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Size and Type of High School as Factors in College Achievement

James Claudia Hinds
Loyola University Chicago

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SIZE AND TYPE OF HIGH SCHOOL
AS FACTORS IN
COLLEGE ACHIEVEMENT

by

Sister James Claudia Hinds, O.P., M.A.

A dissertation Submitted to the Faculty of the Graduate School
of Loyola University in Partial Fulfillment of
the Requirements for the Degree of
Doctor of Education

June

1962
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The suggestions of Dr. Arthur P. O'Mara were invaluable to the progress of this investigation, and the author is especially indebted to him for his guidance and patience.
BIOGRAPHY

Born in Minneapolis, Minnesota on December 29, 1914, Sister James Claudia Hinds, O.P. was educated in the parochial and public schools of Minneapolis. She received her B.S. degree in June, 1936 and her M.A. degree in August, 1939, both from the University of Minnesota. She entered the novitiate of the Sisters of Saint Dominic of the Congregation of the Most Holy Rosary in Adrian, Michigan in 1951.

Her educative experience has included elementary and secondary teaching in Minnesota, Michigan and Illinois; her administrative experience has been in recruitment, placement and training activities in the personnel division of a Federal agency in Washington, D.C. She is at present teaching at Barry College in Miami, Florida.
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CHAPTER I

INTRODUCTION

To predict success in college has been one of the earliest and most frequently sought objectives of educational research. Scholastic ability of individual students is, in part, the raw material with which higher education must work to turn out its finished product. Admissions officers and deans have long been interested in the problem of determining who will succeed among students, once they have been admitted to college. The recent trend toward rising enrollments, taxing greatly the personnel and general facilities of colleges and universities, has stimulated even more concern about the selection of potentially successful students. Collegiate administrative personnel believe that reliable information, readily available and intelligently handled, should bring about a better selection program.

The interest of guidance personnel in this same subject is of more recent development. In their efforts to help high school
students make correct decisions about the demands of college matriculation, and to determine intellectually satisfying choices of college, counselors share the interest of admissions officers in the determinants of college success. To aid high school students make a satisfying choice of college becomes more difficult as the size and complexity of the educational system increases. The diversity that characterizes higher education in the United States is unprecedented.¹ Institutional programs vary in scope and quantity; the student bodies vary in scholarship, academic ability and motivation; and there are large individual differences within any one student body. John W. Gardner observed:

There is higher education for the extremely gifted and for the less gifted, for the future professional and the future tradesman. There is higher education with a strong theoretical bias, or with a strong practical bias. There is higher education in every kind of social and sociological context—urban or rural, religious or secular, with or without social pretensions.²

Finally, the student himself is interested in knowing his chances of success in college. The opportunities open to a


particular student will vary, depending on his search and his eligi-

bility. Any high-school graduate can find a college that will ac-
ccept him, provided he puts forth sufficient effort in the search.

However wide or narrow the range of choice open, the fact remains

that he is faced with a number of choices—whether to go to col-

lege; to which college to seek admission; and what course of study
to elect. Yet the information for wise choice is not commonly in
his possession, nor in the possession of the high school and col-
lege officials who advise him.

The admission officer’s task of selecting from a group of
applicants those who are most likely to succeed, is based on a
two-fold motive: that of efficiency in the operation of his in-
stitution, and that of attention to the welfare and satisfaction
of the individual applicant. The counselor’s problem of helping
an applicant arrive at an intelligent decision about college is
based on the counselor’s confidence in the prospective student’s
ability to make wise choices provided that suitable information
is provided as a basis for these choices.

Strictly speaking, the probability associated with
a prediction applies only to a group of individuals iden-
tical on whatever limited group of characteristics are
used in the prediction. Some of the group will succeed;
others will fail. Factors other than those identified
and used in prediction make the difference. Individuals
either succeed or fail, and no probability statement
can be made regarding an individual. For the group, however, assuming appropriate stability in the criteria of success, the percentage of failure can be controlled and considerably diminished by increasing the accuracy of prediction. Selection emphasizes quality control by the institution; counseling presumes an individual has some choice and helps the individual to make his own choice.²

Those who have worked with students recognize that a particular individual's motivation, temperament, and working conditions are factors which are either not included in the prediction or, if included, may be significantly different from the group coefficients of validity. This phenomenon does not render less useful the statistical approach, but rather emphasizes the need for intelligent use of prediction data in combination with data obtained from counseling and other sources.

The statistical approach most frequently used to provide objective data in forecasting college success has been the prediction study. In design, prediction studies range from simple expectancy tables and tabulation of data to the more sophisticated techniques of analysis of variance and covariance, and multiple regression analysis. In scope, investigations range from rigidly

restricted inquiry into the relationship of a single variable to grades in a particular course, to broadly based studies of the relationships among a large number of predictor and criterion variables. It is probable that prediction studies will continue to be used as a tool to supply basic information for college and secondary school administrative and personnel officers.

THE PROBLEM

Among the factors which have been studied for their validity in predicting success in college, the criteria of high school performance and scholastic aptitude have been found to be consistently more effective. The fact that these predictor variables fall short of perfect prophecy, however, is cause for concern among serious research workers. The basic difficulty is one of unsolved criterion problems: little is known about the meaning of the terms, "success in college", "scholastic aptitude", "high school performance", and other measures commonly employed as either predictor or criterion variables. Almost as fundamental is the lack of substantial information about the meaning and importance of the vast number of non-academic and environmental factors; how "factors other than those identified and used in prediction" operate as

4 Ibid., p. 2.
The purpose of this investigation is to single out for study two particular factors in the environment for analysis in relation to college success: high school size, and status. Generally, research in regard to size of secondary schools has reported inconsistent findings; the studies on high school status, however, have been fairly consistent in attributing superior performance to graduates of public schools.

The variations in design and methodology of the research reported on both size and type of high school make a meaningful interpretation difficult. Furthermore, the definition of a successful student varies to a great deal from institution to institution. There is by no means sufficient conformity in different institutions to permit the development of one formula that would be adequate for the variety of educational institutions that perform admissions research. Much of the research is, therefore, institution-bound.

Since colleges differ with respect to standards of admission and quality of work demanded of their students after admission, practices followed by some institutions do not necessarily fit those of other colleges. In respect to this, one writer asserts:
A basic precaution which must be observed is that college populations vary markedly from one school to another merely because of such factors as admission policies, curriculums offered, state and local cultural and economic differences, and the like.

College freshmen at one institution are not typical of college freshmen throughout the country; it is a fallacy to think this way. This tremendous diversity among American colleges and universities has been cited by Fishman as significant enough to make profitable the study of an individual college as the logical unit for definitive research in identifying and clarifying criteria and in determining their interrelationships.

There are additional limitations which render the findings of doubtful value to the personnel of Catholic colleges and secondary schools who are interested in forecasting academic success in higher education. In no case is there research on either variable done on a Catholic college population. Only two investigations delineate the Catholic secondary school from the


7L. V. Koos, Public and Private Secondary Education: Comparative Study (Chicago, 1931) and D. D. Feder, "Factors Which Affect Achievement and Its Prediction at the College Level", Journal of the American Association of Collegiate Registrars, XV (January 1940), 107-118.
independent private school.

The purpose of this investigation, therefore, is to cast light on the relationship of both size and status of high school to academic success in a particular college and to utilize the result of the analysis in improving the prediction of performance during the freshman year in that college. The institution studied is a Catholic liberal arts college for women, located in a fairly large metropolitan center in Florida and drawing local and non-local students from both public and non-public secondary schools. The non-public secondary schools included in this study are high schools owned and operated by a diocese or a religious order of the Catholic Church; they will be referred to as Catholic, as distinguished from the public schools.

Before reporting the procedure of the study, a brief description of the characteristics of the college and its student body will be given.

THE COLLEGE

Established in 1940 to serve the needs of the Catholic girl in Florida for higher education, Barry College is the only Catholic liberal arts college for women in the state.

As a Catholic college, its program is based on the outlines of the philosophy of Catholic education stated by Pope Pius XI,
"to cooperate with divine grace in forming the true and perfect Christian."8 It seeks to combine Catholicity and scholarship in its students by making theology the integrating factor in all subject-matter areas. In recognizing the value of theology to orient and unify all intellectual endeavor, the aim of the college seeks to approach the truly Catholic, truly liberal arts idea, to form the true and perfect Christian.9 Whether the particular program of studies leads to a major in Latin or to a certificate in elementary education, the primary objective of the curriculum is to develop the intellect in the habit of knowing the truth, and the will in the practice of the virtues.

As a liberal arts college, Barry offers each student background in theology and Thomistic philosophy, in language and literature, in mathematics and the sciences, in history and the social sciences, in the arts of music, painting and sculpture. From these studies the student acquires not only an acquaintanceship with the legacy of human culture, but also with the means of

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individual attainment of personal cultivation. As a consequence, professional or vocational training must be fitted into a liberal arts course of study. For example, a great many teachers are prepared for positions in institutions ranging all the way from first grade through high school to junior college. Each prospective teacher has been broadly trained in the essential and common elements of all professions: in accuracy of thought and expression and in precision in forming judgment, as well as in the specific education necessary for a particular vocation. 10

As a women's college, Barry helps to develop a theory of liberal education which places universal and spiritual motherhood, philosophically and psychologically understood, as the goal of woman. Woman has an impact on society in her spiritual influence, as a bulwark against the sources of social disintegration and as a support and reinforcement of the natural aspiration to good found in all men. Since this function of woman comes not from what she does but from what she is, there is an emphasis on both spiritual and intellectual formation to prepare the student to exert a wholesome Christian influence in whatever role she may assume.

Barry College is accredited by the Southern Association of Colleges and Secondary Schools, and is affiliated with the Catholic University of America. The college offers a four-year program leading to the Bachelor of Arts degree with a major in one of the academic disciplines, and a Bachelor of Science degree in nursing, elementary education, home economics, science, music and art. A program in secretarial science may be pursued as a two-year terminal course or as a minor field of study. All students take foundation courses in the principal fields of learning during the first two years. Advanced courses in the arts, sciences and professional studies will depend on the particular major and minor requirements. The following courses are required of all candidates for the Bachelor degree: twelve semester hours of English (composition and English literature); at least six semester hours of mathematics or science; twelve semester hours of foreign language, including, for the B. A. degree, a minimum of six units of Latin; at least six semester hours of history; and twelve semester hours of philosophy. All students are likewise required to take two semester hours of mental hygiene, one unit of parliamentary law, and four of physical education. All the Catholic students take thirteen hours of theology; all non-Catholics take four semester hours of character education in place of the theology requirements.
A more detailed account of the requirements for graduation will be found in the appendix.

The degree requirements outlined above might be termed rigid and traditional in comparison with those of many American colleges and universities, but the program is a logical implementation of the Catholic liberal arts ideal. Indeed, it is in striking contrast to the data compiled by Mabel Newcomer on the amount and nature of required courses in women's colleges. Her findings were obtained from college catalogs for 1956-57, and are based on figures covering about two-thirds of the non-Catholic colleges and a smaller proportion of the Catholic colleges in the United States. With the exception of English, less than fifty per cent of the colleges she surveyed required the courses enumerated above. This she found to be true whether the breakdown included or excluded Catholic colleges.\(^{11}\)

The admission requirements are geared with similar logic toward achieving academic articulation of secondary-school preparation with the liberal arts pattern of collegiate education. The high school graduate must present a minimum of fifteen units of

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acceptable high school courses, including the following subjects completed: four units of English; two of foreign language; two of college preparatory mathematics; one of laboratory science; and two to three of social studies. Other factors considered in admission are academic aptitude as measured by the Scholastic Aptitude Tests of the College Entrance Examination Board, and character, as endorsed by a clergyman.

The academic achievement of the students is surveyed in broad areas of study twice during the undergraduate program. The area tests of the Graduate Record Examination are given to all students at the end of the sophomore year to determine progress toward the goals of liberal arts instruction. The results of these tests are utilized by faculty advisors in educational and vocational guidance. All candidates for graduation take the Graduate Record Examinations at the end of the senior year. These tests include an aptitude test, a measure of general scholastic ability at the graduate level; one advanced test, a survey of achievement in the student's field of specialization; and the area tests taken in the sophomore year. The latter provide a comprehensive appraisal of the progress of each student toward the objectives of liberal arts instruction in three principal areas of human culture: social science, humanities and natural science.
The extra-curricular program and general campus life are also in harmony with the aims and objectives of the college. The chapel, the center of campus religious life, is open daily for Mass and other devotions, as well as for private prayer and adoration. Two Dominican priests, professors of theology and philosophy, reside on the campus and are available for spiritual counsel. Campus groups provide special opportunities for religious study and action. The Mission Council seeks spiritual and material assistance for the Church in its mission locations. The Confraternity of Christian Doctrine seeks active lay workers to participate in parish life by teaching children the truths of God. The Sodality of Our Lady and the Third Order of St. Dominic offer means of deepening the spiritual life.

In accordance with the Thomistic and Aristotelian concept that "man is by nature social", the college provides many opportunities for social living—student council, class activities, club meetings, proms and informal dances, and other intellectual and social events on and off campus.

THE STUDENT BODY

The description of the student body given here is based on an analysis of the characteristics of the three freshmen classes:

The students represent, in approximately equal proportions, residents and non-residents of Florida. Four-fifths of the Florida girls are residents of Miami or within commuting distance of the college. The middle Atlantic and north central sections of the country each contribute approximately thirteen percent of the total enrollment, and the Latin-American countries contribute ten per cent. With the exception of the last-mentioned group, and an occasional student from Europe or the Far East, the student body is a native-born American population. There is a higher proportion of public high school graduates (sixty per cent) from the Miami area than of Catholic high school graduates (forty per cent). In considering the group as a whole, however, this proportion is reversed. The distribution shown in Table I is for the entire group of first semester freshmen admitted during the period 1958 through 1960.

There is an extremely wide range in the size of high school from which the girls come. The smallest class noted is that of a Catholic high school in Florida which graduated nine. The largest is that of a public school in Miami, the graduating class of which numbered 1,064 graduates.

