in Chapter 1.

Tfall, Texpm, Tspring, Tsummer - indicates term of matriculation, Tfall = Fall Term and etc.

Visit - indicates the student visited campus.

Afall, Awinter, Aspring - indicates the time of the year the student was accepted, Aspring = the spring of the year.

Bible, Business, Engineer, Phy. Sci. Soc. Sci., Arts, Educ., Other - indicates an area of academic interest or major, Arts = an English, History, or Music major.

Table 4-4

Correlation Coefficients for Variables
in the Multiple Regression Analysis
Independent Variables Affecting Status

<u>Variable</u>	<u>Status</u>	<u>Variable</u>	<u>Status</u>
T.Fall	.10612	Commuter	-.20779
T.Spring	-.08834	Resident	.21700
T.Summer	-.06387	PartDay	-.04398
		Eve.Sch.	-.03382
A.Fall	-.04138	Protest.	.00023
A.Winter	.11591	Evangel.	.00822
A.Spring	.04697	Catholic	.00110
A.Summer	-.18229	Non.Demo.	-.01572
Bible	.05128	Test	-.10243
Business	-.02537	Noid	.05503
Engineer	.07014	Direct	.05696
Phy.Sci.	.05675	CampLife	.01252
Soc.Sci.	-.04268	Magazine	.08618
Arts	-.04207	Conferen	.08521
Educ.	-.03948	Persons	.11241
Other	-.02940	Referls	-.14771
		Rank	.06759
		Size	.03402
		Verbal	-.07655
		Math	.05122
		Zip	.06398
		Visit	-.01097

Resident, Commuter, Part-time, Eve. Sch. - indicates the student will live on campus, commute from home, be part-time, or in evening school.

Protest., Evangel., Catholic, Nondeno. - indicates the student's religious affiliation, i.e., Protestant, Nondenominational, and etc.

Verbal and Math - indicates the College Board test scores of the students.

Rank - indicates the student's rank in his or her high school graduating class.

Size - indicates the size of the student's high school graduating class.

Zip - indicates the location of the student's home by U.S. Postal zip code zones.

The following variables describe the source of first contact with the College:

Referrals - indicates a person not directly associated with the recruiting process such as an alumni, friend, pastor, or faculty member.

Persons - indicates a member of the institutions whose job deals directly with recruitment, i.e., admission counselors, athletic coaches, or religious service personnel.

Test - indicates the American College Testing Service.

Direct - indicates any one of a number of college directories that are available as reference sources.

Magazine - indicates an advertisement in a "student" magazine.

Letters - indicates letters sent out by the Admission Department.

Noid - indicates non-identified prospective students.

Conference - indicates conferences held by admissions personnel at various high schools and churches.

Decision: The hypothesis is accepted.

Part II

Hypotheses 2 through 14 - Tests of Independent Variables

Hypothesis 2: There is no significant difference in the term of matriculation between confirmed and withdrawals.

An examination of Table 4-5 shows that there is a significant difference between confirmed and withdrawals as they relate to their anticipated terms of matriculation. By far the most interesting observations to be drawn from this table are reflected in the data for those students that have applied for admission in the Spring term and Summer term. The table would indicate that those students who have been accepted for admission in the Spring term all

Table 4-5

The Effect of Anticipated Term of Matriculation
on Status--Confirmed vs. Withdrawals

Term of Matriculation	% Confirmed (N=330)	% Withdrawals (N=219)
Fall Term	59.0	41.0
Spring Term	100.0	0.0
Summer Term	87.5	12.5

Chi-square = 8.737

Significance = .0127

confirmed and entered the College. This is educationally interesting and implies that this group of students is looking for a college that will meet their immediate needs, and may well be transfer students. These students may have considered Geneva as a second choice when they were shopping for colleges earlier in their career and having not found what they wanted at another institution, are much more certain as to their needs. The figures comparing confirmed and withdrawals for admission in the summer program again reflects the fact that this group of students is much more likely to confirm and enroll at the College, perhaps as a result of having made up their minds well in advance and wanting to get started on their academic programs. As a result of this first table, it would seem that the Admissions Department would want to pay special attention to those students who apply for admission to either the spring or the summer term because of the markedly higher percentage of confirmed status students.

Decision: The hypothesis is rejected.

Hypothesis 3: There is no significant difference in the date of campus visit between the confirmed and withdrawals.

Table 4-6 shows the result of visiting the campus as it affects a student's decision to enroll at Geneva. The data show a statistical significance between confirmed and

Table 4-6

The Effect of Date of Campus Visit
on Status--Confirmed vs. Withdrawals

Date of Campus Visit	% Confirmed (N=326)	% Withdrawals (N=217)
Fall	66.7	33.3
Winter	50.0	50.0
Spring	79.2	20.8
Summer	61.5	38.5

Chi-square = 10.1723

Significance = .0321

withdrawals as related to a campus visit. In addition to the statistical significance of the data in general, there are some very important educationally significant differences depending on the time of the year the campus visit is made. The first thing that becomes apparent is the fact that there is no difference between confirmed and withdrawals if the campus visit is made during the winter months. This reflects the fact that the student might be seeing the campus at a period of time when it is not particularly attractive or any one of a number of other reasons. On the other hand, it is apparent that those students who visit the campus during the spring of the year are much more likely to be included in the confirmed category. Spring is therefore the most desirable time to visit the campus. It would be fair to conclude that everything possible should be done to encourage the student to visit the campus in the spring or early summer, and that particular care should be taken to see that there be a very thoroughly conducted and informative program.

Decision: The hypothesis is rejected.

Hypothesis 4: There is no significant difference in the acceptance date between confirmed and withdrawals.

The data in Table 4-7 indicate that there is a statistically significant difference in status between confirmed and withdrawals as affected by the date of acceptance. An

Table 4-7

The Effect of Date of Acceptance
on Status--Confirmed vs. Withdrawals

Date of Acceptance	% Confirmed (N=326)	% Withdrawals (N=217)
Fall	67.0	33.0
Winter	57.6	42.4
Spring	50.3	49.7
Summer	78.3	21.7

Chi-square = 20.528

Significance = .0001

analysis of the data show the following significant difference. The normal practice of high school students would be to apply to and expect an answer from a number of colleges during the fall and winter months of their senior year in high school, thereby hoping to have a broad choice for the fall of the next year. This group, reflected in the categories of winter and spring acceptance dates, shows very little difference between confirmed and withdrawals, indicating that these students are shopping and have had a number of choices of institutions that are willing to accept them. On the other hand, the other two categories indicate a quite different set of circumstances. The group of students in the category of fall acceptance have apparently shown an early interest in the institution, have applied earlier than normal, and if accepted are more likely to confirm and enroll. In like manner, the relatively high percentage of confirmed students in the summer acceptance period reflects a group of students who have, for any one of a number of reasons, applied to Geneva at a relatively late date in hopes of acceptance for the fall term which is only a month or so away. Again, this group appears to be much more likely to confirm and enroll if they are accepted. The whole question of the acceptance of late applicants is another major Admissions problem, but the statistical indication is that those students who are accepted late in the session are the most likely to confirm and enroll at the College. This is verified by the data developed by the

prediction model in Hypothesis 1.

Once again, this indicates special attention should be paid by the Admissions personnel to those students who are outside the normal pattern. In other words, they should watch those students who either apply early and are accepted early or those students who apply late and are accepted at the last moment. Both of these should be handled with particular care as the instance of them enrolling at the College appears to be much greater.

Decision: The hypothesis is rejected.

Hypothesis 5: There is no significant difference in choice of first major between confirmed and withdrawals.

Table 4-8 shows the result of the examination of the effect of various majors on enrollment at Geneva College. There is no statistical difference in confirmed and withdrawals for the indicated first major category in total, but a closer examination indicates some meaningful educational differences.