Of the 129 Catholic high schools represented by the girls in
### TABLE I

**GEOGRAPHICAL DISTRIBUTION OF THE FRESHMAN CLASSES OF 1958, 1959 AND 1960, BARRY COLLEGE**

<table>
<thead>
<tr>
<th>Section</th>
<th>Total</th>
<th>Percentage</th>
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<tr>
<td>Southern</td>
<td>322</td>
<td>53.7</td>
</tr>
<tr>
<td>Middle Atlantic</td>
<td>79</td>
<td>13.2</td>
</tr>
<tr>
<td>North Central</td>
<td>77</td>
<td>12.8</td>
</tr>
<tr>
<td>Latin American</td>
<td>66</td>
<td>11.0</td>
</tr>
<tr>
<td>New England</td>
<td>36</td>
<td>6.0</td>
</tr>
<tr>
<td>South Central</td>
<td>20</td>
<td>3.3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>600</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

In this sample, eighty-nine have graduating classes of less than fifty; the largest Catholic school graduating class is 681. Only twelve of the eighty public schools, however, have graduating classes of similar size. Although there is a substantial overlap, the distributions of the two groups by size of graduating class is definitely bimodal; the mode of the Catholic schools is toward the small end, and of the public schools toward the large end.

It is interesting to note that forty-three per cent of the public school graduates come from seven per cent of the public
schools. Almost half of the students who have graduated from public schools are products of seven large city schools in and near Miami. There is no comparable concentration of Catholic high school graduates represented in the population. The graphical representation of the distribution of both students (Figure I) and of high schools (Figure II) illustrates clearly both the overlapping and the bimodality of the distributions.

Aptitude for scholastic pursuits is a significant part of the characteristics of a college population. Scholastic aptitude of the Barry College student population is measured by the College Entrance Examination Board Scholastic Aptitude Tests. For the freshmen groups being studied, the mean score on the verbal section is 442; the variability, as measured by the standard deviation, is 996. The mean score on the mathematical section is 408, with a standard deviation of 84. In comparison with the College Board mean of 500, the ability level of the student body can be described as somewhat below the national mean, but within the range of variability of the middle two thirds. The hazard of using a statistical measure as a standard of criterion of merit must be considered; it must be remembered that such data reflect the complex interaction of admissions policies in combination with regional variations in the characteristics of entering freshmen;
PERCENTAGES OF PUBLIC AND CATHOLIC SCHOOLS BY SIZE
(BASED ON DATA FOR BARRY COLLEGE FRESHMEN OF 1958, 1959 AND 1960)

PERCENTAGES OF PUBLIC AND CATHOLIC HIGH SCHOOL GRADUATES BY SIZE OF SCHOOL (BASED ON DATA FOR BARRY COLLEGE FRESHMEN FOR 1958, 1959 AND 1960)
also that national norms conceal the very great diversity that is
typical of American higher education.12

This estimate of academic aptitude is consistent with another
measure of the ability level of the student body. In 1956, Barry
College participated in a study of diversification in higher edu-
cation conducted by the Center for the Study of Higher Education,
Berkeley, California, in which data were secured on entering
freshmen from two hundred colleges and universities; these students
constituted a representative sample of the student bodies of more
than 1800 institutions in the nation. The mean score on the Amer-
ican Council on Education Psychological Examination for the college
was ninety-nine, and the standard deviation, twenty-six; this mean
is two points below the score of the average entrant to all public
institutions, four points below the score of the average entrant to
all Catholic institutions, and five points above the mean score for
all institutions in the South. The scholastic ability of the typ-
ical Barry College student can, therefore, be characterized as
average.13

12 Alfred T. Hill, The Small College Meets the Challenge (New
York, 1959).

13 J. G. Darley, "The Distribution of Scholastic Ability among
Entering Students throughout the United States," Unpublished Manu-
script, Center for the Study of Higher Education (University of
California, Berkeley, 1960).
The religious background of the students is, as would be expected, quite homogeneous. Eighty-five per cent of the student body are of Roman Catholic religion, and the remaining fifteen per cent are of various Protestant denominations. It is interesting to note that there is one Jewish girl in each of the freshman classes studied.

The students are largely a middle-class group—the daughters of professional and business men. A breakdown of the class entering in 1960 in regard to occupation of father has been compared, in Table II, with similar information compiled by Newcomer on other types of women's colleges.

**TABLE II**

**OCCUPATIONS OF FATHERS OF COLLEGE STUDENTS BY PERCENTAGES**

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Professional and semi-professional</td>
<td>40.8</td>
<td>29.9</td>
<td>21.0</td>
<td>22.2</td>
</tr>
<tr>
<td>Business men</td>
<td>45.4</td>
<td>41.7</td>
<td>22.2</td>
<td>47.8</td>
</tr>
<tr>
<td>White collar workers</td>
<td>10.9</td>
<td>18.5</td>
<td>24.1</td>
<td>15.0</td>
</tr>
<tr>
<td>Manual workers</td>
<td>1.5</td>
<td>7.7</td>
<td>30.3</td>
<td>13.9</td>
</tr>
<tr>
<td>Farmers</td>
<td>1.2</td>
<td>2.0</td>
<td>2.3</td>
<td>1.1</td>
</tr>
</tbody>
</table>

14Newcomer, p. 133.
Student retention at Barry College follows a pattern somewhat similar to that of other Catholic colleges. Sister Alice Joseph's study\textsuperscript{15} of Catholic college student retention, based on a representative sample of 3,400 students, indicated the percentage of dropouts as 25.6 at the freshman level, 16.2 at the sophomore level, and 4.4 and .7 at the junior and senior levels, respectively. The figures for Barry College are: of a freshman class of 200, ten per cent do not complete the first semester; another ten per cent attend one semester only; and an additional ten per cent do not return for the sophomore year. There is further dropout at the end of the sophomore and junior years. Of the total of seventy-seven graduates in June, 1960, sixty had attended the college for the entire undergraduate period.

The reasons for dropouts at Barry College similarly reflect the findings of Sister Alice Joseph.\textsuperscript{16} Reasons for transfer are: to be nearer home; to attend a coeducational college; to obtain special curricular offerings; to enter the religious life; and because of finances. Student reasons for discontinuance include


\textsuperscript{16}\textit{Ibid.}, p. 120.
lack of academic interest; lack of finances; and marriage. Involuntary dropouts are found principally among those girls dismissed for low scholarship and for disciplinary reasons.

THE PROCEDURE

The following data were collected on three successive groups of college freshmen, those entering the college in 1958, 1959 and 1960:

1. Scores on the verbal and mathematical sections of Scholastic Aptitude Test of the College Entrance Examination Board;

2. High school average;

3. College grade point average for the freshman year;

4. Size of the high school graduating class;

5. Status of high school (public or private);

The following data were collected on only one group of college freshmen (the class entering in 1960):

1. Scores on the California Language Test, Advanced;

2. Scores on the Brown-Holtzman Survey of Study Habits and Attitudes.

The data were first analyzed to investigate the problem of whether there are significant differences in the quality of students who come to Barry College from high schools of various sizes. The following null hypothesis was tested:
There are no differences in the relationship of size of high school to each of the following variables:

- High school average
- College grade point average
- CEEB verbal score
- CEEB mathematical score

The total group was divided into three sub-groups on the basis of size of high school graduating class. For each sub-group and for the total population, the mean and standard deviation of each of the above variables were computed. Differences between the means were tested for significance by the z-ratio test.

To investigate the problem of whether there are significant differences in the quality of students sent to Barry College by public and Catholic high schools, the following null hypothesis was tested: there are no differences in graduates of public and Catholic high schools in regard to the following variables:

- High school average
- College grade point average
- CEEB verbal score
- CEEB mathematical score

For this analysis, the total was divided into two sub-groups on the basis of status of high schools. Means and standard deviations were computed for each of the variables for the public and Catholic school populations, and critical ratios were computed for the differences.
The analysis of the relationship of size of high school to the above variables was performed in a similar manner on the group composed of the 165 members of the 1960 class on whom complete information was available. The following additional variables were included in the analysis for this group:

California Language (Mechanics of English)
California Language (Spelling)
Study Habits and Attitudes (Brown-Holtzman Inventory)

The investigation of the relationship of status of high school to these variables was performed in a similar manner, again using the 1960 freshman class.

Inter-correlations for all pairs of independent variables and the dependent variable were computed for the total group, for each of the three sub-groups of the total which were formed on the basis of size, for the public-Catholic grouping, and for each or the corresponding sub-groups of the class of 1960.

From these interrelationships, the relative effectiveness of each of the predictor variables to the criterion was determined. The data were further analyzed by multiple correlation and regression techniques. Such analysis made it possible to isolate variables which had better than chance correlation with the criterion, to estimate their efficiency singly and in combination, and to compute the maximum regression for the various predictor variables.
It should be emphasized that the conclusions drawn are for a particular population. Any generalizations made from this study would not necessarily hold for a college enrolling students of levels of ability different from those of Barry College. They might not apply to an institution drawing its students from high schools distributed differently with respect to size and type. They might not hold for an institution using a different system for the evaluation of student achievement or in one with methods of instruction and curricular organization differing from those of the college dealt with in this study. Numerous other factors could be enumerated which would prevent the findings of this study from holding for a particular institution. Consequently, broad generalizations for all institutions on the basis of this study are not believed to be justified and are not made. For the specific population and situation dealt with in this study, however, certain generalizations and conclusions of possible practical value seem to be indicated.
CHAPTER II

CRITICAL SUMMARY OF THE RELEVANT RESEARCH

The background against which this study is projected is threefold: a brief survey of prediction studies in general; a survey of investigations on the subject of the relationship of type of high school to college success; and finally, a review of studies concerned with the relationship of high school size to successful performance in college.

A. PREDICTION STUDIES IN GENERAL

The numerous studies on the relationship between selective criteria and academic performance are so alike essentially that only two studies will be described. One of the early investigations, at the University of Minnesota,¹ was based on data obtained

¹University of Minnesota Studies in Predicting Scholastic Achievement, Part I, College of Science, Literature and the Arts. (Minneapolis, 1942), pp. 37-38.
for 454 men and 373 women who entered the College of Science, Literature and the Arts of the University in 1935. Coefficients of correlation, both zero order and multiple, were computed for men and women separately and for the total group between college grade-point average and several predictive criteria: high school rank; three aptitude tests; and a battery of achievement tests. The following correlations between the predictive variables and grade-point average for the total group are similar to the relationships other investigators have found: high school percentile rank, .54; American Council on Education Psychological Examination, .50; Ohio State Psychological Examination, .46; Minnesota College Aptitude Test, .44; Cooperative Achievement Tests, from .25 in General Science to .37 in English. Previous school achievement has been consistently found to predict college grades most accurately; scholastic aptitude is usually next in value; and scores on achievement tests of less value.

The work of Hoops and Marshall\(^2\) at Stanford University is a good illustration of a more recent study bearing out the same trends. The investigation analyzes the relationship of the four-

\(^2\)Robert Hoops and Hubert Marshall, *The Undergraduate in the University* (Stanford, 1957), pp. 41-43.
year grade-point averages of Stanford graduates to the following predictive criteria: scores on the verbal and mathematical sections of the College Entrance Examination Board; high school grade record; and personal ratings of freshmen.

The coefficient of correlation found between verbal and scholastic aptitude and college grade point average was .46; between high school rank and grade point average, .54; and between mathematical aptitude and grade point average, .22. The correlation of .09 found between personal rating and grade-point average is typical of the very low relationship between personal, non-intellectual attributes and academic ability.

In summary, the survey of college admission-selection studies by Fishman and Pasanella for the decade 1949-1959 can be cited. Of 263 studies reviewed, the high school record correlated roughly .50 with comprehensive freshmen-year intellectual criteria. The correlation of scholastic aptitude test scores with freshmen intellectual criteria averaged .47.

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THE RELATION OF TYPE OF HIGH SCHOOL TO COLLEGE SUCCESS

The question of the comparative performance of public and private high-school graduates in college has been the subject of a number of investigations during the last forty years. Sims\(^4\) reports that there is almost perfect consistency in the conclusions reached by various studies that public high-school graduates do better college work than do graduates of private high schools.

As early as 1913, Potter\(^5\) studied the comparative performance during the freshman year at the University of Chicago of 170 private-school graduates and 340 public-school graduates. He found that fourteen per cent of the private-school graduates and twenty-six per cent of the public-school graduates earned honors. Using the term "academy" to apply to all types of private school, Potter stated that "the conclusion is evident that as an agency preparing for college the public high school is far superior to the academy."

Harvard University has been a fertile field for investigation

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of this problem. In 1922, Beatley\(^6\) reported, as a minor finding in his study of the new plan of comprehensive examinations, that the men prepared at the private schools obtained on the average poorer marks in high school and college than men prepared at the public schools, but that on the comprehensive examination the two groups were approximately equal in attainment. His means were based on 139 public- and 284 private-school graduates, and the differences he found were not tested for statistical significance.

Six years later Dean Hanford\(^7\) found a similar "margin of superiority" of Harvard freshmen from public high schools over those from private schools. He reported almost twice as many public-school graduates in the freshman class on the Dean's list as private-school graduates. Unsatisfactory final records were made by 11.2 percent of the public-school graduates as compared with 27.4 percent of the private-school group. Consistency rather than significance of the differences was emphasized.

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\(^7\)A. C. Hanford, "Report to the President of Harvard University," Official Register of Harvard University, XXV, No. 8 (1928), 83-94.
The 1924 Proceedings of the Association of Colleges and Secondary Schools of the Southern States\(^8\) contained a report of the only analysis known to the writer which involves several institutions of higher education.

The first-semester grades of 12,119 freshmen in sixteen institutions were studied. Of that number, 10,654 had been educated in 584 southern public schools, and 1,465 in 112 southern private schools. Roemer reports that 12.2 per cent of their courses were failed by public high-school graduates, while 15.4 per cent of course work was failed by students from private schools. It was noted that percentages of freshmen failure for the two preceding years were similar. The 1926 report of the Southern Association contained similar results: i.e., in 12,414 public high school graduates, the percentage of failure was 13.7; of 1,475 private school students, 15.9. No attempt was made to determine the significance of the differences, nor to control the many factors at work in a multi-dimensional survey such as this.