As the popularity of various academic programs shifts (over a period of time) from one program to another, the recruitment emphasis as well as college curricula and new programs seem to follow. Today, Business Administration and Accounting, as well as Engineering, are very popular and are in great demand. On the other hand, Education and the Liberal Arts seem to be somewhat out of vogue. A

Table 4-8

The Effect of Indicated First Major
on Status--Confirmed vs. Withdrawals

Indicated First Major	% Confirmed (N=330)	% Withdrawals (N=219)
Undecided	58.8	41.2
Business Administration and Accounting	63.9	36.1
Bible	45.0	55.0
Physical Science	53.3	46.7
Social Science	63.2	36.8
Education	66.7	33.3
Engineering	56.0	44.0
Liberal Arts	74.4	25.6

Chi-square = 9.248

Significance = .2353

comparison of the confirmed and withdrawals in those areas would indicate that while Business Administration and Accounting as well as Engineering have ratios of close to 2-to-1 favoring the confirmed category as compared to withdrawals, the areas of Liberal Arts and Education are doing even better and that Liberal Arts is running a 3-to-1 ratio favoring the confirmed over the withdrawal category.

Another worthwhile observation, particularly for a college such as Geneva, which prides itself on being a Christian college with a strong Bible Department, is the fact that the ratio of confirmed to withdrawals in the Bible Major shows a slightly higher percentage of withdrawals, indicating that the choice among institutions offering a major in Bible must be sufficiently large enough to offer students a broad choice.

The point is relatively clear (because of the large numbers of applicants), it is operationally important to meet the demands of those academic disciplines that are in vogue. On the other hand, it should be equally clear that a college such as Geneva should stress the programs such as Liberal Arts. The Admissions people should be particularly conscious of the fact that those students who do apply for admission in one of the less popular programs are more likely to enroll than those students who are interested in the more popular programs offered by a large number of schools.

Decision: The hypothesis is accepted.

Hypothesis 6: There is no significant difference in the source of contact between confirmed and withdrawals.

The data from Table 4-9 show that there is a significant statistical difference between confirmed and withdrawals as affected by the source of contact with the college. A closer examination shows that there are marked contrasts between the various sources of contact as they affect the confirmed students and those students who withdraw and do not enroll.

The data in the table can be divided into two major areas, one might be referred to in marketing terms as the areas of "personal selling" while the other might be referred to as "general promotion." In the area of personal selling or contact by persons employed by or interested in the college, there is a wide variation in the degree of success as one attempts to get students to confirm their intentions to enroll at Geneva. The personal referrals from alumni, faculty and friends of the college and those students who come from local families show the greatest positive effect favoring confirms over withdrawals. In marked contrast to the personal referrals and local residents, the category entitled Special Personal Contacts made up predominantly of non-Admissions recruiters had a very low success rate in generating confirmed students. In defense of these people, these withdrawals may have been highly sought after by a number of colleges, and might well

Table 4-9

The Effect of Source of Contact with College
on Status--Confirmed vs. Withdrawals

Source of Contact	% Confirmed (N=329)	% Withdrawals (N=218)
American College Testing Services	67.9	32.1
Recruitment Letters	54.1	45.9
Non-identified	48.3	51.7
Telephone Calls (recruitment)	73.7	26.3
Visit to Campus	71.0	29.0
Local Resident	81.8	18.2
College Directories	46.2	53.8
Other Magazine Promotion	50.0	50.0
"Campus Life"	58.8	41.2
"Christian College Profile"	56.3	43.8
High School & Other Conferences	48.4	51.6
Special Personal Contacts	41.9	58.1
Personal Referrals	82.9	17.1

Chi-square = 31.7609

Significance = .0015

be top athletes or top-ranking scholastic scholars who have a wide range of choice from among a number of schools. It is equally clear that recruitment telephone calls and campus visits have been highly successful as a tool in generating confirmed students compared with withdrawals. On the other hand, the general category of conferences such as those conducted at high schools or churches have apparently been ineffectual at best.

An examination of what we might call the promotional sources of contact would also indicate some wide variations in the comparison of confirmed with withdrawals. The Campus Life magazine and the Christian College Profile are running well ahead of the other magazine publications as their confirmed to withdrawals categories would indicate. Listing in college directories have related more specifically to withdrawals than to confirmed while the great emphasis on recruitment letters seems to have a marginal success. It is of interest to note that those high school students who found out about Geneva College through the American College Testing Service publications have somewhat better than a 2-to-1 ratio favoring confirmed over withdrawals. A possible explanation would be to suggest that these students feel that this is a less biased source of information.

It would seem that the examination of this table and data reflected in it should help Admissions people sort out the sources of first contact and concentrate on those that

tend to be most effective in generating confirmed students. This would reduce the expense of maintaining the less productive methods and would provide additional funds that could be directed to those tools that seem more beneficial in the generation of confirmed students.

Decision: The hypothesis is rejected.

Hypothesis 7: There is no significant difference in type of student between confirmed and withdrawals.

During the last 10 to 15 years, Geneva College has changed from an institution with a student body make up of two-thirds commuting students and one-third resident students, to an institution with a resident student body that now makes up two-thirds of the total enrollment. The effects of this change have been of marked importance in the life of the institution. Table 4-10 reflects these data as it relates to confirmed versus withdrawals, and they show that there is a statistically significant difference between the two categories. The three categories, commuter, part-time day, and evening students, are all groups that commute to the college. All of these groups show a statistically significant difference between confirmed and withdrawals, heavily favoring the confirmed category. In contrast, the data for the resident student body show no significant difference between the confirmed and withdrawal categories, indicating that this more traditional group of students has

Table 4-10

The Effect of Type of Student
on Status--Confirmed vs. Withdrawals

Type of Student	% Confirmed (N=329)	% Withdrawals (N=219)
Commuter	75.5	24.5
Resident	56.3	43.7
Part-time Day	100.0	0.0
Evening	85.7	14.3

Chi-square = 14.6223

Significance = .0022

wider range of choice between Geneva and other institutions.

The implications of these data are rather clear; while the resident students make up the biggest segment of the student body, the students that indicate that they are going to be commuting either as full-time, part-time, or evening students are much more likely to confirm their intentions of enrolling in the institution. The important thing for the people in Admissions is to realize that although the primary emphasis is being given to the resident student body, that particular attention should be paid in the recruitment process to those students from the local area that indicate an interest in the College, for there is a much greater probability that they will enroll at Geneva.

Decision: The hypothesis is rejected.

Hypothesis 8: There is no significant difference in denominations between confirmed and withdrawals.

Frequently, colleges tend to affiliate themselves with a particular denomination or group of denominations, or at least a particular theological position and often emphasize that position in their recruiting efforts in an attempt to draw from a specific market segment. The data in Table 4-11 show the effect of such affiliation as it relates to the status of confirmed versus withdrawals for the four major denominational groupings; Nondenominational, Evangelical,

Table 4-11

The Effect of Church Affiliation
on Status--Confirmed vs. Withdrawals

Church Affiliation	% Confirmed (N=330)	% Withdrawals (N=218)
Non-denominational	51.9	48.1
Evangelical	63.0	37.0
Protestant	62.2	37.8
Catholic	54.4	45.6

Chi-square = 3.7022

Significance = .2955

Protestant, and Catholic. The data show that there is no significant difference between confirmed and withdrawals as affected by church affiliation. Of operational significance, there is, as might be expected, a slight difference favoring confirmed over withdrawals for the Evangelical and Protestant groupings which shows about a 60-40 split in favor of the confirmed. On the other hand, the nondenominational group and the Catholic group show no significant difference between the two status categories.

All that can be concluded is that denominational differences are not all that significant, as they seem to have a minimal effect on the status of confirmed versus withdrawals.

Decision: The hypothesis is accepted.

Hypothesis 9: There is no significant difference in the distance from home between confirmed and withdrawals.

The geographic dimension of any market is always of major interest to any institution supplying a service, and colleges are no exception. Table 4-12 shows the results of analyzing location data based on the status of confirmed versus withdrawals. This analysis indicates that there is a statistically significant difference between the two groupings. A detailed analysis of the data on commuting versus residential students in connection with Hypothesis 7 would suggest the fact that students living close enough to

Table 4-12

The Effect of Location of Hometown
on Status--Confirmed vs. Withdrawals

Location of Hometown	% Confirmed (N=320)	% Withdrawals (N=214)
Beaver County	70.5	29.5
Lawrence, Allegheny & Butler Counties	62.9	37.1
Western Pennsylvania	51.2	48.8
Philadelphia Area	48.5	51.5
Eastern Ohio	61.5	38.5
North Atlantic & New England Zip Code Areas 0-1-2-4	59.9	40.1
South East & Central Zip Code Areas 3-5-6-7	60.0	40.0
Far West Zip Code Areas 8-9	25.0	75.0

Chi-square = 14.3653

Significance = .0451

commute would show a significantly greater number in the confirmed category. Beaver County, where Geneva College is located, showed that 70 percent of the accepted students actually confirmed their intentions of enrolling at the College. Lawrence, Allegheny, and Butler counties and the eastern Ohio group also showed a significantly higher number in the confirmed category.

In contrast, the rest of Western Pennsylvania and the Philadelphia area, which includes part of the states of Delaware and New Jersey, showed no difference between confirmed and withdrawals as is reflected by the 50-50 split shown in the table. This might well reflect and indicate the fact that Geneva has some rather strong competition within this general geographical area. The difference between confirmed and withdrawal status for the next two most distant locational areas--those indicated as the zip code areas 0, 1, 2, and 4, and zipcode areas 3, 5, 6, and 7 representing the North Atlantic and New England and Southeast and Central areas, respectively--show a slight increase favoring the confirmed status category. Again, one can speculate as to the reasons and might conclude that students who are interested enough to apply to a college that is some 500 to 1,000 miles away from home, might be more likely to attend that institution because they see Geneva as significantly different enough to make it worth the additional travel time. Finally, the confirmed versus withdrawals figures for the areas farther west,

represented by the major geographic area in zipcodes 8 and 9, would simply indicate that Geneva College is too far away to attract very many students. The data shows that three-fourths of the students who do apply eventually withdraw their applications and elect to go someplace else.

The message for the recruitment efforts again seem relatively clear; those students close by are the most likely to confirm their intentions of enrolling at the college, and those students at great distances are the most likely not to enroll in the institution. The areas in-between are, of course, the most difficult to analyze; but it would seem that the emphasis should be placed by the recruitment personnel on attracting students from the tri-county, that is, the Lawrence, Allegheny, and Butler counties, and the bordering counties in eastern Ohio. Beyond that, all that could be suggested is that the recruitment effort should follow a pattern of concentration in areas where the college has successfully attracted students in the past. This would relate to some of the previous data dealt with under Hypothesis 6 which suggests that the source of first contact can be of great importance.

Decision: The hypothesis is rejected.

Hypothesis 10: There is no significant difference in type of scholarship and between confirmed and withdrawals.

The data in Table 4-13 indicate that there is a significant statistical difference between confirmed and withdrawals as related to the type of scholarship aid offered to various students. Of major interest to the Admissions Office and Financial Aid Office is the fact that certain scholarships seem to increase the probability of the confirmed status while other scholarships seem to have little or no effect. Two comparisons seem especially relevant.

The first is a comparison between the scholarship group entitled "clergy only" and the scholarship group identified as "RPNA". Both of these groups reflect relatively small scholarships awarded on the basis of religious association. The clergy scholarship is awarded to children of clergy and would seem to have no positive effect on status. In contrast, the RPNA scholarship is awarded to children of the members of the Reformed Presbyterian Church of North America, which is the church that controls the College. Those students offered this scholarship show a very high probability of attending Geneva, an event which would probably occur regardless of the scholarship aid being offered. It could, therefore, be argued that neither of these scholarships greatly increase the number of students that eventually enroll at Geneva College.

The second comparison of educationally significant interest is between first and second honor scholarships. The first honor scholarship group is made up of those students who graduated in the top 10 percent of their high

Table 4-13

The Effect of Scholarship Aid
on Status--Confirmed vs. Withdrawals

Type of Scholarship Aid	% Confirmed (N=107)	% Withdrawals (N=70)
Clergy Only	50.0	50.0
1st Honor-Top 10% Only	69.8	30.2
2nd Honor-Top 20% Only	50.8	49.2
NMSQT National Merit and All Combinations	57.1	42.9
RPNA-Church and All Combinations	91.7	8.3
Science and All Combinations	50.0	50.0

Chi-square = 11.1656

Significance = .048

school class. The second honor scholarship group represents those students who graduated in the top 20 percent of their high school class. The two groups are mutually exclusive. There appears to be some gain in the confirmed group represented by the first honor category. The second honor group shows, at best, a neutral relationship to the scholarship being offered, and it could be argued that the effect might even be negative. Likewise, a comparison of first honor scholarships and science scholarships, i.e., special scholarships offered to students interested in the hard sciences who meet certain qualifications, shows the same relationship as the one between first honor scholarships and second honor scholarships.

It would therefore appear that the scholarship program might very well be re-evaluated to examine the benefits of eliminating some of the less productive scholarships and adding those funds to scholarships which produce the greatest return in confirmed students.

Decision: The hypothesis is rejected.

Hypothesis 11: There is no significant difference in class rank between confirmed and withdrawals.

Hypothesis 12: There is no significant difference in class size between confirmed and withdrawals.

Tables 4-14 and 4-15 indicate the data dealing with class size and rank in high school class. The data indicate that there was no statistical significant difference in either of these two majors as they affected the status of confirmed versus withdrawals. In terms of educationally significant differences, the average student in the confirmed category came from a slightly smaller size high school class and stood somewhat higher in that class. The comparatively high standard deviation values in both tables would indicate a wide range of students in terms of both high school class size and standings within that class.

Decision: Hypothesis 11 is accepted.

Decision: Hypothesis 12 is accepted.

Hypothesis 13: There is no significant difference in the SAT verbal test scores between confirms and withdrawals.

Hypothesis 14: There is no significant difference in the SAT math test scores between confirms and withdrawals.

The data in Table 4-16 and 4-17 indicate that there is no statistically significant difference between confirmed and withdrawals as affected by either SAT verbal or math scores. The confirmed group of students had slightly higher average verbal test scores and slightly lower average math test scores than did their corresponding withdrawal

Table 4- 14

The Effect of High School Class Rank
on Status---Confirmed vs. Withdrawals

Variable	Status	N	Mean	S.D.	Significance	T-Value
High School	Confirmed	263	89.07	101.90		
Class Rank	Withdrawals	184	103.80	113.89	.161	XXX

XXX - Inappropriate Statistical Analysis

Table 4-15

The Effect of High School Class Size
on Status--Confirmed vs. Withdrawals

Variable	Status	N	Mean	S.D.	Significance	T-Value
High School	Confirmed	265	327.10	496.45		
Class Size	Withdrawals	187	364.05	242.40	.295	XXX

XXX - Inappropriate Statistical Analysis

Table 4-16

The Effect of SAT Verbal Scores
on Status--Confirmed vs. Withdrawals

Variable	Status	N	Mean	S.D.	Significance	T-Value
SAT	Confirmed	214	458.35	99.66		
Verbal Score	Withdrawals	149	443.44	92.16	.149	XXX

XXX - Inappropriate Statistical Analysis

Table 4-17

The Effect of SAT Math Scores
on Status--Confirmed vs. Withdrawals

Variable	Status	N	Mean	S.D.	Significance	T-Value
SAT	Confirmed	214	491.57	99.44		
Math Score	Withdrawals	149	501.74	96.06	.337	XXX

XXX - Inappropriate Statistical Analysis

status counterparts. The standard deviations for all categories showed a value of over 90 and indicated that the students reflected a wide range of test scores. The implications for the admissions and recruitment personnel for all four of these academic performance indicators are simply that they are of no significance in the effect that they have on the status of either confirmed or withdrawals.

Decision: Hypothesis 13 is accepted.

Decision: Hypothesis 14 is accepted.

Part III

Comparative Analysis and Operational Application

Comparative Analysis

A comparison of the results of the prediction model developed in Hypothesis 1 and the significance of the individual independent variables would suggest the need for some additional observations. The prediction model indicates that status, specifically confirmed status, can be statistically predicted at a significance level of .05. There were only three independent variables remaining in the final regression equation. These three variables, "Commuter", "Asummer", and "Referrals", were in reality the only predictors that in themselves were statistically significant at the .05 level in the regression model. All

other variables affecting the predictability of status could therefore be the result of offsetting factors generated by a combination of the other independent variables, or could have simply occurred by chance.

An examination of the data in Hypotheses 2 through 14 would indicate that the following general predictor variables were not statistically significant in their effect on status:

Indicated First Major	Hypothesis 5
Denomination or Church Affiliation	Hypothesis 8
Type of Scholarship Aid ⁶⁸	Hypothesis 10
High School Class Rank	Hypothesis 11
High School Class Size	Hypothesis 12
SAT Verbal Scores	Hypothesis 13
SAT Math Scores	Hypothesis 14

It is, therefore, not surprising that the independent predictor variables, Table 4-2, associated with these general variables are not statistically significant in the prediction model. An examination of the levels of statistical significance for these variables as reflected by the data in Table 4-3 would verify this observation.