Koos\(^9\) conducted a large-scale study similar to the above

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\(^9\) L. V. Koos, Public and Private Secondary Education: A Comparative Study (Chicago, 1931).
investigations and found like results. His study, conducted at the University of Minnesota, concerned 1,029 freshmen from public high schools, and 252 entrants from private high schools. Koos’ study represents two refinements in experimental design: he matched his groups on college aptitude, age, sex, and location of high school; and he subdivided the private school students into Roman Catholic, Scandinavian and independent school graduates. He matched two or more public-school graduates to each private-school student.

The median honor point ratio of the public high school sample was found to be significantly higher than for the private school group. Students from Roman Catholic schools, half of the total private group, accounted for more of the difference than the other private groups; they secured the lowest of the quality-point ratios. The two groups were much alike on college aptitude, with the private group superior as a whole. The classification by location of school resulted in two groups--one composed of students from high schools located in the cities of Minneapolis and St. Paul (the twin city group), and one of students from all other high school in the state. Comparisons of these groups were presented in a mass of data bearing out the superior scholastic performance of public-school graduates. He noted much overlapping and great differences among schools, but, with only “minor exceptions,” striking
superiority of public school graduates to those from "all private schools combined." In order to simplify as far as possible the presentation of the materials, the data on significance was not reported. The one ratio reported in a footnote, a value of 2.17, was defined as significant. In the successive subdivisions of the data, he reported groups as small as nine. His comment in regard to the critical ratios is that "the differences where large numbers of matches were concerned, were statistically significant." For some of the differences where the means for smaller numbers of students are being compared, "significance must be sought in the consistency of the differences reported."10

Chamberlain,11 studying freshmen entering the University of Kentucky between 1924-29, matched 100 pairs on the basis of scholastic aptitude, sex, and divisions of the University. He used the average semester hours attempted during the two-year period as one basis of comparison of the groups. Apparently the index measured

10 Ibid., p. 132.

retention in college. The public-school students attempted a higher average number of semester hours of college work (82.8) than did the private-school graduates (74.2); nine of the twenty-three students who attempted fewer than thirty semester hours were public-high school graduates; thirty-five of the sixty-three who attempted more than 100 semester hours were public-school graduates. The mean grade point average earned by the private school group was .95, as compared with 1.11 by the public school group. The author interprets the critical ratio of 1.6 between this latter difference and its standard error as meaning that the chances are about ninety-four in 100 that the true difference is greater than zero and that it is on the side of the public-school student. Of those earning grade point averages above B, eleven were public-school graduates, and six were private school students; of those earning grade point averages below C, forty-nine were private- and forty-two public-school graduates. Chamberlain, like Koos, supplements significance by consistency to warrant the belief that the differences are due to true rather than chance variations.

A conclusion reached by Feder, in an experiment concerned

12 D. Feder, "Factors Which Affect Achievement and Its Prediction at the College Level," Journal of American Association of Collegiate Registrars, XV (January, 1940), 107-08.
primarily with size of high schools, is relevant to the question of comparative performance in college of public and private high school graduates. He studied samples of freshman classes of 1929-33 entering the College of Liberal Arts of the State University of Iowa. He included in one such group students from Iowa parochial schools. In scholastic aptitude, parochial school graduates were much poorer risks than any other group; in achievement, also, the parochial graduates were "markedly" below the total class average in every year studied. No tests of significance were computed.

Seltzer analyzed the grades of 1,871 students in the freshman year at Harvard during the academic years 1939-41. The freshmen were divided into three groups--public, private-day and private boarding-school graduates. The public-school students were "markedly superior" in performance; the private day-school students next, and the private boarding, lowest. Twice as many public-school students attained the Dean's list as private boarding students; twice as many private boarding students were failures as public graduates. The intellectual potential of the groups, as measured by the Scholastic Aptitude Test and Mathematics Attainment

Test scores, was "strikingly similar." Seltzer's research is a simple descriptive study of the relationships involved, with no attempt to determine whether the differences noted are significant.

From the point of view of statistical treatment of the data, perhaps the most sophisticated analysis of the comparative performance in college of public and private high school graduates is the study by Davis and Frederickson at Princeton University. The subjects were 244 public-school students and 389 private school students from the freshman class, and 236 public-school graduates and 366 private-school graduates from the sophomore class of 1955. The verbal score of the Scholastic Aptitude Test was used as the measure of ability. Previous scholastic performance for the freshmen was expressed by a predicted freshman average grade based on high-school class rank and adjusted on the basis of grades earned at Princeton by previous students from that school; for the sophomores, the index of previous achievement was their first-term average grade. The criterion variable was grade-point average for each group. Means and standard deviations for the freshman group and intercorrelations among the variables were computed. Differences

Means indicated a superiority by the public-school groups in both measures of scholastic achievement. The data were treated by covariance analysis, which permits the comparison of two or more groups on achievement on some variable while holding constant the effect of one or more variables which may influence the first one. The results indicated that, for a given level of ability, public graduates earn better freshman average grades. In the analysis for the sophomores, the trend was in the same direction and more marked.

A study which was concerned totally with women was conducted by Audrey M. Shuey at Randolph-Macon Women's College. From a total of about 1,000 freshmen in the years 1947-51, she selected 189 pairs of students, matched on American Council of Education Psychological Examination score; section of country; size of community; academic program; hours of course work. The findings were similar to other studies in attributing significantly higher grades to public high-school graduates. Dr. Shuey eliminated from her investigation parochial-school graduates because of the extremely small number of them. The difference in means for college

performance was significant at the one per cent level.

A later study by the same author analyzed the comparative performance of students during the sophomore year. From a total of 1,660 sophomores in the nine-year period between 1944 and 1953, she selected 245 pairs, matched on the same variables as the freshmen were. The previous hypothesis was supported, in that the public school group was significantly higher in grades, the difference being significant at the one per cent level.

A more recent study of this problem was done on Iowa State College students by Lathrop and Kieffer. The subjects were sixty pairs, matched on sex, division of the college, high school average, score on American Council on Education Psychological Examination, high school size and high school course pattern. Four high-school course patterns were defined: math-science; general; home economics; industrial education and business; miscellaneous. Tracing the comparative progress of the groups through their entire academic career, the investigators found higher mean grade-point

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averages for public graduates at the end of their first, third and final semester of attendance, with a significant difference for the final semester. Thirty-six per cent of the public high school graduates were graduated, in contrast to sixteen per cent of the private school graduates. Twenty-two per cent of private high school students transferred to other colleges, whereas only twelve per cent of the public group left for this reason. Sixty-two per cent of the private graduates were dropped in comparison to fifty per cent of the public group. The math-science background group had only eight per cent of the private school graduates, but twenty-eight per cent of the public school graduates; on the other hand, the general pattern was most prevalent among eighty per cent of the private school graduates as against only twenty-eight per cent of the public graduates.

The most recently published investigation of the comparative performance of college students from public and parochial secondary schools is a study by Hill concerning freshmen at Ball State Teachers College.¹⁸ He selected 103 graduates of parochial schools and an equal number of graduates of public schools who had matri-

culated at the college during 1952 and 1957. He based his compari-
son on the following variables: father's occupation; entrance test
scores on the American Council on Education Psychological Examina-
tion or the School and College Abilities Test; grade point average
for each of the three quarters of the freshman year and the cumula-
tive average for the entire freshman year; and the number of quar-
ters the student was enrolled. The main comparison between the
groups was that of grade point averages. Data were treated by
means of analysis of covariance, with scholastic aptitude the con-
trol variable.

The results indicated that graduates of parochial schools ob-
tained a slightly higher mean in socio-economic class rating,
while graduates of public schools were slightly higher in persis-
tence in college. Scholastic aptitude scores favored graduates of
parochial schools, the only significant difference, however, being
between the linguistic measures. Grade point averages, by con-
trast, favored graduates of public schools, although not signifi-
cantly so.

The major comparisons of the investigation involved three
analyses of covariance,—for the fall quarter, for the spring quar-
ter, and for the entire freshman year. Ruling out the effect of
scholastic aptitude by this technique, Hill found all differences
to be in favor of public school graduates, and statistically significant at the one or five per cent level.

Mr. Hill indicated that his findings were limited in scope, since the study was restricted to a single college. However, in referring to similar findings in Koos' study at the University of Minnesota thirty years earlier, he concluded that "the situation may be stable in time over the years and in various geographical locations."

In concluding the summary of research on the relation of type of high school to college success, two pronouncements by the National Education Association are presented. David Iwamoto, Research Assistant for the National Education Association, interpreted the research findings on comparative performance in college of public and private school graduates as offering no conclusive evidence to indicate superiority of one type of education over the other. He further concluded that "the general notion that students from private schools do better in college than graduates from public high schools is a generalization that lacks supporting data."¹⁹

¹⁹David Iwamoto, "Don't Sneer at Public Education," National Education Association Journal, XLVII (February, 1958), 118-119.
The National Education Association has cited figures\textsuperscript{20} published by the College Entrance Examination Board on the quality of preparation for college of public and private school graduates. The scores made by public school graduates were slightly higher on the verbal section of the scholastic aptitude tests, but slightly lower on the mathematical section. The independent school students scored higher on the French, chemistry and advanced mathematics tests, but were slightly inferior on the English composition, social studies and intermediate mathematics tests. No tests for significance were reported, and differences seem slight. The article concluded that "available studies show that the average public high school student who aspired to college entrance is sufficiently grounded in the fundamentals to give a good account of himself when compared with students from independent high schools."

The public-private dichotomy in secondary education in this country is a strikingly significant phase of our social structure. Viewing the problem from the sociological angle, McArthur\textsuperscript{21} would


classify the phenomenon of relative under-achievement in college by private school graduates as a psychological one of level of aspiration; he would even suggest that a particular I.Q. is different for a public- and private-school graduate, the private-school boy possessing more intellectual range and power for speed, while the public-school boy possesses more speed for his range and power. This identification of school with a subculture is potent and significant—a social parameter which cuts across and overrides the effectiveness of almost every other social parameter.

Viewed from the aspect of our dual educational pattern, the comparative consideration of private and public secondary education has been, as Koos remarks, a matter of prejudice and partisanship. Prominent and articulate among the educators who view with alarm this characteristic of our American educational pattern is James B. Conant. His main concern at the growth of a private-school system, whether religious or independent, is that the enthusiastic support of the American people for universal free public education will thus be weakened. Viewed from this background of rivalry and

22Koos, p. 1.

competition, the research cited above may be somewhat lacking in scientific objectivity.

Although the independent and the denominational private school are both viewed as possible starters of a "chain reaction inimical to public education in a community", 24 there is a wide difference in the social class orientation of their respective graduate.

If Catholics in the United States constitute a sub-culture, in the sense that they are homogeneous enough to create an elementary and secondary school system, it would not be on the social class basis that is characteristic of the private independent school personality. The population of the American Catholic secondary school, although not as representative a sample of American Catholic life as that of the elementary school, is nevertheless broadly typical of the average Catholic of high school age, and of the average American secondary school pupil. Perceptive social scientists, through independent research, have come to this same conclusion. Havighurst 25 states that "the parochial type of private school is usually quite similar to a public school in its relation to social class. Most parochial schools are Roman Catholic,

24 Ibid., p. 87.

25 Robert J. Havighurst and Bernice L. Neugarten, Society and Education (Boston, 1957), p. 239.
and the Catholic Church in most communities is fairly representa-
tive of the population as regards social class. The independent
private schools cater to families of upper and middle class and
perform special functions in relation to the social order."

Counts' classic study of the selectivity of the American pub-
lic high school labeled that institution as a class institution in
a very real sense. Differences of a socio-economic nature be-
tween public and private secondary school pupils made this feature
even more characteristic of the private school. The increase in
secondary school population in the forty years since Counts' sur-
vey marks a considerable advance toward the democratization of
secondary education. Current research, however, discloses factors
still present which indicate selectivity in both public and paro-
chial secondary education. The public school study of Harold Hand
on "hidden costs" and the parochial findings of Sister Mary
Pauline on academic, economic and general factors both disclose

26 George S. Counts, The Selective Character of American
Secondary Education (Chicago, 1922).

27 Harold C. Hand, "Principal Findings of the 1947-48 Basic
Illinois Secondary School Curriculum Program Bulletin Number II
(Springfield, 1949).

28 Sister Mary Pauline Degan, Student Admittance and Placement
in Regional Catholic High Schools (Washington, D.C., 1950).
that selectivity is still at work in both public and Catholic second­
ary education.

The determination on the part of the Catholic parent to send
his child to a Catholic high school is usually influenced by reli­
gious and moral values, rather than by social aspirations, intel­
lectual ambitions or economic considerations. At the heart of
Catholic education, recognized to a greater or less degree by all
Catholic parents, is the Catholic philosophy of life, voiced for­
mally in the religion course and implicitly and indirectly in
every other subject. The priceless value of Catholic education
stems from the supernaturally orientated basis of its philosophy.
It embraces "the whole aggregate of human life, physical and spiri­
tual, intellectual and moral, individual, domestic and social, ... in order to elevate, regulate, and perfect it in accordance with
the example and teaching of Christ." 29

Attempts to measure the degree to which the implementation of
this philosophy influences behavior have not yielded conclusive
positive evidence of its value. Father Fichter's sociological
study of the parochial school revealed no differences between

29 Pope Pius XI, p. 65.
Catholic and public school children. The Rossis likewise found no strong evidence that parochial school Catholics were very different from other Catholics; in most areas, only a marginal differentiation was noted. Nevertheless, the fact remains that each year brings some increase in the per cent of Catholic students in Catholic secondary schools. The American Catholic school system has experienced phenomenal growth since the Bishops' statement of 1883 recommending the establishment of parochial schools in every parish. Secondary and higher education, although later in growth, has paralleled this development, most particularly during the twentieth century. In view of the paucity of information which has been gained by research on comparative performance in college of Catholic-school graduates, it would seem timely to investigate the effectiveness of Catholic secondary schools for preparing students for higher education.

C. STUDIES ON THE RELATION OF HIGH SCHOOL SIZE TO COLLEGE SUCCESS

Another type of investigation that has long if not often been


the subject of educational research is that of differences among
the college grades of students from high schools of different size.
The factor of size of school has commonly been considered to be in-
directly related to a better educational product: as the size of
the school increases, so does the excellence of the staff, of phy-
sical facilities, of variety of curricular and extra-curricular
offerings, and of classroom and library equipment. The trend to-
ward consolidation of public-school districts throughout the nation
has accomplished the elimination of a large number of extremely
small elementary and secondary schools. The recommendations of
Dr. Conant in regard to further consolidation in the interests of
improved quality and greater operating efficiency have given
further impetus to this movement. 32

Cost-quality studies usually measure quality by a quantitative
enumeration of the factors fo amount and quality of facilities;
number and variety of curricular and extra-curricular activities;
pupil-teacher ratio; educational preparation of the staff. This
type of research generally bears out the theory that the larger
school is superior to the smaller.

The type of investigation that will be reviewed for this study

32James B. Conant, The American High School Today (New York,
1959).
however, are those analyzing the relationship between academic success in college and size of high school.

The earliest research on this problem is reported by Pittenger in 1917.\textsuperscript{33} His subjects included entering freshmen in the College of Science, Literature and the Arts at the University of Minnesota of the 1910 and 1911 classes. He treated the sexes separately. He ranked students from highest to lowest on the grade-point sum of their total college-grade record. He found the median, and first and third quartile points according to this criterion in the groups representing the different entrance ages and sizes of high schools.

The subjects were divided into six groups of public-school graduates on the basis of high school enrollment; military and private schools constituted two additional groups. The private-school group included both independent and denominational schools. He found that the graduates of the larger public schools showed superior college performance, both in grades and in retention, than did graduates of the smaller public schools. This trend was

discernible in the second and third quartiles, but not for the first quartile. No tests of significance were made; nor was there any attempt to measure the effect of scholastic aptitude on scholarship. Nevertheless, he concluded that, in general, the larger the school, the greater was the college efficiency of its graduates.

Thornberg 34 analyzed the scholastic records made by entering freshmen at the State College of Washington in 1921 and 1922. He divided the subjects into seven groups by size of high schools, with an eighth group of out-of-state schools whose enrollment was not known. Using the point system A, three; B, two; C, one; D, zero, he computed the average number of A, B, C, and D grades and the average number of honor points earned by graduates of the various sizes of high schools.

The graduates of the smallest high schools (under fifty) maintained an average of 4.92 hours of A grade, while the graduates of the largest high schools (over 1,000) had an average of 9.95 hours of A. The difference was less in the average number of B grades, but the trend was similar. Comparison of the points made by each group showed a difference of 24.17 points between the students.

from the largest and smallest high schools. Students from high
schools having an enrollment of fifty or less had an average of
16.91 honor points for each semester, while students from the lar­
gest high schools maintained an average of 23.11 honor points each
semester. The Army Alpha Examination was given to three-fifths of
the 1922 group (dropouts, or failures to report for the test, ac­
count for the loss), and the distribution of mean raw scores by
size of high school shows a difference of twelve points between the
smallest and largest schools. This information was compared with
the scholarship data on the entire freshman class of 1922. The
average number of points made by the freshmen from the smallest
schools was 37.25, while that of the largest schools was 43.77.
From this questionable comparison the author arrived at the con­
clusion that the superior scholarship of the students from the lar­
gest high schools must be due, not to their superior native intel­
ligence, but to a great extent to the training these schools give.
None of the differences were analyzed to determine their signifi­
cance.

In their intensive and comprehensive studies of the student
population at Purdue University, Stalnaker and Remmers secured data
on the relation of size of high school to college scholarship. In
characterizing the freshman class of 1926, they offered the follow­
ing narrative conclusion of the relationship of high school size
to academic success in college:

...the graduates of the larger high schools secure
higher average personnel ratings, stay in school
longer, come from the city to a greater extent, are
distinguished students in larger proportion, are not
put on probation as frequently, come from the lower
division of their graduating class, and obtain a
higher college grade although they secured a lower
high school average.35

The study included tabular presentation of means for the following
variables: personnel ratings; number of semesters in college;
high-school grades; and college grades. These differences showed
a consistent trend toward superiority scholastically on the part of
the graduates of the largest schools. No critical ratios were
computed, however.

In a comprehensive study of the factors involved in under­
graduate elimination at Purdue University, Stalnaker and Remmers36
collected data on 5,220 students over the period 1922 to 1928. A

35H. H. Remmers and J. M. Stalnaker, "A Study of the Class
Entering Purdue University in 1926," Studies in Higher Education,
XVII (Lafayette, 1931), 31 pp.

36J. M. Stalnaker and H. H. Remmers, "What Kind of High
Schools Contribute to College Failures?" Studies in Higher Educa-
tion, XIV (Lafayette, 1930), 39pp.
consistent positive relationship was found between scholarship and the size of schools, and between elimination and size of school. None of the differences were tested for significance, nor was there any attempt to control the factor of aptitude.

In an article explaining the basis for selection of freshmen at Northwestern University, Clark reports informally the findings of admissions research on several freshman classes. For representative groups of students from high school classes of 100 or more, he obtained a correlation of .70 between high school rank and college ranking; the correlation for groups of students from high school classes of less than 100 was much smaller. He stated his conclusions thus:

The standing of those from high school graduating classes of one hundred or more is especially valuable in indicating the quality of work which will be done in college... The rank of students who come from the smaller high schools is not so valuable in predicting success in college; but the standing even of these is somewhat more valuable than the scores on intelligence tests alone.

No details were given in regard to the reliability of the figures.

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37 E. L. Clark, "Selection of Freshmen at Northwestern University College of Liberal Arts," Educational Record, VIII (April, 1927), 122-128.
Douglass\textsuperscript{38} collected data on the connection between size of high school and academic success in college as a minor part of his investigation of relationship of the pattern of high-school subjects to college performance. The groups studied had completed one year at the University of Oregon in 1926-27. He found a coefficient of correlation of .04 between size of high school and college success. His scattergrams indicated that students from schools having fewer than four teachers did not do as well in college as those from schools having larger faculties; but the difference was small—less than one-fourth of a grade point. Almost as many outstanding students came from the small schools as from larger ones.

Pettengill\textsuperscript{39} made a study of the effect of size of high school on the value of college-aptitude test rank and high-school rank in predicting first-quarter average college grades at the University of Minnesota. He compared 417 freshmen from public schools in cities and towns of fewer than 5,000 population with 1,151 graduates

\textsuperscript{38}Harl R. Douglass, "Relation of the Pattern of High School Credits to Scholastic Success in College," \textit{North Central Association Quarterly}, VI (December, 1931), 283-97.

of Minneapolis and St. Paul public high schools who entered the university during the academic year of 1932-33. He found no significant difference between the average college grades of the two groups. The mean high-school percentile rank for students from the small schools was significantly higher than for the graduates of the large schools, and the mean college-aptitude percentile rank was significantly lower. The multiple correlation coefficients of first quarter grades with college aptitude test and high school percentile ranks obtained from the two groups were not significantly different, however.

Dwyer also used zero order correlation to investigate the problem. His subjects included 1,222 students who entered the University of Michigan in 1928. He found a positive correlation of .25 between high-school size and scholastic record, a relationship which decreased as the group progressed through college and became insignificant at the end of two or three years. Students from small schools were eliminated in larger percentages during the first few semesters, but all groups were relatively equivalent scholastically during the later years.

Feder 41 studied the effect of size of high school on academic success at the University of Iowa by taking samples from the freshman classes of 1929-33 of the College of Liberal Arts. The total of more than 3,000 students was divided according to four sizes of high schools from which they came. The students from the larger high schools were best equipped for college in terms of status on the Freshman qualifying examinations, but their scholastic achievement was not commensurate with their superiority. The mean grade-point average of the group composed of medium-sized schools (those with an enrollment of 65-149) exceeded that of any other group. In variability of achievement, no meaningful differences were discovered among the various groups, although nearly all became less variable in achievement. Neither mean nor standard deviation differences were tested for significance.

Saupe 42 analyzed the records of 1,321 freshmen in the University of Missouri. She selected, of this group, 462 "average" students, i.e., those whose scores on the Ohio State Psychological


42Mildred W. Saupe, "Size of High School as a Factor in College Success of Average and Superior Students," Journal of the American Association of Collegiate Registrars, XVII (October, 1941), 45-47.
Examination fell in the middle two-thirds of the distribution of all Missouri high school seniors and who were in the middle two-thirds of the percentile rank in graduating class. A group of "superior" students was selected from the upper quintile of both measures. The students were divided according to seven sizes of schools, and by sex, and placed in either the average or superior group. The grades were converted into a scholarship index, according to a system used by the university to determine honor students.

In the superior groups, the differences were not consistently in favor of any single size of school. In the average groups, however, the students from the smallest schools earned higher grades than the graduates of the large city high schools.

In the progressive subdivisions by sex, size of high school and college, many of the sub-groups were so small that the means could not be considered as highly reliable. Of those over 25, the largest difference was not statistically significant. She, too, substituted consistency for significance in attributing superior scholarship to graduates of the smallest schools.

Seyler investigated the effect of size of high school on the

correlations between high-school rank and collegiate success as part of a general prediction study. He used data from the combined classes of 1935, 1956, and 1937 at the University of Illinois. The students were grouped in five categories according to size of high school from which they graduated. Although he had no measure of intelligence or scholastic aptitude in the analysis, he did state:

A comparison of the mean percentile ranks in high school and the mean percentile averages in college of the several groups shows that at the University of Illinois a better quality of student is received from small schools than from the large schools. However, the size of high school does not seem to have a sufficient effect on the relationship between rank in high school class and freshman scholarship to warrant an educational guidance program based on size of high school. No attempt was made to determine the significance of the differences found.

Gray studied the records of 1,520 students during their freshman year at the University of Minnesota, to determine the relationship of size of high school to each of the following criteria: first-year honor-point ratio in college; score on the American Council on Education Psychological Examination; high-school percentile rank, and Cooperative English Test percentile rank. He found no differences in scholastic aptitude or collegiate honor-point ratio among graduates of various-sized high schools. He found a sex difference in collegiate honor-point ratio, the means for the
men from various-sized high schools being homogeneous and those for
the women being significantly different, in favor of the small
high-school group.

In analyzing the group according to grade-point averages when
high-school rank was controlled, he found that students from the
larger high schools made better grades than those from medium or
small schools, for a high-school rank above fifty. The correlation
between high-school rank and college grade-point average varied
directly with size of school; the correlation of the psychological
test scores and college grade-point average, however, varied in­
versely with the size of the school. 44

He concluded that the American Council on Education Psycholo­
gical Test percentile rank was the best predictor of collegiate
grades for graduates from small schools; that high school percen­
tile rank is the best predictor for those from the large schools.
He recommended that different prediction formulas be used for
females from large and small schools.

Bledsoe's analysis of the problem was based on data for all

44 A. L. Gray, "The Relation of Size of High School to Col­
legiate Success," Unpublished Doctoral Dissertation (University

45 J. C. Bledsoe, "An Analysis of the Relationship of Size of
High School to Marks Received by Graduates in First Year of Col­
white public secondary schools in Georgia. He used the annual reports of the Georgia Accrediting Commission containing average marks received in Georgia Colleges by graduates of each secondary school during the period 1924-51. He computed an index of performance in college by assigning a numerical value to each letter grade, ranging from zero for F to four for A, and weighting each value by multiplying by the number of students within each marking category and dividing by the total number of students. The secondary schools were classified in three groups according to size: the small group consisting of schools with less than forty graduates, the medium, of schools with forty to ninety-nine graduates, and the large, of schools of more than 100 graduates.

He found that the students from large graduating classes obtained the highest mean grade index (2.01), followed by the medium (1.925), and small (1.921). The differences between the large and medium, and large and small schools were significant, but not the difference between the medium and small schools. He did not report the standard errors nor the level of significance he obtained.

Bertrand\textsuperscript{46} analyzed the records for 637 freshmen in the agri-

\textsuperscript{46}J. R. Bertrand, "Relation between Enrollment of High School from Which Students Graduated and Academic Achievement of Agricultural Students, A. and M. College of Texas," \textit{Journal of Experimental Education}, XXV (September, 1956), 59-69.
culture curriculum of Texas Agriculture and Mechanics College who entered in 1946, 1947, and 1948, to explore the relation of high-school size to academic success in college. In order to control aptitude, the analysis was done within the four quartile categories of the gross scores on the American Council on Education Psychological Examination. He found little consistent relationship between either size of high school or aptitude quartile category and mean college grade-point ratio. For the students in the lowest quartile groups, the highest mean grade-point average was made by students from small high schools (enrollment under 100). The medium-sized schools (150-249) and the largest schools (over 1,000) were highest in both aptitude and grade-point average. The lowest mean grade-point shown by any category was by students in the lowest quartile from the largest schools.

The only study in which analysis of variance and covariance were used to explore the relationship of high-school grades to college success was done by Hoyt47 on Kansas State College freshmen. His subjects were 596 men and 286 women who entered college in the fall of 1956. He divided them into five sub-groups defined

in terms of size of high-school graduating class from which the students came. He found no significant difference in the means for aptitude, as measured by the American Council on Education Psychological Examination raw scores, or for college grade-point average. When the groups were compared in regard to average high-school rank, there was relatively little variability among the women, and a slight downward trend among the men as size of high school increased, a difference significant at the five per cent level on the analysis of variance F-test (F, 3.10) (F, 3.12).

In order to compare the mean grade-point averages when differences in high-school rank were controlled, he performed an analysis of covariance, with the result that the adjusted mean values had a significant difference, for both men and women (F, 6.48 and 2.58 for men and women, respectively).

He concluded that, in terms of first-year college grades, the high-school rank for students from very small schools (twenty-five or fewer seniors) tends to overpredict college performance, whereas the high-school rank for students from larger schools (twenty-six or more graduates) tends to predict more accurately the college grade-point average.

A brief summary of the salient points in the research just reviewed follows. Most of the investigators used descriptive methods
of presentation of data, such as scattergrams, frequency distributions, and tables of means, medians, percentages and standard deviations. In the research on the comparative performance of public and private-school graduates in college, only three investigators reported tests of significance; three also attempted to control the factor of academic aptitude. One used zero order correlation in the analysis, and one used the analysis of variance and covariance. Two authors provided separate tabulations of data for the sexes, and several studies were concerned with single sex populations.