Six of the general variables were statistically significant in their effect on confirmed status when examined individually:

Term of Matriculation	Hypothesis 2
Date of First Campus Visit	Hypothesis 3
Acceptance Date	Hypothesis 4
Source of First Contact	Hypothesis 6
Type of Student	Hypothesis 7
Location or Distance from Home	Hypothesis 9

The three statistically significant predictors developed in the model were included in the data examined in the above hypotheses:

"Commuter" is a Type of Student

"Asummer" is an Accepted Date

"Referrals" is a Source of First Contact

An examination of the correlation coefficient data in Table 4-4 show that these three variables have the three highest negative correlation coefficients of any of the variables in the equation. This would indicate that they would be statistically significant in the prediction of confirmed status. "Commuter", the variable with the greatest degree of predictability as indicated in the regression model, is one of the variables which was statistically significant in Hypothesis 7, Type of Student. The data in Table 4-4 also indicates that "resident", the counterpart of "commuter", has a high positive correlation coefficient, indicating a relationship with "withdrawal" status. This would reinforce the relationship indicated by Hypothesis 7. A similar relationship can be observed among the variables in Hypothesis 4--Acceptance Date, where "Asummer" has a high

negative correlation coefficient while both "Awinter" and "Aspring" show a high positive correlation coefficient. "Referrals", the last of the statistically significant predictors developed in the model, is one of the variables examined in Hypothesis 6, Source of First Contact. Data in Table 4-4 indicate five of the seven identified sources of first contact have comparatively high correlation coefficients, indicating that the source of first contact has an operationally significant effect on either confirmed or withdrawal status. Those five independent variables include: "test", "magazine", "conference", "persons", and "referrals".

None of the variables from the remaining statistically significant hypotheses appear in the final regression equation, Table 4-1, which raises some question as to the relationship between those hypotheses and the prediction model. Term of Matriculation, Location or Distance from Home, and Date of First Campus Visit, although statistically significant in their own right as individual variables, were simply not significant in a regression model and therefore were not statistically significant predictor variables. It must be concluded that the variation that occurred in the individual hypotheses was accounted for by some other combination of factors in the prediction model. It should be pointed out, however, that there were some operationally significant variables in these hypotheses as discussed in Part III of this chapter.

Operational Applications

The operationally significant findings which would give direction to the Admissions Department at Geneva College could be divided into two parts:

1. The prediction of confirmed status.
2. Program changes which might be made to increase the number of confirmed status students.

The results of the first part, prediction, have been stated very specifically in the discussion of Hypothesis 1 but should be stressed again. Any applicant who is (1) a commuter, (2) accepted in the summer prior to the fall term, (3) referred to the College by an alumni, faculty or friend of the College, is more likely to become a confirmed status student than those applicants who do not meet these criteria.

The operationally important point concerning Part II, increasing the number of confirmed status students, is that prospective students should be handled with special care. This is particularly true since the commuters and the late applicants are often given less attention than those students who apply from some distance and who do so during the traditional applicant period. It must also be pointed out that the variables associated with Source of Contact is an area where the College can have maximum influence, thereby hoping to increase the number of confirmed status students. The various Sources of Contact seem to have an important influence on the confirmed or withdrawal status and the

College can control, or at least influence, this variable by being certain that the contact the student has with the College is as positive as possible.

Operationally, the other two variables are the result of self-selection by the student and are, therefore, not under the direct control of the Admissions process. In other words, the number of confirms would not be increased by deferring acceptance of all applicants to late August. In the case of commuters it would be difficult to predict the results of a major recruiting effort in an attempt to increase the number of confirms by increasing the number of commuters.

The last variable that should be commented on is the variable "visit" which showed no statistical significant influence in the prediction model. The data in Table 4-3 showed the correlation coefficients for a "visit" to be very low, which would support the position that "visit" would not remain in the regression equation as a valid predictor variable. The data would suggest that the findings examined in Hypothesis 3, Part II, should be interpreted with extreme care. This should be operationally significant since it is generally felt that a visit to the campus greatly increases the probability of confirmed status -- a fact not indicated by the prediction model developed in Hypothesis 1.

Summary

In the first part of the chapter the development and results of the Enrollment Prediction Model were analyzed, using multiple regression techniques. It was determined that "confirmed" status could be predicted with statistical significance. Three predictor variables, "commuter," "Asummer" and "referrals" were found to be significant in the Enrollment Prediction Model.

In the second part of the chapter the data included in the remaining hypotheses were analyzed. The significance of each independent variable's effect on status was tested using the appropriate statistic. It was determined that six variables were statistically significant while the remaining seven variables were not significant at the .05 level.

In part three the comparative results of the Enrollment Prediction Model and the information generated by the other hypotheses were analyzed to determine their operational application to the Geneva College Admissions Program. It was determined that the three statistically significant predictors were also operationally significant as predictors. It was determined that the variable, Source of Contact, represents a group of variables that can be controlled or at least influenced by Geneva College as they attempt to increase the number of "confirmed" status students.

In Chapter 5 the summary, conclusion and recommendations are presented.

CHAPTER 5

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Summary

The study, an Enrollment Prediction Model for Geneva College, is justified and comes about as a result of the general declining enrollments that have become prevalent in American higher education during the last ten years. In addition to the decline in enrollments, the costs of operation have increased more rapidly than the general costs of the economy and so education can be referred to as a depressed industry. The future of higher education in the United States looks to be no more promising. Nationally, the pool of graduating high school seniors is predicted to decrease by twenty percent or more between now and 1990. The situation in Western Pennsylvania is compounded by the general decreasing demographic projections for the area, an indication that the high school graduating classes will decline by close to forty percent between now and the year 2000.

The resulting decline in enrollments will affect the private school as severely, if not more severely, than the public higher educational institutions. Private sector higher educational institutions have already seen an enrollment decline of about ten percent during the last five years

and the announcements of college closings are now becoming common. The most recent announcement of the closing of an old, well-established college was made by Wilson College in Eastern Pennsylvania during January, 1979. The declining market potential of high school graduating seniors has brought about an increase in the marketing or recruiting efforts of all the colleges and universities in the country as they attempt to survive in the face of this shrinking market. This is particularly crucial for small, independent colleges as students are the primary source of revenue representing in many instances, 70 to 80 percent of the total revenue generated by the college. The costs of recruitment or marketing have been increasing, and all indications are that they will remain an extremely expensive but necessary part of the college operating budget. If this is the case, then it follows that it is necessary for an institution to try to get maximum return from the dollars spent on their recruitment program.

Of the students who apply and are accepted by Geneva College, approximately 60 percent of those students confirm their intentions of enrolling at the College, the balance, approximately 40 percent, withdraw their applications and go elsewhere. Any increase in the number of confirmed students would represent not only a greater source of revenue for the institution but would also reduce the per unit cost of the recruiting effort. Both of these considerations, then, are of strong financial importance. This study seeks to

develop a body of knowledge including a prediction model, which will aid Geneva College in two specific ways. First, by predicting those students who are most likely to end up confirming their intention of enrolling at the College. Second, the study hopes to develop information which would lead to suggestions of some possible changes which would increase the number of confirmed students.

The Study

To develop a prediction model and the body of knowledge relating to it, it was decided to use the data that was already available at Geneva College. The information collected in the Admissions process on each student that applied during the 1976-77 school year for admission during the 1977-78 school year was used as a basis for the study. The data that were available at the College were key-punched onto IBM computer cards. Of the total 673 students that applied during the specified period of time, 124 students were declined admission by the College and were therefore not utilized in the study. Of the 549 students that were accepted by the College, 330 of them confirmed their intentions of enrolling at the College, while 219 of the students withdrew and enrolled at another institution or did not attend college at all. From the information collected on each student as part of the application process, it was hoped that a set of statistically significant predictor variables could be developed which would aid in the prediction of confirmed

status students. The statistical analysis was conducted using the Michigan State University computer system and the Statistical Package for the Social Sciences (SPSS). A series of hypotheses were established to identify the effect of a group of independent variables on the dependent variable status, either confirmed or withdrawal. The appropriate statistical tests were applied to each hypothesis. A prediction model was developed utilizing the linear multiple regressions equations in an attempt to develop a set of specific predictor variables.