The research on the relation of size of high school to academic success in college is likewise varied in the methods employed in analyzing the data. In no instance was partial correlation used to rule out the effect of one or more variables. One study used regression equations and two employed multiple correlation to increase the efficiency of prediction.

The most obvious meaning to be derived from the survey is the dearth of information available on the academic efficiency of Catholic high-school students in college, and the conflicting information yielded by the studies on the relative efficiency in college of students from high schools of various sizes. The diversity in aims, in composition of student body, in curriculum and methods among the various public and private colleges and secondary schools
that compose the American educational pattern are certainly contributory to the diversity of the research findings. Our educational institutions have a quality of uniqueness, and investigations that have meaning for one college may not be applicable to another. This fact points at once to the usefulness of institutional research, the responsibility for maintenance of adequate professional standards in the conduct of such studies, and the danger of generalizations in the interpretation of research findings.
CHAPTER III

THE PROCEDURE

This investigation uses data from a sample of 472 high school graduates who entered Barry College for the first time during the fall semesters of the years 1958, 1959, and 1960, and who received grades for at least one semester. Chapter III presents a preliminary description of the data used in the study: the basic information collected about each student, an analysis of the population, and an outline of the basic procedures used.

BASIC INFORMATION COLLECTED

The data reported in this study were collected in two different ways. The following information was obtained from the Registrar's office: Scholastic Aptitude Test verbal and mathematical scores; college grade point average; high school average; and size, type and geographical location of high school. The Survey of Study Habits and Attitudes scores and the California Language Test scores were secured through a specially planned testing program during the
 freshman orientation week in September of 1960.

DESCRIPTION OF TESTS USED

The Scholastic Aptitude Test of the College Entrance Examination Board is one of the most widely used instruments in forecasting success in academic work, especially on the college level. As described by John Dailey, the test is "essentially a conventional, general abstract 'intelligence' test at the bright adult level."1 The verbal sections, consisting of completion items, opposites, analogies and paragraph comprehension exercises, emphasize the ability to understand word relationships and to comprehend written material. The mathematical sections, including arithmetic, algebra and elementary geometry, emphasize the ability to understand and solve problems.2 The examiners feel that the mathematical test is designed to measure aptitude for handling quantitative concepts rather than achievement in the field of mathematics. The test is intended to identify the student who can apply basic knowledge in


reasoning out solutions to new problems.

The College Board, seeking better selection of students for college admission, first offered the Scholastic Aptitude Test in 1926. From the beginning, the raw scores for both the verbal and mathematical sections were converted into standard scores in order to provide a ready means of showing each student's performance in relation to other students. Initially the score scale was established on the basis of the group tested each year. Later a standard group was set up from the students who had taken the examination in April of 1941. The standard scale in terms of this fixed reference group ranges from 200 to 800, having a mean of 500 and a standard deviation of 100.3

The reliability of each successive form is estimated from the scores attained in each respective year by the March candidates. Because of the change in variability of the candidate groups from test to test and from year to year, and since the reliability coefficient is affected by the variability of the group on which it is estimated, the probable error of the scholastic aptitude test is reasonably constant from year to year. For the years 1954-1957,

this measure ranges from seventeen to nineteen for the verbal, and from twenty-one to twenty-three for the mathematical. ⁴

The College Board manuals contain voluminous data in regard to the validity of the Scholastic Aptitude Test. The great majority of the studies use some measure of academic success as the criterion, usually grade point average. Fishman reports a median correlation of .49 between the verbal score and the average first year grades of girls in five liberal arts colleges, and of .35 between the mathematical section and the same criterion. ⁵

Studies in which college achievement was predicted from a combination of high school record and College Board scores consistently give a better prediction. Fishman gives multiple correlation data for the same group of girls' liberal arts colleges obtained by correlating scores on the verbal and mathematical sections and high school record with first year college grades. The combined predictors gave correlations which ranged from .57 to .65 with a median of .56. ⁶ Although these coefficients are not outstanding


⁵Ibid., p. 8.

⁶Ibid.
proof of the validity of the Scholastic Aptitude Test, they do not offer some evidence to support its generally established reputation as a satisfactory measure of intellectual promise.

The California Language Test (Advanced) consists of two main sections: the first, composed of three sub-tests on capitalization, punctuation and word usage, and the second, of a single spelling test. The capitalization test measures the extent to which the student knows the use of capitalization of the first word of a sentence, proper nouns, proper adjectives and the first word of a quotation. The punctuation test, consisting of narrative form, letter form, and unrelated sentences, measures the knowledge of the use of commas, question marks, quotation marks, and apostrophes. The word usage section, phrased in the two-choice item type, consists of sentences to be proofread for errors of number, case, tense, good usage, and sentence structure. Items range from a fairly obvious choice between literate and illiterate English to choices involving subtle distinctions in idiom. The spelling test consists of thirty sets of four words each. The student must de-

cide which, if any, is misspelled in each set. The scores used in this study include the mechanics of English score, obtained by combining the scores of the first five sub-tests; and the spelling score.

Although the California Language Test has been criticised as failing to measure the more complicated problems of written expression, such as parallelism, subordination and transition, the test does measure achievement with precision and accuracy in the more clearly defined areas of grammar and usage. The criticism of W. L. Post that the test is not a completely satisfactory instrument to measure the full range of ability in written expression of students at the freshman level in college is perhaps a valid one. However, the phrase "mechanics of English" accurately and modestly defines its scope and purpose, and in this area the test works efficiently. Sopchak, analyzing the records of 356 students entering Adelphi College, found the California Language Test to be substantially correlated with the high school average and to be more highly related to college grade point average than the American Council Psychological Examination.

8 Buros, p. 178.

The reliability coefficients and related data of the California Language Test are reported for Grade Twelve below.\textsuperscript{10}

\begin{table}[h]
\centering
\caption{RELIABILITY COEFFICIENTS AND RELATED DATA FOR THE CALIFORNIA LANGUAGE TEST (ADVANCED) Grade 12}
\begin{tabular}{|l|c|c|}
\hline
                      & Mechanics of English & Spelling \\
\hline
Reliability coefficient & .93 & .61 \\
Raw score             &      &      \\
  Mean                & 107.6 & 17.0  \\
  Standard deviation   & 17.9  & 5.8  \\
  Standard error of measurement & 4.8 & 2.5  \\
\hline
\end{tabular}
\end{table}

The manuals describe careful and comprehensive measures taken to secure curricular validity.\textsuperscript{11} Three approaches were used to determine actual test validity: relating performance on the test to intelligence; comparing test achievement to grade placement; and correlating test performance with other achievement test scores.\textsuperscript{12}


\textsuperscript{11}Ibid., pp. 26-28.

The Brown-Holtzman Survey of Study Habits and Attitudes was selected in an attempt to uncover attitudinal and motivational correlates of scholastic success. This inventory differs from the usual inventory of study skills in that it is heavily pointed in the direction of study attitudes, anxiety before and during tests, attitudes toward academic work, and general personality characteristics as well as topics dealing with the mechanics of study and the actual practices of the student.

The survey consists of seventy-five items, each describing a mode of conduct in a typical academic situation or an attitude toward a certain aspect of college life. The subject is required to indicate the extent to which the suggested behaviors are typical of his own or the extent to which he shared the suggested attitudes. The multiple choice responses to the items represent degrees of conformity ranging from "rarely" (feel or act in this manner) to "always" (feel or act in this way). The inventory takes approximately twenty minutes to be administered on a group basis.

The assumptions underlying this type of self-report are admittedly questionable, on the basis of present knowledge in this area: we assume that the student will respond frankly and is capable of understanding and reporting his own motivations and attitudes
toward studying and academic activities.\textsuperscript{13}

The development procedure for the inventory was extremely well conceived. Beginning with an exhaustive review of the literature and a series of group discussions with college freshmen concerning the motivational differences between good and poor students, the authors constructed a total of 234 items. After ambiguous items were eliminated, the statistical analysis produced those items which discriminated between good and poor students; the revised questionnaire was administered to approximately 500 first semester freshmen and the results were correlated with first semester grade point average.\textsuperscript{14}

The Survey of Study Habits and Attitudes has been validated in a number of colleges throughout the United States. In all these studies the criterion used was the one-semester grade-point average. Correlation coefficients so obtained for women varied from .26 to .65 with an average of .45.

Georgiana Sic analyzed the effectiveness of the contribution of the S.S.H.A. to the prediction of academic success for 400 undergraduates in elementary psychology at the State University of Iowa.

\textsuperscript{13}Buros, p. 689.

\textsuperscript{14}Ibid.
She concluded that the inventory is a valid measure of motivational variables, and its contribution results from the measurement of sources of variance present in the grade point average but absent from both intelligence and achievement tests.15

### TABLE IV

**CORRELATION BETWEEN SURVEY OF STUDY HABITS AND ATTITUDES SCORES AND ONE SEMESTER GRADES IN COLLEGE FOR WOMEN16**

<table>
<thead>
<tr>
<th>College</th>
<th>Grades</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>N</td>
<td>r</td>
<td>Mean</td>
<td>S.S.H.A.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Mean</td>
</tr>
<tr>
<td>University of Texas</td>
<td>312</td>
<td>.45</td>
<td>2.3</td>
<td>.86</td>
<td>29.1</td>
</tr>
<tr>
<td>San Antonio College</td>
<td>59</td>
<td>.65</td>
<td>2.7</td>
<td>.69</td>
<td>33.9</td>
</tr>
<tr>
<td>Southeastern University</td>
<td>44</td>
<td>.50</td>
<td>80.8</td>
<td>6.8</td>
<td>30.1</td>
</tr>
<tr>
<td>Southwest Texas State Teachers College</td>
<td>137</td>
<td>.47</td>
<td>2.5</td>
<td>.83</td>
<td>31.2</td>
</tr>
<tr>
<td>North Texas State Teachers College</td>
<td>49</td>
<td>.47</td>
<td>1.7</td>
<td>.69</td>
<td>31.1</td>
</tr>
<tr>
<td>Grinnell College</td>
<td>114</td>
<td>.26</td>
<td>80.5</td>
<td>6.9</td>
<td>35.8</td>
</tr>
<tr>
<td>Allegheny College</td>
<td>175</td>
<td>.37</td>
<td>78.3</td>
<td>5.6</td>
<td>36.1</td>
</tr>
</tbody>
</table>


The split-third reliability of the SSBA was estimated from scores of 178 men and 170 women. The reliability coefficient of the inventory for men was found to be .93, and for women, .84. Additional evidence concerning the reliability of the instrument was provided by the results of the two test-retest studies. The reliability coefficients for a two-week interval between administration were .95 for men and .93 for women. The coefficients for an eleven-week interval were .88 and .84, respectively.17

To determine the extent to which the survey made a unique contribution to the prediction of academic success, scores on the American Council on Education Psychological Examination were obtained for 1,294 men in seven colleges and 832 women in six colleges. Correlations between the two measures were low, varying from .13 to .48 for men and from .16 to .42 for women. Since the American Council test is highly saturated with known scholastic factors, the authors concluded that the instrument measures important traits which are relatively untouched by a standard college entrance examination.18


18 Brown and Holtzman, Manual, p. 7
The following table indicates many of these relationships.

**TABLE V**

INTERCORRELATIONS AMONG SSHA SCORES, ONE-SEMESTER GRADE AVERAGES, AND TOTAL SCORES ON THE ACE FOR COLLEGE FRESHMEN WOMEN

<table>
<thead>
<tr>
<th>College</th>
<th>N</th>
<th>SSHA vs. ACE vs. SSHA Mult.</th>
<th>ACE Mean</th>
<th>S.D.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Grades Grades ACE R</td>
<td></td>
<td></td>
</tr>
<tr>
<td>U. of Texas (1952; Feb., 1953)</td>
<td>109</td>
<td>.57 .39 .16 .65</td>
<td>97.5</td>
<td>21.5</td>
</tr>
<tr>
<td>U. of Texas (Sept., 1953)</td>
<td>305</td>
<td>.45 .52 .36 .59</td>
<td>107.0</td>
<td>23.1</td>
</tr>
<tr>
<td>Southwest Texas State T. C.</td>
<td>137</td>
<td>.47 .64 .33 .69</td>
<td>90.0</td>
<td>23.2</td>
</tr>
<tr>
<td>Grinnell College</td>
<td>114</td>
<td>.26 .52 .36 .53</td>
<td>119.9</td>
<td>21.3</td>
</tr>
<tr>
<td>Allegheny College</td>
<td>125</td>
<td>.37 .57 .26 .61</td>
<td>123.0</td>
<td>19.4</td>
</tr>
<tr>
<td>Weighted averages</td>
<td></td>
<td>.44 .53 .34 .61</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**DESCRIPTION OF INFORMATION OBTAINED FROM RECORDS**

Size and status of high school were obtained from the high school transcript. Since size of high school graduating class is an acceptable index of the size of the high school, it was used as the measure of the former variable. The latter variable, status, was secured by noting certain items of information on the transcript sufficient to classify it as public or Catholic. In doubt-
ful cases, i.e., transcripts of schools in which this information could not be determined, the decision was made by consulting the student directly or by referring to the appropriate state department of education directory of public and non-public schools.

The high school averages used in this investigation were computed by the registrar's office personnel. Some schools reported marks in terms of percentages, while others reported them in terms of letters. All marks given in percentages were converted to corresponding letter marks based on the marking system used by the high school from which the student came. The converted marks and the marks already reported on the high school transcripts in terms of letters were then arbitrarily changed to numbers by assigning 3 to A, 2 to B, 1 to C, and 0 to D and F. The quality of a student's work was determined by computing a weighted average.

College grade point average was computed by dividing the total number of credit points earned during the freshman year by the total number of credit hours taken. Credit points were allocated as follows by the registrar's office: a mark of A was assigned three credit points; a mark of B, two credit points; C, one point, and D and F, no credit points. For this investigation, it was necessary to differentiate between those earning grades of D and F. Accordingly, a value of -1 was assigned to failing grades. In order
to eliminate the negative values in computation, each grade point average was increased by one, and a corresponding adjustment was made in the means.

The decision to use the marks for the entire first year of college work as the criterion of success rather than a smaller or greater number of semesters is based on the following reasons:
1) one year marks tend to be a more accurate measure of the student's achievement than do the marks for only a single semester;
2) action taken on scholastic failures is generally taken at the end of the first year rather than at the end of the first semester;
3) to go beyond one year would remove the student from her entrance data and subject her to the influence of the college. This last point is clearly expressed in the following remarks by Cole:

   . . . certainly by sophomore year, and even more clearly in upperclass years, the student is as much a product of the college itself as of any school from which he came, or of the admissions procedure by which he was admitted.19

First semester grade point average, however, has been included as a variable in order to explore more fully the nature of the interrelationships involved.

DESCRIPTION OF THE POPULATION

The population consisted of all full-time freshman students entering college for the first time and matriculating during the fall semester of three successive years. Although a total of 608 new students were admitted to the Barry freshman classes during the fall semester of 1958, 1959, and 1960, 136 cases were eliminated from the present investigation. The actual population, therefore, included 472 students. A breakdown of the cases eliminated is shown in the following table:

### TABLE VI

TOTAL ELIMINATED BY YEAR OF ENTRANCE

<table>
<thead>
<tr>
<th>Reason for elimination</th>
<th>1958</th>
<th>1959</th>
<th>1960</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>no. %</td>
<td>no. %</td>
<td>no. %</td>
<td>no. %</td>
</tr>
<tr>
<td>Foreign students</td>
<td>13</td>
<td>16</td>
<td>16</td>
<td>45</td>
</tr>
<tr>
<td>Students who withdrew before completing one semester</td>
<td>19</td>
<td>9</td>
<td>13</td>
<td>41</td>
</tr>
<tr>
<td>Students who had attended another college previously</td>
<td>10</td>
<td>9</td>
<td>11</td>
<td>30</td>
</tr>
<tr>
<td>Students for whom no scholastic aptitude test scores were available</td>
<td>7</td>
<td>2</td>
<td>1</td>
<td>10</td>
</tr>
<tr>
<td>Students who graduated from a private secular school</td>
<td>2</td>
<td>5</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>Total</td>
<td>51</td>
<td>41</td>
<td>44</td>
<td>136</td>
</tr>
</tbody>
</table>
The largest group of cases eliminated from the investigation was composed of students from the Latin-American and Caribbean countries. However well educated and intelligent, these girls possessed a language difficulty sufficient to invalidate test data. For this reason, and also because the type of high school attended could not logically be combined with American schools for the particular comparisons of this investigation, it was decided to eliminate them from the investigation.

Very often outcomes in this investigation may be expressed as differences between two or more values. As a point of reference for the rigorous interpretation of any such differences, it is necessary to set up some hypothesis as to the probable magnitude of the difference. Because there is no previous knowledge as to the size of the true difference, the most appropriate hypothesis is that there is no difference which cannot be accounted for by the influence of chance factors alone. This hypothesis that chance factors alone may have produced the observed difference is usually called the null hypothesis. The null hypothesis will be used in the interpretation of the several types of differences observed throughout this investigation.

If in the statistical analysis, it should be found that chance factors alone could have accounted for the observed difference, the
only valid conclusion would be that the null hypothesis is tenable. Or if the difference is found to be so great that such factors alone could not have reasonably accounted for the observed differences, the null hypothesis may be said to have been refuted. In this case, it may be argued that the observed difference is a real difference, and that the obtained difference is the best estimate of the true difference.

The criterion often required for rejecting the null hypothesis is the one per cent level or the probability that the observed difference could have been brought about by chance factors not more than once in one hundred trials. This may be abbreviated to $P<.01$. If these factors could not have caused the observed differences more than once ($P>.01$) but not over five times in one hundred trials ($P<.05$), the null hypothesis may be considered tenable, that is, it is accepted at the five per cent level of significance. \(^{20}\)

Errors of statistical analysis arise in the interpretation of the level of significance. The alpha error, or error of the first kind, is made when the null hypothesis is rejected when it is true, i.e., when the level of confidence is set too low. The beta error, \(^{20}\)J. P. Guilford, Fundamental Statistics in Psychology and Education (New York, 1956), pp. 185-186.
or error of the second kind, is committed when the null hypothesis is accepted when it is false, i.e., when the level of confidence is set too high. There is no sure way to avoid both kinds of errors. A logical and considered weighing of the risks involved in either type of error should precede the decision as to the level of significance to be used in evaluating the results. 21

In this investigation both five per cent and one per cent levels of significance have been reported; however, the null hypothesis has been rejected at the one per cent level (P < .01) in all tests for differences.

The statistical test for differences between means was made by using the formula: \( \bar{z} = \frac{M_1 - M_2}{\sigma_m} \). 22 The following commonly adopted levels of significance have been used as criteria for evaluating z ratios: the one per cent level (when \( \bar{z} \) is 2.58) and the five per cent level (when \( \bar{z} \) is 1.96). Instead of testing the differences between standard deviations, the significance of the ratio of the two corresponding variances was tested by means of the F ratio. 23 The level of probability of each F ratio was determined

21Ibid., p. 216.
22Ibid., p. 185.
23Ibid., pp. 224-225.
by reference to a table of the sampling distribution of F. The same levels of significance have been used as in testing the differences between means. Fisher's technique for determining the significance of the differences between correlation coefficients by the z transformation was also employed.24

ANALYSIS OF THE POPULATION

Before combining the data for the three successive years, a brief comparison of the characteristics of the three groups was made. The total of 472 students fell into yearly groups as follows: the 1958 group consisted of 137; the 1959, of 167, and the 1960, of 169 students. In the intensive study of the 1960 group, four cases were eliminated because of lack of complete test data.

The smaller total for 1958 can be accounted for principally because of the smaller total freshman matriculation that year compared to the two later years, and because of a higher mortality rate before the close of the first semester. The relatively larger group of 1958 freshmen for whom no scholastic aptitude scores were available reflects the fact that some exceptions were made to that requirement during the first year in which the College Board scores were required of entering freshmen.

There is a slightly higher percentage of Catholic high school graduates in the 1958 group than in either of the two succeeding groups of freshmen. Bearing in mind the relatively smaller size of Catholic high schools in general, the trend is also reflected in the following tabulation of freshmen by size of high schools:

<table>
<thead>
<tr>
<th>Year</th>
<th>Catholic</th>
<th>Public</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Per cent</td>
</tr>
<tr>
<td>1958</td>
<td>88</td>
<td>64</td>
</tr>
<tr>
<td>1959</td>
<td>98</td>
<td>59</td>
</tr>
<tr>
<td>1960</td>
<td>92</td>
<td>56</td>
</tr>
<tr>
<td>Total</td>
<td>278</td>
<td>59</td>
</tr>
</tbody>
</table>

### TABLE VIII

NUMBER OF FRESHMEN BY YEAR WHO GRADUATED FROM LARGE SIZES

<table>
<thead>
<tr>
<th>Year</th>
<th>Small</th>
<th>Medium</th>
<th>Large</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Per cent</td>
<td>Number</td>
</tr>
<tr>
<td>1958</td>
<td>55</td>
<td>40</td>
<td>43</td>
</tr>
<tr>
<td>1959</td>
<td>50</td>
<td>30</td>
<td>61</td>
</tr>
<tr>
<td>1960</td>
<td>59</td>
<td>36</td>
<td>54</td>
</tr>
<tr>
<td>Total</td>
<td>164</td>
<td>35</td>
<td>158</td>
</tr>
</tbody>
</table>
The slightly higher proportion of graduates of small high schools in the class entering in 1958 is in striking contrast to the lower proportion of entering graduates of large high schools. The proportions for the two later years, however, are more evenly distributed.

The geographical distribution of the high schools from which the members of the three classes are drawn is quite generally comparable from year to year, as the following table will show:

**TABLE IX**

NUMBER OF FRESHMEN FOR EACH YEAR BY GEOGRAPHICAL LOCATION OF HIGH SCHOOL

<table>
<thead>
<tr>
<th>Area</th>
<th>1958</th>
<th>1959</th>
<th>1960</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number Per cent</td>
<td>Number Per cent</td>
<td>Number Per cent</td>
</tr>
<tr>
<td>Miami (including Hollywood, Ft. Lauderdale, Hialeah and Coral Gables)</td>
<td>62</td>
<td>46</td>
<td>83</td>
</tr>
<tr>
<td>South (Florida except for Miami; Louisiana; Alabama; Georgia; North and South Carolina)</td>
<td>17</td>
<td>12</td>
<td>29</td>
</tr>
<tr>
<td>Middle Atlantic (New York; New Jersey; Delaware; Pennsylvania; Maryland; Virginia; West Virginia; District of Columbia)</td>
<td>21</td>
<td>15</td>
<td>20</td>
</tr>
</tbody>
</table>
TABLE IX CONTINUED

<table>
<thead>
<tr>
<th>Area</th>
<th>1958</th>
<th>1959</th>
<th>1960</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Per cent</td>
<td>Number</td>
</tr>
<tr>
<td>New England</td>
<td>4</td>
<td>3</td>
<td>14</td>
</tr>
<tr>
<td>(Main: Vermont; Rhode Island;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Massachusetts; Connecticut)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mid-West (Wisconsin; Michigan;</td>
<td>33</td>
<td>24</td>
<td>21</td>
</tr>
<tr>
<td>Minnesota; Kansas; Illinois;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indiana; Ohio; Iowa; Missouri;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tennessee; Kentucky; Texas;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oklahoma)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The class of 1960, however, is composed of a higher percentage of non-local students than either of the two preceding classes. The decrease in number of graduates of high schools in the Miami area may be in part caused by the establishment in September of 1960 of a public community junior college located very close to Barry College.

A comparison was also made of the means and variances of each group on the several variables. The following table reports this
Although there is no significant difference between the means for the three successive years, there is a consistent upward trend from year to year. There is a similar trend toward a narrowing of the dispersion of each subsequent group of freshmen. There is a sharp drop of fifteen points in the standard deviation of the 1959 group, and a further drop of five points in the 1960 group, indicating a narrowing of the spread of scholastic aptitude of the verbal type among the candidates for each successive year.

The homogeneity of the groups with regard to mean verbal score is definitely established; however, the variance ratio for the
1958 group with two later freshman classes exceeds or approaches the one per cent level of significance.

The trend in regard to performance on the Scholastic Aptitude Test-Mathematical is indicated in the following table:

**TABLE XI**

**HOMOGENEITY OF THE GROUPS BY YEARS ON THE SAT-M**

<table>
<thead>
<tr>
<th>Year</th>
<th>1958</th>
<th>1959</th>
<th>1960</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>389.46</td>
<td>409.17</td>
<td>427.65</td>
</tr>
<tr>
<td>Standard deviation</td>
<td>86.18</td>
<td>76.21</td>
<td>86.54</td>
</tr>
<tr>
<td>Standard error of the mean</td>
<td>7.39</td>
<td>5.92</td>
<td>6.76</td>
</tr>
</tbody>
</table>

\[ z (1958 \& 1959) = 2.08^* \]
\[ z (1958 \& 1960) = 3.82^{**} \]
\[ z (1959 \& 1960) = 2.06^* \]

* significant at the five per cent level
** significant at the one per cent level

As in the performance on the verbal section, there is a consistent upward trend of the mean mathematical scores of subsequent years. This trend is much sharper, however, than for mean scores on the verbal section; each difference is significant at either the five or the one per cent level of significance. In contrast to the significant differences in variability on the verbal test, the
variability of scores on the mathematical section is relatively stable for the three years, the differences being small enough to be attributed to chance factors.

Comparison of the groups in regard to performance in high school is shown by the following table:

**TABLE XII**

**HOMOGENEITY OF GROUPS BY YEAR ON HIGH SCHOOL AVERAGE**

<table>
<thead>
<tr>
<th>Year</th>
<th>1958</th>
<th>1959</th>
<th>1960</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>1.73</td>
<td>1.86</td>
<td>1.88</td>
</tr>
<tr>
<td>Standard deviation</td>
<td>.56</td>
<td>.54</td>
<td>.49</td>
</tr>
<tr>
<td>Standard error of the mean</td>
<td>.11</td>
<td>.04</td>
<td>.04</td>
</tr>
</tbody>
</table>

\[
z(1958 \ & 1960) = 2.03^*\]

\[
z(1958 \ & 1960) = 2.44^*\]

* significant at the five per cent level

This tendency toward greater selectivity with successive years is consistent with that indicated in regard to the two measures of scholastic aptitude; no differences, however, are significant at the one per cent level. The dispersion of the groups, although consistently decreasing from year to year, is well within the range of variability possible by chance.
The sociological factor of the establishment of a public community junior college in the vicinity may be related to this pattern of consistently rising standards in regard to pre-college admissions data. The less exacting entrance requirements of Dade Junior College, while perhaps influencing the decrease in the Barry College non-resident freshman enrollment, may also be a contributing cause in the improved over-all potential of the 1960 freshman class.

The previous comparisons all relate to pre-college measures of aptitude or achievement. Comparison of the groups on a fourth variable, achievement during the freshman year of college, is reported in the following table:

TABLE XIII

HOMOGENEITY OF GROUPS BY YEAR ON COLLEGE GRADE POINT AVERAGE

<table>
<thead>
<tr>
<th>Year</th>
<th>1958</th>
<th>1959</th>
<th>1960</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>1.57</td>
<td>1.56</td>
<td>1.33</td>
</tr>
<tr>
<td>Standard deviation</td>
<td>.58</td>
<td>.69</td>
<td>.60</td>
</tr>
<tr>
<td>Standard error of the mean</td>
<td>.05</td>
<td>.05</td>
<td>.05</td>
</tr>
</tbody>
</table>

\[ \overline{X} (1959 \& 1960) = 3.07^{**} \]
\[ \overline{X} (1958 \& 1960) = 3.34^{**} \]

*significant at the five per cent level
**significant at the one per cent level

\[ F (1958 \& 1959) = 1.44^* \]
\[ F (1959 \& 1960) = 1.34^* \]
\[ F (1958 \& 1960) = 1.07 \]
The trend indicated in the above data is in sharp contrast to the phenomena revealed in the analysis of the pre-admission data. Mean freshman grade point averages are marked by significant differences in favor of the 1958 and 1959 groups, although all the evidence in regard to the relative potential of these groups was either similar to or inferior to that of the 1960 freshman group.