Review of Literature

A review of the literature examined three particular areas. The first related to the overall decreasing enrollments. The second examined the use of general prediction models. And the third looked at the possible applications of prediction models to the specific enrollment decision. The general decline in the overall enrollment pattern that had taken place during the last ten years was most clearly indicated by the literature review. The specific problems being faced by the private church-related institution was examined in light of the declining market and the increasing costs of operation.

The review of the literature relating to prediction models revealed an extensive use of these models over the last twenty years in an attempt to predict various probable changes in enrollment patterns. Most of these models were

developed for and used to predict national or regional shifts in enrollment potentials. On the other hand, some models were developed for internal institutional use to predict such things as the demand for student credit hours, faculty loads and department course offerings. All of these general prediction models were based on various mathematical formulas that were reviewed and examined in the literature.

Related Work

The literature review showed that little work had been conducted on the specific prediction of the actual enrollment decision. Most of the so-called enrollment prediction models really dealt with the decision to apply to go to any one of a number of colleges. Most of the enrollment prediction analysis is actually an analysis of the application process rather than the analysis or the prediction of the enrollment decision. The literature suggests that the limited amount of work that has been conducted on predicting the actual enrollment decision is due to the fact that the enrollment decision is a very personal decision. The variables involved in that decision cannot easily be defined in the quantitative terms that are necessary for the development of the mathematical models that are used in prediction techniques.

Conclusions

An analysis of the data examined showed that the dependent variable "confirmed" could be statistically predicted

from a group of independent variables at the .05 level of significance. From this first hypothesis, evolved a prediction model which produced three statistically significant predictor variables. These will be helpful in the Admissions program at Geneva College. These predictor variables included the following: First, "commuter"-a student that is accepted by the College and decides to commute rather than live on the campus. Second, "A summer"-a student that is accepted during the months of July and August. Third, "referrals"-students that are referred to the College by an Alumni, faculty or other friend of the institution.

The data developed from the variables examined in the other hypotheses also produced a body of knowledge which will be of help in the future direction of the Admissions program. Of operational significance is the fact that of the 30 independent variables examined in the study, only three were found to be statistically significant as predictors and the group did not include some of the variables that are thought very important in the recruitment process. Most notable in its absence is the influence of a campus visit. On the other hand, it is also operationally significant to notice the importance of the general category of variables, source of first contact, which includes the variable, referrals. The College can directly control this group of variables to insure that the prospective student's personal contact with the College is as positive as possible. This would suggest coordination of the recruitment and general

marketing effort to insure that those individuals which are most effective in supplying positive contact are utilized to the fullest extent. Of additional operational significance is the fact that even though the College is now predominantly a resident institution, the commuting student cannot be overlooked. The prediction model suggests that a student who applies as a commuter, if accepted, is much more likely to confirm his/her intentions of enrolling at the institution. In like manner, special attention must be given to those students who apply late in the academic year and are accepted in the months of July and August. Although this is after the normal Admissions rush, these students appear to be much more likely to confirm and enroll at the College than do those students who have been involved in the Admissions process during the earlier part of their senior year in high school.

Recommendations for Further Study

As a result of the study, it would seem that there are two areas that would warrant additional study. Both of these areas and the studies connected with them could be examined by the Institutional Research Department or the Admissions Department. The first involves a more detailed study of the effect of visiting the campus. The general feeling that a campus visit is advantageous to the recruiting process was not statistically significant in the prediction model which used the multiple linear regression techniques. On the

other hand, the chi-squared tests applied to the hypothetical question that there was no statistical difference between confirmed and withdrawals as it relates to date of first campus visit, indicated that there was a statistically significant difference. This apparent conflict, coupled with the general feeling that a visit to the campus is advantageous to a particular institution would warrant a more specific and involved analysis of this phenomena.

The second area that seems to warrant further investigation is the role played by the various people involved in the recruitment process. A detailed analysis of the data included under the general heading of "sources of first contact with the institution" would indicate that some of the sources of first contact have a much more positive effect on "confirms" than do other sources. The data would also suggest that certain people increase the probability of a student enrolling at the institution while others have the opposite effect. This wide discrepancy suggested by the analysis of the data would certainly seem to indicate that a more detailed study should be conducted to determine which types of promotional materials, sources of contact and individuals should be involved in the recruitment process.

Reflections

The initial position taken in this dissertation was the fact that higher education and particularly the private

sector was facing an impending financial crisis. A major requirement for the survival of an institution such as Geneva College is directly related to identifying and capturing a particular or specific market segment. Although the data in this study does not deal directly with the issue, it is the opinion of the author that Geneva College should examine the possibilities of changes in the curriculum allowing for the addition of new programs that would expand the potential market segments of the college. This is particularly appropriate in light of the fact that many such programs are not being offered by institutions in the Christian tradition. Included as part of this market segment study should be the examination of traditional admissions standards and the accompanying data base developed from these standards which might deter the acceptance of certain members of those market segments. It is further suggested that Geneva examine the programs and approaches being utilized by other small private institutions. The point being that if the market is changing, then the institutions that are going to survive must change and adapt to those changing conditions.

APPENDICES

APPENDIX A

ADMISSIONS APPLE FILE

I.D. _____ NAME _____ TERM 1 Fall Year 197____
 2 Spring
 3 Exp
 4 Summer

Phone _____ - _____ - _____

Social Security _____ - _____ - _____ Degree 1 -BA 2 -BA 3 -AA

Birthdate _____ - _____ - _____ Majors _____

Citizenship 1 U.S. 2 Other Source _____

Marital Status 1 Single male
 2 Single female
 3 Married male
 4 Married female

Type of Student 1 Full Time Comm Type of Applicant
 2 Full Time Res 0 Freshman
 3 Part Time Day 1 Transfer
 4 Evening School 2 Student Teacher

CARD 2	CARD 3
Address _____ _____ _____ _____	Guardian Code 0 Parent 1 Guardian 2 Spouse
County - Foreign Code _____ _____	Guardian _____
	Billing Address _____ _____ _____ _____

ADMISSIONS APPLE FILE (Continued)

CARD 4	CARD 5
Special Scholarship Eligibility	Extension From ____-____-____
0 Clergy 3 NMSQT	Extension To ____-____-____
1 1-Honor 4 RPNA	2nd Extension ____-____-____
2 2-Honor 5 Science	Confirmation Date ____-____-____
Financial Aid Request Date ____-____-____	Confirmation Amount
PCS In Date ____-____-____	1 \$25 2 \$50 3 \$75
Award Form Date ____-____-____	Drop Date ____-____-____
Hold Date ____-____-____	Drop Code 05 Recommend Top Twenty
Hold Reasons 4 SAT	06 Recommend PACE
0 App 5 Trans-HS	07 Declined
1 Interv 6 Trans-Col	10 Retired
2 Pastor Rec 7 7th Sem	11 Withdrawn
3 Recomm 8 8th Sem	Reasons for Withdrawal _____
Acceptance Date ____-____-____	
Type 03 Accepted	
04 Accepted Prob	
Reactivation ____-____-____	
	CARD 6
Church _____	Date of 1st Visit ____-____-____
CODE _____	Date of 2nd Visit ____-____-____
Denomination _____	Date of 3rd Visit ____-____-____
Commitment C D	Interviews
	0 Adm 3 FA
	1 C Host 4 O-night
	2 Dept 5 Tour

ADMISSIONS APPLE FILE (Continued)

CARD 7	CARD 8
High School _____	College _____
CODE _____	CODE _____
Year of Graduation _____	Date Enrolled _____ - _____ month year
Class Rank _____ Class Size _____	GPA _____ Dropped _____ - _____ month year
SAT Verbal _____ Math _____	Flag 0 Nothing 3 Suspended 1 Warning 4 Ineligible 2 Probation 5 Dropped
ACT Eng _____ Math _____ Comp _____	
Predicted GPA _____	
Activities _____	
CARD 9	CARD 10
College _____	College _____
CODE _____	CODE _____
Date Enrolled _____ - _____ month year	Date Enrolled _____ - _____ month year
GPA _____ Dropped _____ - _____ month year	GPA _____ Dropped _____ - _____ month year
Flag 0 Nothing 3 Suspended 1 Warning 4 Ineligible 2 Probation 5 Dropped	Flag 0 Nothing 3 Suspended 1 Warning 4 Ineligible 2 Probation 5 Dropped