In an effort to explain the inconsistency reported above, it is necessary to describe certain aspects of the college which might have a direct bearing. The fact that there has been a certain amount of turnover on the college staff during the three year period studied may account somewhat for the substantial change in grades awarded at the freshman level. Newer faculty members may be less aware of the fact that Barry College is designed to meet the needs of the average student, and draws its student body largely from the average range of scholastic aptitude. A more important factor, however, has been the repeated action of the academic dean in calling attention to the high proportion of above-average grades at all levels. The registrar's office personnel have prepared grade distribution reports annually, as well as distributions of scores by the student body on scholastic aptitude tests and graduate record examinations. This information has been distributed to the entire faculty, with the recommendation that grades be brought more
in line with objectively measured capacity and achievement of the student body.

The administration is engaged in a concerted effort, indicated perhaps initially by the act of assuming membership in the College Entrance Examination Board, to improve the academic quality of the college. This striving for greater excellence, however, does not alter the primary and ever-present responsibility of the teacher to accept the student at her present potential and use every means possible to stimulate full use of her capacities. Active participation in self-improvement by the entire faculty has been stimulated by the conduct of an institutional self-study, a research project which will reach its climax in the fall of 1961 with the visit of the evaluation committee to the campus of Barry College. Two inquiries conducted in connection with the self-study may have a direct bearing on the lower comparative performance of the 1960 group of freshmen. Each department has made a thorough study of its grading practices jointly with the academic dean. A faculty member has conducted an intensive research study of the teaching-learning practices existing throughout the college. The impact of its findings has done much to awaken both student body and faculty to certain basic qualities of excellence in college teaching and learning. This awakening may have encouraged teachers to demand a
level of performance for which the student's native ability has not prepared her.

It would seem to be a valid conclusion, therefore, that Barry College can be characterized, with regard to admissions and grading practices, to be in an extremely dynamic state, and to be definitely tending toward standards of greater selectivity of candidates and more exacting demands of academic performance of students. (The College Vice President, however, constantly reminds the faculty that Barry is a college designed to meet the needs of the average student.) It might be well to reemphasize the point made in Chapter I about the limitations in the use of school marks as a criterion of success. The freshman grade point average is computed by pooling marks from different subjects and instructors and treating them as if they were the same kind of coin. There is much fluctuating of marking ideas and ideals from instructor to instructor, introducing questionable validity.

Because of this important phenomenon of intra-institutional variability, greater emphasis has been placed on the analysis of the 1960 group of freshmen rather than on that of the combined groups. Guilford recommends that "in general practice, if it is

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25 Guiford, p. 324.
doubtful whether subsamples arose by random sampling from the same population, it would be best to compute correlations within sub-samples separately".

**STATISTICAL ANALYSIS OF THE DATA**

For the analysis of the comparative performance in college of public and Catholic high school graduates, the schools were dichotomized on this basis. The sub-groups resulting from this classification are given below:

<table>
<thead>
<tr>
<th>Category</th>
<th>Number of cases in total group</th>
<th>Number of cases in 1960 group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public</td>
<td>193</td>
<td>74</td>
</tr>
<tr>
<td>Catholic</td>
<td>279</td>
<td>91</td>
</tr>
</tbody>
</table>

The schools were grouped into three categories on the basis of size of graduating class. The resulting sub-groups are indicated below:

<table>
<thead>
<tr>
<th>Category</th>
<th>Number of cases in total group</th>
<th>Number of cases in 1960 group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small (under 100 seniors)</td>
<td>146</td>
<td>59</td>
</tr>
<tr>
<td>Medium (100-299 seniors)</td>
<td>158</td>
<td>54</td>
</tr>
<tr>
<td>Large (over 300 seniors)</td>
<td>168</td>
<td>52</td>
</tr>
</tbody>
</table>

The data were first analyzed to investigate the problem of whether there are significant differences in certain characteristics of Barry students who are graduates of public and Catholic high
schools. Means, standard deviations and standard errors of the mean were computed for all variables for the two types of schools, for both the total sample and the 1960 group. Differences between the means and variances were tested for significance.

A second analysis was performed to investigate the problem of whether there are significant differences among Barry College students who are graduates of high schools of various sizes. The procedure was essentially the same as that of the analysis by type of school.

Another aspect of the study was the intercorrelation of college grades with the various predictor variables in the following ways:

1) Zero order correlations were computed for the entire group of 472 freshmen, and for the 165 members of the 1960 group.

2) Correlations were computed for the sub-groups formed for each of the above groups for small, medium, and large high schools.

3) Correlations between grades and the predictor variables were computed for the dichotomized sub-groups of public and Catholic high school graduates for the entire group of 472 freshmen and for the 165 members of the 1960 group.

Further analysis of the 1960 data was attempted by means of partial and multiple correlation procedures. Correlations were
computed between grades and scores on each of the dependent variables with scholastic aptitude and high school average partialled out. In the multiple correlation analysis, beta weights were determined and tested for significance, regression equations developed, and multiple R's computed between college grades and various combinations of predictors.

In order to simplify tabulation and setting up the regression equations, the following system of notation has been used throughout the study:

- Freshman grade point average (CGPA) \( X_1 \)
- First semester grade point average (IGPA) \( X_2 \)
- High school average (HSA) \( X_3 \)
- Scholastic Aptitude Test-Verbal (SAT-V) \( X_4 \)
- Scholastic Aptitude Test-Mathematical (SAT-M) \( X_5 \)
- California Language Test (Advanced) Mechanics of English \( X_6 \)
- California Language Test (Advanced) Spelling \( X_7 \)
- Brown-Holtzman Survey of Study Habits and Attitudes \( X_8 \)

The data were transferred to International Business Machine punch cards, and the means, standard deviations and zero order correlations were computed on the IBM 650 electronic computer. The following codes were used:
1. A one digit code was used to indicate the size of high school.

2. A one digit code was used to indicate the type of high school.

3. Three columns each were used to record the freshman grade point average and the first semester grade point average.

4. Three columns were used to give the numerical value of the high school average.

5. Three columns were devoted to scores on the SAT-V and the SAT-M.

6. Three columns were used to indicate the raw scores on the Mechanics of English test, and three for the Spelling Test.

7. Three columns were used to record the raw scores on the SSHA.

Copies of the Fortran data sheet, the work sheet used to collect the initial information on each student and the machine tabulation data sheets are included in the appendix.
CHAPTER IV

THE RESULTS

Before analyzing the data on comparative performance of Barry College freshmen by size and type of high school attended, a brief examination of the data for the entire group on each variable was made. Table XIV reports the means and the standard deviations of the three year group, as well as for the 1960 group of freshmen.

TABLE XIV

MEANS AND STANDARD DEVIATIONS OF FRESHMEN ON THE VARIOUS PREDICTOR VARIABLES AND FRESHMAN AVERAGE GRADE

<table>
<thead>
<tr>
<th>Variable</th>
<th>TOTAL (N=472)</th>
<th>1960 GROUP (N=165)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>S.D.</td>
</tr>
<tr>
<td>X_1</td>
<td>1.49</td>
<td>.59</td>
</tr>
<tr>
<td>X_2</td>
<td>1.48</td>
<td>.59</td>
</tr>
<tr>
<td>X_3</td>
<td>1.83</td>
<td>.53</td>
</tr>
<tr>
<td>X_4</td>
<td>442.37</td>
<td>99.62</td>
</tr>
<tr>
<td>X_5</td>
<td>408.63</td>
<td>83.79</td>
</tr>
<tr>
<td>X_6</td>
<td>118.85</td>
<td>11.48</td>
</tr>
<tr>
<td>X_7</td>
<td>21.87</td>
<td>4.46</td>
</tr>
<tr>
<td>X_8</td>
<td>32.96</td>
<td>10.96</td>
</tr>
</tbody>
</table>
The total group of freshmen (N=472) is characterized by a consistent level of performance during the first and second semester in college, and by the expected discrepancy between mean high school average and mean grade point average in college. The relatively higher mean verbal score over the mathematical is also consistent with the data for girls' colleges reported by the College Board.¹

With the exception of the first two variables, the data for the 1960 freshmen (N=165) follows this general pattern. There is a noticeable difference between the total group and the 1960 group on first semester grade average; however, the marked difference appears in the mean grade point average for the entire year. This situation reflects perhaps a growing tendency, emphasized during the second semester of the 1960-61 academic year, toward stricter grading practices by the faculty.

The Mechanics of English (X₆) mean score is comparable to a grade level of 14.0, or a level of performance typical of the beginning college sophomore. The spelling mean score (X₇) of 21.9 is comparable to a grade level of 12.6, or that of a second semester high school senior. These scores are equivalent to percentiles

¹Fishman, 1957 Supplement, p. 24, 27.
of 60 for Mechanics of English and 40 for spelling, based on the distribution of scores of beginning college freshmen. The mean score of 32.9 on the study habits inventory is consistent with the standardization data appearing in the test manual and reported in Chapter III of this investigation.

In order to test the hypothesis that there are no differences between graduates of public and Catholic high school graduates on the various predictor variables and on the criterion variables, \( z \) ratios were computed on all variables between the two groups. Table XV reports the data for the entire group of 472 subjects.

### TABLE XV


| Variable | Public \((N=193)\) | Catholic \((N=279)\) |  \
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>S.D.</td>
<td>Mean</td>
</tr>
<tr>
<td>( X_1 )</td>
<td>1.50</td>
<td>.62</td>
<td>1.48</td>
</tr>
<tr>
<td>( X_2 )</td>
<td>1.50</td>
<td>.63</td>
<td>1.47</td>
</tr>
<tr>
<td>( X_3 )</td>
<td>1.83</td>
<td>.51</td>
<td>1.83</td>
</tr>
<tr>
<td>( X_4 )</td>
<td>444.40</td>
<td>97.23</td>
<td>441.12</td>
</tr>
<tr>
<td>( X_5 )</td>
<td>412.11</td>
<td>80.62</td>
<td>406.38</td>
</tr>
</tbody>
</table>

\(^2\)Tiegs and Clark, Manual, p. 60, 64.

\(^3\)Ibid., pp. 72-73a.
Having decided on the one per cent level of significance categorically as the criterion for rejection of the null hypothesis, the last column is perhaps logically inconsistent. However, Lindquist would concede that there is valid justification for reporting actual \( \bar{z} \) values for each difference, so that maximum information be provided for interpretation of results. There was no significant difference on any variable between the means of the Catholic and public school groups. In fact, there is a surprising degree of similarity in regard to high school record, scholastic aptitude and academic performance in college. The F ratios for the variances in the above table indicated that any differences in variability were, like the differences between means, slight enough to be attributable to chance fluctuations.

More conclusive evidence for the assumption that the groups did not differ at the beginning of the school year on the predictor variables, or at the close of the first or second semester of college, is given by the data reported in Table XVI.

This tabulation for the 1960 freshman group includes data on the California Language Test for Mechanics of English (X6) and spelling (X7) and scores on the Survey of Study Habits (X8).

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TABLE XVI

MEANS, STANDARD DEVIATIONS AND CRITICAL RATIOS OF PUBLIC AND CATHOLIC HIGH SCHOOL GRADUATES ON VARIOUS PREDICTOR VARIABLES AND FRESHMAN AVERAGE (1960 FRESHMEN)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Public (N=74)</th>
<th>Catholic (N=91)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>S.D.</td>
</tr>
<tr>
<td>X1</td>
<td>1.37</td>
<td>.65</td>
</tr>
<tr>
<td>X2</td>
<td>1.45</td>
<td>.63</td>
</tr>
<tr>
<td>X3</td>
<td>1.87</td>
<td>.46</td>
</tr>
<tr>
<td>X4</td>
<td>450.43</td>
<td>90.16</td>
</tr>
<tr>
<td>X5</td>
<td>425.62</td>
<td>87.31</td>
</tr>
<tr>
<td>X6</td>
<td>118.24</td>
<td>12.40</td>
</tr>
<tr>
<td>X7</td>
<td>21.94</td>
<td>4.64</td>
</tr>
<tr>
<td>X8</td>
<td>33.35</td>
<td>9.66</td>
</tr>
</tbody>
</table>

There were no significant differences between the groups with respect to mean scores on all the criteria available at the beginning of the school year. The similarity noted between the public and Catholic school groups in college academic achievement, both at the end of the first semester and at the end of the entire first year, is consistent with the data previously presented. The F ratios between the groups were also insignificant at the one percent level. The variability in regard to first semester grades approached the specified level, as did that of the Study Habits
Inventory scores. Apparently public school graduates have greater range in the degree of adjustment to the academic requirements of the college; on the other hand, Catholic school graduates show more heterogeneity in how to use their time and how to take and study for examinations.

There are several factors which may help to explain why the data just presented is not consistent with the research findings summarized in Chapter II on the comparative performance in college of public and private school graduates. The most obvious reason is that the Catholic secondary school is perhaps as broadly representative of the American secondary school population as is the public school; that students entering Barry College from either type of school cannot be distinguished in regard to several of the important factors involved in collegiate success. The admissions requirements of the college, more specific in regard to both kind and quality of high school background than most colleges, may act as a selective factor in achieving a more homogeneous college population. The courses in general education required at the freshman level provide a fairly uniform pattern of first year studies, and may encourage this tendency toward similarity. The relatively

\[^5\text{pp. 12-13.}\]
small student body and the high degree of personal contact between faculty and students are characteristics which differentiate the Barry student body sharply from that of a large university.

The null hypothesis is, therefore, accepted with respect to the comparative performance of Barry College freshmen who are graduates of public and Catholic high schools on the achievement and aptitude measures used.

The hypothesis that there are no differences between graduates of small, medium and large high schools on the same measures was next tested. Table XVII reports the means and standard deviations for the entire group of 472 subjects.