APPENDIX B

Admissions
Applicant
KFS

APPLICANT FILE MAP

<u>Information</u>	<u>Digits</u>	<u>Columns</u>
I.D. Number	4	1 - 4
Name	24	5 - 28
First Line Address	20	29 - 48
Second Line Address	20	49 - 68
Third Line Address	20	69 - 88
Zip Code	5	89 - 93
County - Foreign Code	2	94 - 95
Phone Number	10	96 - 105
Blank	10	106 - 115
Term of Matriculation	1	116
Year of Matriculation	1	117
Current Admissions Status	2	118 - 119
Date of Status	6	120 - 125
Date of First Visit	6	126 - 131
Date of Second Visit	6	132 - 137
Date of Third Visit	6	138 - 143
Interviews	8	144 - 151
Special Scholarship Eligibility	8	152 - 159
Financial Aid Request Date	6	160 - 165
PCS In Date	6	166 - 171
Award Form Date	6	172 - 177
Hold Date	6	178 - 183
Hold Reasons	10	184 - 193

APPLICANT FILE MAP (Continued)

<u>Information</u>	<u>Digits</u>	<u>Columns</u>
Acceptance Date	6	194 - 199
Acceptance Type	2	200 - 201
Reactivation Date	6	202 - 207
Extension Request Date From	6	208 - 213
Extension Request Date To	6	214 - 219
Extension Request Date From	6	220 - 225
Extension Request Date To	6	226 - 231
Confirmation Date	6	232 - 237
Confirmation Amount	1	238
Drop Date	6	239 - 244
Drop Code	2	245 - 246
Reasons for Withdrawal	6	247 - 252
Blank	10	253 - 262
Degree Sought	1	263
First Major	2	264 - 265
Second Major	2	266 - 267
Third Major	2	268 - 269
Fourth Major	2	270 - 271
Source of Contact	3	272 - 274
Blank	10	275 - 284
Social Security Number	9	285 - 293
Birthdate	6	294 - 299
Citizenship	1	300
Marital Status	1	301
Type of Student	1	302

APPLICANT FILE MAP (Continued)

<u>Information</u>	<u>Digits</u>	<u>Columns</u>
Type of Applicant	1	303
Church Congregation	25	304 - 328

APPENDIX C

A REVIEW OF THE METHODOLOGY OF MODELS
AND METHODS OF FORECASTING

1. **Ratio Methods.** In one of the simplest techniques, an externally forecasted base population figure is multiplied by an estimated ratio to produce a projection for a future time period.
2. **Cohort Survival Methods.** The number of individuals in a given group or cohort is estimated for some time in the future by multiplying a fraction representing the survival rate times a base year number for the cohort.
3. **Markov Models.** These are also called linear fractional flow models. In statistics, a Markov process is one in which the future depends only upon the present and not on the past. During any given time period, students are classified in one of a fixed number of states. The fractional flow rates between states are then estimated (and are usually assumed to be time-invariant). Forecasting is initiated by multiplying these fractions by the inventory numbers in the states given by historical enrollment figures for the base year. After accumulating the resulting numbers and adding in new admissions, a new set of enrollment inventories is produced for the first year's projections. The process is then repeated for the number of periods to be forecasted. The output inventories at any given stage serve as the input for the next stage.
4. **Regression Methods.** In this method, functional relationships (called the regression equations) are specified between exogeneous, external variables and enrollment variables. The parameters specifying the functional relationships are then estimated using historical data for the values of the exogeneous and enrollment variables.

If the functional relations are linear equations, the technique is called linear regression. Ratio methods are actually a simple form of linear regression.

5. Optimization Methods. This general category includes all those techniques in which enrollment projections are expressed as functions of previous enrollment projections, exogeneous variables, and decision variables.
6. Combination Methods. In arriving at enrollment forecasts, some combination of these five methods is usually applied.
7. Gues-Estimation. To paraphrase one administrator: "To fill in the enrollment forecasts on the state budget forms in the Fall, I gather together all the computer forecasts my staff has drawn up, I look at the data for several previous years, I look at the data that has just come in, I make a few phone calls, and I decide on the projections. I've never been off by more than one percent."
8. When it comes time to make a forecast that has to be lived with at the institutional level, model results must be tempered with insight and experience. Some of the above methods may look well on paper, but they are a waste of time and money unless they can provide an administrator with more accurate estimates than could be obtained intuitively.

Source: Edward H. Lyell and Patrick Toole, "Student Flow Modeling and Enrollment Forecasting." Society for College and University Planning, New York: New York, December 1974.

FOOTNOTES

¹Jack Magarrell, "Colleges in the Red," The Chronicle of Higher Education. XI, No. 15 (December 22, 1975), p. 4.

²Jack Magarrell, "Private Higher Education: Leaner, Perhaps Stronger," The Chronicle of Higher Education. XI, No. 13 (December 8, 1975), p. 7.

³Martin M. Frankel and Fred Beamer, Projections of Educational Statistics, 1982-83. (Washington, D.C.: U.S. Office of Education, National Center for Educational Statistics, 1974), p. 6.

⁴U.S. Bureau of Census, HEW, as quoted in "Trends in Higher Education Affecting the Admissions Process," by David S. Crockett, Vice President for ACT, July 1976, p. 4.

⁵Garland G. Parker, Collegiate Enrollments in the U.S., 1975-1976. (Iowa City, Iowa: The American College Testing Program Publications, 1976), p. 11.

⁶Thomas D. LaBaugh, Information Needs Assessment of Potential Hope College Freshmen. Dissertation: Michigan State University, 1977, p. 42-43.

⁷David W. Barton, Jr., "If the Customers Don't Buy the Institution Will Die," The Journal of the National Association of College Admissions Counselors. Vol. 17, No. 3 (January 1973), p. 10.

⁸Luci Switzer, "Recruiting Looks Like an Art, Acts Like a Science," College and University Business. Vol. 52, No. 2 (February 1972), p. 47.

⁹David R. Treadwell, Jr., "Hard Work--Not Hard Sell--Boosts Admissions," Journal of the National Association of College Admissions Counselors. Vol. 19, No. 3 (February 1975), p. 11.

¹⁰Barton, op. cit., p. 10.

¹¹Thomas Huddleston, Jr., "Student Marketing," College and University. Vol. 50, No. 4 (Summer 1975), p. 339.

¹²Jeremy M. Lord, "Student Marketing," College and University. Vol. 50, No. 4 (Summer 1975), p. 342.

¹³J. E. McCarthy, Basic Marketing. (Chicago: Irwin Publishers, 1976, 6th edition), p. 29.

¹⁴Earl J. McGrath and Richard C. Neese, "Are Church-Related Colleges Losing Students?" Topical Paper #6, (Arizona University at Tuscon: College of Education, April 1977).

¹⁵McCarthy, op. cit., p. 71.

¹⁶"Thesarus of ERIC Descriptors," (Washington, D.C.: U.S. Office of Education, Educational Research Information Center, 1978), p. IV.

¹⁷James Stedman, "An Analysis of Enrollment Projections," Future Higher Education Enrollments. (Washington, D.C.: Congressional Research Service, Library of Congress, 1978), p. 23.

¹⁸Stedman, op. cit., p. 3.

¹⁹Allen Cartter, "Ph.D.'s and the Academic Labor Market," (The Carnegie Commission on Higher Education, 1978), p. 7.

²⁰Stedman, op. cit., p. 22.

²¹Stedman, op. cit., p. 23.

²²School Enrollment - Social and Economic Characteristics of Students," October 1976 Current Population Reports. Population Characteristics, Series P-20, No. 319. (Bureau of the Census Population Division, February 1978).

²³Howard R. Bowen and John W. Minter, "Private Higher Education," Second Annual Report of Financial and Educational Trends in the Private Sector of American Higher Education. (Washington, D.C.: Association of American Colleges, 1976), p. 23.

²⁴Howard R. Bowen, "Are the Private Colleges Slipping," A.G.B. Reports. (May-June, 1976).

²⁵Public and Private Higher Education Differences in Role, Character, and Clientele. Policy Analysis Service Report, Vol. II, No. 3. (Washington, D.C.: American Council on Education, 1976).

²⁶Richard E. Anderson, "Private Higher Education Beyond Surpluses (Deficits) and Enrollments," (American Research Association, March 10, 1975).

- ²⁷ McGrath and Neese, op. cit.
- ²⁸ McGrath and Neese, op. cit., p. 1.
- ²⁹ Bowen, op. cit.
- ³⁰ Robert Pace, "A Profile of a Protestant College," (The Carnegie Commission on Higher Education, 1975).
- ³¹ McGrath and Neese, op. cit., p. 10.
- ³² McGrath and Neese, op. cit., p. 11.
- ³³ Allen C. Pfistner, "Trends in American Higher Education, (A Review of Recent Literature)," (Lutheran Educational Conference of North America, March 1975).
- ³⁴ Pfistner, op. cit., p. 2.
- ³⁵ Carol H. Shulman, "Private Colleges, Present Conditions and Future Prospects," ERIC/Higher Education Report #9. (1974).
- ³⁶ Carnegie Commission on Higher Education, The Capitol and the Campus. (New York: McGraw-Hill Book Company, 1971), p. 69.
- ³⁷ John Sibling, "Independent, Not Private," Report of the Board of Higher Education and Ministry. (The United Methodist Church, February 1975), p. 1.
- ³⁸ Michael T. Elliott and others, "Toward 2000: Perspectives on the Environment for United Methodist and Independent Higher Education," (Nashville, Tennessee: National Commission on United Methodist Higher Education, 1976).
- ³⁹ Elliott, op. cit., p. 55.
- ⁴⁰ Ibid.
- ⁴¹ Elliott, op. cit., p. 56.
- ⁴² Ibid.
- ⁴³ Elliott, op. cit., p. 57.
- ⁴⁴ Edward H. Lyell and Patrick Toole, "Student Flow Modeling and Enrollment Forecasting," Planning for Higher Education. Vol. III, December 1974.
- ⁴⁵ Michigan Department of Education. State Plan for Higher Education in Michigan. (Lansing, Michigan: 1969).

⁴⁶Higher Education Enrollment Projections. (Olympia, Washington: Washington Office of Program Planning and Fiscal Management, 1970),

⁴⁷C. C. Lovell, "Student Flow Models: A Review and Conceptualization," Technical Report No. 25, NCHEMS at WICHE. (Boulder, Colorado: August 1971),

⁴⁸R. Judy, "Systems Analysis for Efficient Resource Allocation in Higher Education: A Report on the Development and Implementation of CAMPUS Techniques," Paper presented to the Conference on Management Information Systems: Their Development and Application to the Administration of Higher Education. (Washington, D.C.: 1969).

⁴⁹Lyell, op. cit., p. 2.

⁵⁰Projecting Institutional Enrollments, 1974- 1990. (St. Paul, Minnesota: Minnesota Higher Educational Coordinating Commission, 1974).

⁵¹Projecting Institutional Enrollments, op. cit.

⁵²B. M. Tillman and R. D. Newton, "A Student Flow Model for Projection of Enrollments in a Multicampus University." (University Park, Pennsylvania: Office of Budget and Planning, Pennsylvania State University, July 24, 1973), p. 1.

⁵³Robert D. Newton, "Assessing the Impact of Future Student Demand: An Application of a Demographically Differentiated Projection Model," Paper presented at the Association for Institutional Research, 1976, p. 2.

⁵⁴B. K. Gustafson and S. P. Hample, "Enrollment Projections," (Annapolis, Maryland: Maryland Council for Higher Education, 1976).

⁵⁵R. M. Oliver, "Models for Predicting Growth Enrollments at the University of California," (Berkeley, California: University of California).

⁵⁶K. T. Marshall and R. M. Oliver, "A Constant Work Model for Student Attendance and Enrollment," (Berkeley, California: University of California, 1969).

⁵⁷T. S. Chidasbaras, "Enrollment Forecasting in an Open Admissions Environment," (Office of Institutional Research, Federal City College, 1974).

⁵⁸Charles D. Salley, "Helping Administrators Identify Shifts in Enrollment Patterns," (Office of Institutional Planning, Georgia State University, March 1977).

⁵⁹Richard R. Spies, "The Future of Private Colleges, the Effect of Rising Costs on College Choice," (Princeton, New Jersey: Industrial Relations Section, Princeton University, 1973), p. 19.

⁶⁰Spies, op. cit., p. 20.

⁶¹Daniel F. Sullivan, "Choice or Chance, Planning for Independent College Marketing and Retention," The Carleton Application Pool, An Imperical Study. Report on the Admission and Retention Phase of Northwest Area Foundations. (Independent College Program, 1973, 1975, published 197).

⁶²Sullivan, op. cit., p. 30.

⁶³Sullivan, op. cit., p. 56.

⁶⁴Ibid.

⁶⁵Sullivan. op. cit., p. 58.

⁶⁶Sullivan, op. cit., p. 63.

⁶⁷Stefan Valavanis, Econometrics. (New York: McGraw-Hill Book Company, 1959).

BIBLIOGRAPHY

- Anderson, Richard E. "Private Higher Education Beyond Surpluses (Deficits) and Enrollments," American Research Association, March 10, 1975.
- Barton, David W., Jr. "If the Customers Don't Buy the Institution Will Die," The Journal of the National Association of College Admissions Counselors. Vol. 17, No. 3, January 1973.
- Bowen, Howard R. "Are the Private Colleges Slipping," A.G.B. Reports. May-June, 1976.
- Bowen, Howard R. and John W. Minter. "Private Higher Education," Second Annual Report of Financial and Educational Trends in the Private Sector of American Higher Education. Washington, D.C., Association of American Colleges, 1976.
- Carnegie Commission on Higher Education. The Capitol and the Campus. New York, McGraw-Hill Book Company, 1971.
- Cartter, Allen. "Ph.D.'s and the Academic Labor Market," The Carnegie Commission on Higher Education, 1976.
- Chidasbaras, T. S. "Enrollment Forecasting in an Open Admissions Environment," Office of Institutional Research, Federal City College, 1974.
- Elliott, Michael T. and other. "Toward 2000: Perspectives on the Environment for United Methodist and Independent Higher Education," Nashville, Tennessee, National Commission on United Methodist Higher Education, 1976.
- Frankel, Martin M. and Fred Beamer. Projections of Educational Statistics, 1982-83. Washington, D.C., U.S. Office of Education, National Center for Educational Statistics, 1974.
- Gustafson, B. K. and S. P. Hample. "Enrollment Projections," Annapolis, Maryland, Maryland Council for Higher Education, 1976.

- Higher Education Enrollment Projections. Olympis, Washington, Washington Office of Program Planning and Fiscal Management, 1970.
- Huddleston, Thomas, Jr. "Student Marketing," College and University. Vol. 50, No. 4, Summer 1975.
- Judy, R. "Systems Analysis for Efficient Resource Allocation in Higher Education: A Report on the Development and Implementation of CAMPUS Techniques," Paper presented to the Conference on Management Information Systems: Their Development to the Administration of Higher Education. Washington, D.C., 1969.
- LaBaugh, Thomas D. Information Needs Assessment of Potential Hope College Freshmen. Dissertation: Michigan State University, 1977.
- Lord, Jeremy M. "Student Marketing," College and University. Vol. 50, No. 4, Summer 1975.
- Lovell, C. C. "Student Flow Models: A Review and Conceptualization," Technical Report No. 25, MCHEMS and WICHE. Boulder, Colorado, August 1971.
- Lyell, Edward H. and Patrick Toole. "Student Flow Modeling and Enrollment Forecasting," Planning for Higher Education. Vol. 3, December 1974.
- Magarrell, Jack. "Colleges in the Red," The Chronicle of Higher Education. Vol. 11, No. 15, December 22, 1975.
- Magarrell, Jack. "Private Higher Education: Leaner, Perhaps Stronger," The Chronicle of Higher Education. Vol. 11, No. 13, December 8, 1975.
- Marshall, K. T. and R. M. Oliver. "A Constant Work Model for Student Attendance and Enrollment," Berkely, California, University of California, 1969.
- McCarthy, J. E. Basic Marketing. Chicao, Irwin Publishers, 1976, 6th edition.
- McGrath, Earl J. and Richard C. Neese. "Are Church-Related Colleges Losing Students?" Topical Paper #6, Arizona University at Tuscon, College of Education, April 1977.
- Michigan Department of Education. State Plan for Higher Education in Michigan, Lansing, Michigan, 1969.
- Newton, Robert D. "Assessing the Impact of Future Student Demand: An Application of a Demographically Differentiated Projection Model," Paper presented at the Association for Institutional Research, 1976.

Oliver, R. M. "Models for Predicting Growth Enrollments at the University of California," Berkely, California, University of California.

Pace, Robert. "A Profile of a Protestant College." The Carnegie Commission on Higher Education, 1975.

Parker, Garland G. Collegiate Enrollments in the U.S., 1975-1976. Iowa City, Iowa, The American College Testing Program Publications, 1976.

Pfistner, Allen C. "Trends in American Higher Education, (A Review of Recent Literature)," Lutheran Educational Conference of North America, March 1975.

Projecting Institutional Enrollments, 1974-1990. St. Paul, Minnesota, Minnesota Higher Education Coordinating Commission, 1974.

Public and Private Higher Education Differences in Role, Character, and Clientele. Policy Analysis Service Report, Vol. 2, No. 3, Washington, D.C., American Council on Education, 1976.

Salley, Charles D. "Helping Administrators Identify Shifts in Enrollment Patterns," Office of Institutional Planning, Georgia State University, March 1977.

"School Enrollment - Social and Economic Characteristics of Students," October 1976 Current Population Reports, Population Characteristics. Series P-20, No. 319, Bureau of the Census Population Division, February 1978.

Shulman, Carol H. "Private Colleges, Present Conditions and Future Prospects," ERIC/Higher Education Report #9. 1974.

Sibler, John. "Independent, Not Private," Report of the Board of Higher Education and Ministry. The United Methodist Church, February 1975.

Spies, Richard R. "The Future of Private Colleges, the Effects of Rising Costs on College Choice," Princeton, New Jersey, Industrial Relations Section, Princeton University, 1973.

Stedman, James. "An Analysis of Enrollment Projections," Future Higher Education Enrollments. Washington, D.C., Congressional Research Service, Library of Congress, 1978.

- Sullivan, Daniel F. "Choice or Chance, Planning for Independent College Marketing and Retention," The Carleton Application Pool, An Imperical Study. Report on the Admission and Retention Phase of Northwest Area Foundations, Independent College Program, 1973, 1975, published 1976.
- Switzer, Luci. "Recruiting Looks Like an Art, Acts Like a Science," College and University Business. Vol. 52, No. 2, February 1972.
- "Thesarus of ERIC Descriptors," Washington, D.C., U.S. Office of Education, Educational Research Information Center, 1978.
- Tillman, B. M. and R. D. Newton. "A Student Flow Model for Projection of Enrollments in a Multi-campus University," University Park, Pennsylvania, Office of Budget and Planning, Pennsylvania State University, July 24, 1973.
- Treadwell, David R., Jr. "Hard Work - Not Hard Sell - Boosts Admissions," Journal of the National Association of College Admissions Counselors. Vol. 19, No. 3, February 1975.
- U.S. Bureau of Census, HEW, as quoted in "Trends in Higher Education Affecting the Admissions Process," by David S. Crockett, Vice President for ACT, July 1976.
- Valavanis, Stefan. Econometrics. New York, McGraw-Hill Book Company, 1959.

GENERAL REFERENCES

- Agor, Weston H. "Financing Independent Higher Education in Michigan: A Staff Report Analyzing Recent Enrollment, Cost, and Revenue Trends with Projections to 1980 and 1985," Michigan State Department of Education, Lansing.
- Averill, Richard F. and Lloyd J. Suttle. "A Model for University Enrollment Planning," Socio-Economic Planning Sciences. Vol. 9, No. 6, December 1975.
- Bowe, Howard R. and John W. Minter. "Private Higher Education. Second Annual Report on Financial and Educational Trends in the Private Sector of American Higher Education," Association of American Colleges, Washington, D.C., May 1976.
- Cohn, Elchanan. "The Demand for Higher Education in the U.S. A Survey and Some Additional Results," American Journal of Economics and Sociology. Vol. 37, No. 2, April 1978.
- Cope, Robert G. (Ed.), "Information for Decisions in Postsecondary Education," Association for Institutional Research, 15th Annual Information for Decisions in Postsecondary Education, St. Louis, Missouri.
- Diekhoff, John S. and Ida Long Rogers. "A Study of Private Higher Education in Tennessee," Tennessee Council of Private Colleges, Nashville, Tennessee Higher Education Commission, 1970.
- Dunham, Paul C. Montana State Department of Public Instruction, Helena. Office of the Commissioner of Higher Education Institutions in the State of Montana, Fall 1977.
- Funk, Herbert J. "Price Elasticity of Demand for Education at a Private University," Journal of Educational Research. Vol. 66, No. 3, November 1972.
- Ghali, Moheb and others. "The Demand for Higher Education Facing an Individual Institution," Higher Education. Vol. 6, No. 4, November 1977.

Gilbert, Charles C. and Lowell A. Lueck. The Student Flow Model as a Tool to Analyze the Student Dropout. 1975.

Gillmore, Gerald M. The University of Washington Uniform Admissions System. Description and Prediction Equations for 1978-79 Applicants. January 1978.

Gustafson, B. Kerry and Stephen R. Hample. Enrollment Projection Model. May 1976.

Hayden, Mary and other. "Choice or Chance. Planning for Independent College Marketing and Retention," Report on the Admissions and Retention Phase of Northwest Area Foundation's Independent College Program 1973-1975. Northwest Area Foundation, St. Paul, Minnesota, 1976.

Holzman, Albert G. and Donald B. Johnson. "Practice of Management Science: A Simulation Model of the College Admission Process," Interfaces. Vol. 5, No. 3, May 1975.

Hopkins, David, S. P. and William F. Massey. "Long-Range Budget Planning in Private Colleges and Universities," New Directions for Institutional Research. Vol. 13, Spring 1977.

Hummell, Roger G. "Summer and Fall College Enrollments in Pennsylvania, 1975. Our Colleges and Universities Today," Pennsylvania State Department of Education, Harrisburg. Bureau 00& Information Systems. Vol. 13, No. 1, 1976.

Jellema, William W. "The Numbers Game. A Study of Enrollment Patterns in Private Colleges and Universities," Association of American Colleges, Washington, D.C., January 1972.

Jewett, James E. "Proactive Planning for Admissions: The Case of Ohio Wesleyan University," College and University. Vol. 51, No. 3, Spring 1976.

Johnson, Dennis. "Can Your Admissions Program Fill the Empty Beds on Campus?" College University Business. Vol. 46, No. 2, February 1969.

Keefe, R. M. "Private Education and the Critical Matrix of College Admissions," Journal of National Association of College Admissions Counselors. Vol. 15, No. 1, May 1970.

Keeton, Morris T. "Models and Mavericks: A Profile of Private Liberal Arts Colleges," Carnegie Commission on Higher Education, Bereley, California, 1971.

- Kentucky Council on Public Higher Education. "Origin of Kentucky College and University Enrollments, 1976," 1976.
- Lyell, Edward H. and Patrick Toole. "Student Flow Modeling and Enrollment Forecasting," Planning for Higher Education. Vol. 3, No. 6, December 1974.
- Meeth, L. Richard. "Innovation Admission Practices for the Liberal Arts College," Journal of Higher Education. Vol. 41, No. 7, October 1970.
- Minter, W. John and Howard R. Bowen. "Private Higher Education. Third Annual Report on Financial and Educational Trends in the Private Sector of American Higher Education," Association of American Colleges, Washington, D.C., May 1977.
- Newton, Robert D. Assessing the Impacts of Future Student Demand: An Application of a Demographically-Differentiated Projection Model. May 1976.
- Ryan, Edmund G. "Plea for Enlightened Planning," College Management. Vol. 8, No. 1, January 1973.
- Thompson, Hugh L. and James J. Hearn. Differential Admissions Standards in the Plac. August 1970.
- Thompson, Ronald B. "Changing Enrollment Trends in Higher Education," North Central Association Quarterly. Vol. 47, No. 4, Spring 1973.
- Tibby, Edward R. and Judith Bonnett Hirabaysahi. "A Survey of Trends and Patterns in Collegiate Admission and Placement. A Focused Informational Report," Educational Testing Service, Berkely, California, September 1977.