**TABLE XVII**


<table>
<thead>
<tr>
<th>Variable</th>
<th>Small (N = 168)</th>
<th>Medium (N=158)</th>
<th>Large (N=146)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>S. D.</td>
<td>Mean</td>
</tr>
<tr>
<td>X₁</td>
<td>1.50</td>
<td>.57</td>
<td>1.44</td>
</tr>
<tr>
<td>X₂</td>
<td>1.48</td>
<td>.56</td>
<td>1.43</td>
</tr>
<tr>
<td>X₃</td>
<td>1.81</td>
<td>.56</td>
<td>1.82</td>
</tr>
<tr>
<td>X₄</td>
<td>437.42</td>
<td>99.87</td>
<td>442.31</td>
</tr>
<tr>
<td>X₅</td>
<td>405.23</td>
<td>85.92</td>
<td>407.78</td>
</tr>
</tbody>
</table>
"Z" ratios were computed on the larger difference between means for each variable. The data is reported in Table XVIII.

TABLE XVIII

\[ Z \text{ TESTS OF DIFFERENCES BETWEEN MEAN SCORES OF GRADUATES OF SMALL, MEDIUM AND LARGE HIGH SCHOOLS ON PREDICTOR AND CRITERION VARIABLES (Freshmen of 1958, 1959 and 1960)} \]

<table>
<thead>
<tr>
<th>Variable</th>
<th>Pair</th>
<th>( \bar{z} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( X_1 )</td>
<td>Medium vs. Small</td>
<td>1.34</td>
</tr>
<tr>
<td>( X_2 )</td>
<td>Large vs. Small</td>
<td>1.48</td>
</tr>
<tr>
<td>( X_3 )</td>
<td>Large vs. Small</td>
<td>1.03</td>
</tr>
<tr>
<td>( X_4 )</td>
<td>Large vs. Small</td>
<td>.98</td>
</tr>
<tr>
<td>( X_5 )</td>
<td>Large vs. Small</td>
<td>.91</td>
</tr>
</tbody>
</table>

It will be noted that there are no significant differences among the groups formed on the basis of size of high school, in regard to scholastic aptitude, high school performance or college achievement. There are, however, some trends worthy of note. The graduates of large high schools appear to be slightly superior on all variables, than the graduates of medium or small high schools. Between the medium and small high school groups there is less consistency of trend, the former group showing some superiority in scholastic aptitude and high school average, while the latter excel
slightly in college achievement. All differences, though not significant, are in the direction of the graduate of the large high school.

There were no significant differences in the F ratios testing the homogeneity of the variances among the graduates of small, medium and large high schools. The only F ratios which exceeded the five per cent level of significance were those between the variances for high school average for the large and small groups and for the large and medium high school groups. Neither, however, approached the one per cent level.

An interesting trend may be noted in further analyzing the variability of the groups. There are fewer freshmen from large high schools coming to Barry College with extremely high and low high school averages than from medium and small high schools. This trend of smaller standard deviation for high school average for the graduate of large high schools is seen also in the comparison of Catholic and public groups. Perhaps the superior graduate of a small high school goes on to the small college, and the superior student graduating from a large high school tends to seek higher education in a public institution or in a larger denominational one. Conversely, it is possible that the poorer graduate of a small high school might more readily apply to a small college than would
the inferior product of a large high school.

Thus, the very fact of size of a college may be a determining factor in regard to the differential variability of its student body. Recalling the fact that the Catholic high schools included in this investigation are predominantly of small or medium size, it is logical to assume also that the tendency just described may be induced partly by the factor of religion also; i.e., that superior graduates of Catholic high schools go to Catholic colleges, and that superior graduates of public high schools go to public colleges; that a Catholic college would be more prone to accept the below average graduate of a Catholic high school than an inferior graduate of a public high school.

This trend is borne out by the comparative variability of the groups in regard to scholastic aptitude test scores, although the differences are very slight.

The hypothesis that there are no differences between graduates of small, medium and large high schools on the various predictor and criterion variables was also tested on the group of freshmen admitted in 1960. Table XIX reports the mean scores and standard deviations for this group of 165 subjects.
TABLE XIX

COMPARISON OF THE MEANSCORES AND STANDARD DEVIATIONS OF GRADUATES OF SMALL, MEDIUM AND LARGE HIGH SCHOOLS ON THE VARIOUS PREDICTOR AND CRITERION VARIABLES (Freshmen of 1967, N=165)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Small (N=59)</th>
<th>Medium (N=54)</th>
<th>Large (N=52)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>S.D.</td>
<td>Mean</td>
</tr>
<tr>
<td>X1</td>
<td>1.42</td>
<td>.54</td>
<td>1.22</td>
</tr>
<tr>
<td>X2</td>
<td>1.48</td>
<td>.48</td>
<td>1.30</td>
</tr>
<tr>
<td>X3</td>
<td>1.96</td>
<td>.51</td>
<td>1.77</td>
</tr>
<tr>
<td>X4</td>
<td>450.88</td>
<td>91.84</td>
<td>430.94</td>
</tr>
<tr>
<td>X5</td>
<td>440.41</td>
<td>87.56</td>
<td>410.57</td>
</tr>
<tr>
<td>X6</td>
<td>120.51</td>
<td>10.58</td>
<td>118.24</td>
</tr>
<tr>
<td>X7</td>
<td>22.22</td>
<td>3.84</td>
<td>21.50</td>
</tr>
<tr>
<td>X8</td>
<td>31.57</td>
<td>10.32</td>
<td>33.18</td>
</tr>
</tbody>
</table>

"t" ratios were computed on the larger difference between means for each variable; no further computations were necessary, since none of the differences proved to be significant at the one per cent level. The outcomes are reported in Table XX.

In this comparison, as in the analysis of the total group of freshmen, none of the differences are of a magnitude to be attributed to other than chance factors; i.e., none of the values exceed that required for significance at the selected level of one
<table>
<thead>
<tr>
<th>Variable</th>
<th>Pair</th>
<th>$\bar{z}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$X_1$</td>
<td>Small vs. Medium</td>
<td>1.99*</td>
</tr>
<tr>
<td>$X_2$</td>
<td>Small vs. Medium</td>
<td>1.87</td>
</tr>
<tr>
<td>$X_3$</td>
<td>Small vs. Medium</td>
<td>1.96*</td>
</tr>
<tr>
<td>$X_4$</td>
<td>Large vs. Medium</td>
<td>1.25</td>
</tr>
<tr>
<td>$X_5$</td>
<td>Small vs. Medium</td>
<td>1.82</td>
</tr>
<tr>
<td>$X_6$</td>
<td>Small vs. Large</td>
<td>0.80</td>
</tr>
<tr>
<td>$X_7$</td>
<td>Small vs. Medium</td>
<td>0.91</td>
</tr>
<tr>
<td>$X_8$</td>
<td>Large vs. Small</td>
<td>1.42</td>
</tr>
</tbody>
</table>

*significant at .05 level

per cent. It will be noted, however, that the $\bar{z}$ values are larger for the 1960 group than for the entire three year group of freshmen, two approaching the five per cent level and two exceeding it. The direction of superiority, likewise, has shifted from the large to the small high school. The medium group has changed to a position of inferiority with respect to both of the other groups.

The graduates of the large and small high schools seem to do
consistently, though not significantly, better in the freshman year at Barry College than do the products of medium sized high schools. Academic achievement prior to college is similarly superior on the part of the graduates of small high schools, although again the differences are not significant. It is interesting to note that the trend in regard to scholastic aptitude is one of superiority on the part of the graduate of the large high school with regard to the verbal aspect of scholastic aptitude, and of the graduate of the small high school with regard to mathematical. Also of note is the superiority of the large group in regard to the study habits factor, although the actual difference is small.

The differences in variability disclosed by the variance ratios, however, do not follow any such clear-cut pattern. The F ratios for the 1960 groups, although below the one per cent level of significance with respect to all variables except freshman grade point average, do follow somewhat the trends disclosed for the three year group of freshmen. The most striking aspect of the comparison is the consistent trend toward greater variability of the graduates of large high schools with respect to most of the variables, both predictor and criterion, contrasted with the comparatively narrower spread of this group in regard to high school average. Sufficient ratios are reported in Table XXI to indicate
the nature and extent of this trend.

**TABLE XXI**

**F RATIOS BETWEEN VARIANCES OF GRADUATES OF SMALL, MEDIUM AND LARGE HIGH SCHOOLS ON PREDICTOR AND CRITERION VARIABLES (165 subjects)**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Pair</th>
<th>Degrees of freedom</th>
<th>F Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>$X_1$</td>
<td>Large vs. Medium</td>
<td>51, 53</td>
<td>1.85*</td>
</tr>
<tr>
<td>$X_1$</td>
<td>Large vs. Small</td>
<td>51, 58</td>
<td>1.72*</td>
</tr>
<tr>
<td>$X_2$</td>
<td>Large vs. Small</td>
<td>51, 58</td>
<td>2.02**</td>
</tr>
<tr>
<td>$X_2$</td>
<td>Large vs. Medium</td>
<td>51, 53</td>
<td>1.22</td>
</tr>
<tr>
<td>$X_3$</td>
<td>Small vs. Large</td>
<td>51, 58</td>
<td>1.39</td>
</tr>
<tr>
<td>$X_4$</td>
<td>Large vs. Medium</td>
<td>51, 53</td>
<td>1.23</td>
</tr>
<tr>
<td>$X_5$</td>
<td>Small vs. Medium</td>
<td>51, 58</td>
<td>1.12</td>
</tr>
<tr>
<td>$X_6$</td>
<td>Large vs. Small</td>
<td>51, 58</td>
<td>1.36</td>
</tr>
<tr>
<td>$X_7$</td>
<td>Large vs. Medium</td>
<td>51, 58</td>
<td>1.73*</td>
</tr>
<tr>
<td>$X_8$</td>
<td>Large vs. Medium</td>
<td>51, 53</td>
<td>1.29</td>
</tr>
<tr>
<td>$X_8$</td>
<td>Medium vs. Large</td>
<td>53, 51</td>
<td>1.67*</td>
</tr>
<tr>
<td>$X_8$</td>
<td>Medium vs. Small</td>
<td>53, 58</td>
<td>1.47</td>
</tr>
</tbody>
</table>

* significant at .05 level
** significant at .01 level

There is a significant difference in the variability of first semester college grades between the group of graduates of small
high schools and of large high schools. The students from large high schools attain extremely high and low averages during this initial period in greater proportion than do those who have graduated from small high schools. Although this tendency levels off somewhat for the measure of achievement for the entire freshman year, no longer attaining the one per cent level of significance, it still remains as a noticeable characteristic. In the larger group and the 1960 group of freshmen this tendency toward greater heterogeneity was present in respect to the measures of scholastic aptitude as well but the conditions of relative variability of both groups are reversed for the high school average.

This "consistent inconsistency" bears further support to the hypothesis that there are fewer cases of outstandingly superior and inferior high school records among Barry College freshmen who are graduates of large high schools; i.e., among the student body, the range of academic talent and of performance in college is greater for graduates of large high schools, but in the area of high school achievement this same group is comparatively less variable.

The data that has been presented and analyzed thus far is rather conclusive evidence for accepting the null hypothesis in regard to differences among groups of Barry College freshmen on the
basis of either size or type of high school attended. The groups did not differ significantly on mean scores on the predictor variables at the time of their admittance to the college, nor did they differ significantly in grade point average at the end of the freshman year in college. The only significant difference found was in regard to the relative variability with respect to first semester grade point average of the 1960 freshman group from large high schools and that of the group who had graduated from small high schools. The outstanding fact is that there is more homogeneity in scholastic aptitude, high school average and freshman average grades among the groups formed on the basis of size and type of high school than exists among successive freshman classes.

In relating the findings of the present investigation with similar research which, reviewed in Chapter II, can now be reviewed with respect to chronology. Eleven of the fifteen studies were conducted and published prior to 1940; only three of them were done within the last ten years, one of these using data for entering freshmen over the entire period 1924-1951. It is possible that the small high school, whether public or Catholic has experienced more substantial improvement in the last thirty years than has the large high school. Accreditation and certification standards imposed by both state and regional associations have
constant stimuli to increase the quality of personnel, curriculum, and physical plant and equipment, in both private and public secondary schools. The greater stability of the religious teaching personnel may perhaps be an additional factor contributing to the relative superiority of the small Catholic high school.

The relative inferiority of the graduates of the high school of medium size as well as that of the superiority of students from small high schools, can probably be accounted for in part by sociological and psychological factors involved in the selection of candidates, rather than by quality of schools. Seventy-five per cent of the medium group are graduates of Catholic high schools; of this group, fifty-five per cent are girls from high schools in the Miami area. The superior graduate of these high schools, the girl who is more intelligent and more intellectually ambitious, may attend college elsewhere. Conversely, the graduates in this same category who migrate to Florida may be consciously seeking a college more in line with their capabilities.

The superiority of the graduates of small high schools may likewise be explained in part by selection factors operating within the situation, rather than by the inherent quality of the institutions. Only thirteen per cent of the girls in the small high school group are from the Miami area; eighty-seven per cent come
from high schools in other Florida communities or from other states. Their relative superiority, with respect to scholastic aptitude as well as level of performance in high school and college, may be accounted for partly by qualities within the girl herself; i.e., solid motivation for college attendance; knowledge of and identification with the aims and practices of Catholic education; a background of academic preparation which articulates smoothly with the college curriculum. Motivational correlates of college success, however, are not reflected in the mean scores for the graduates of small high schools with respect to study habits and attitudes.

The following table summarizes the extent and nature of the differences found.

**TABLE XXII**

**SIGNIFICANT DIFFERENCES IDENTIFIED IN FRESHMAN SUB-GROUPS**

<table>
<thead>
<tr>
<th>Sub-group</th>
<th>One per cent level</th>
<th>Five per cent level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of high school</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Year of entrance</td>
<td><strong>Mean:</strong> SAT-M</td>
<td><strong>Mean:</strong> high school average</td>
</tr>
<tr>
<td></td>
<td><strong>freshman average</strong></td>
<td><strong>Variability:</strong> SAT-V</td>
</tr>
<tr>
<td>Size of high school</td>
<td><strong>Variability:</strong> freshman average</td>
<td><strong>Mean:</strong> first semester average; high school average</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Variability:</strong> spelling; SSHA; first semester average</td>
</tr>
</tbody>
</table>
The second aspect of the study was an examination of the inter-relationships of the variables and the relative effectiveness of the independent variables in predicting the dependent variable, freshman grade point average. Information on the extent of changes in the interrelationships of the variables for the various classifications of schools was sought in order to throw further light on the conditions under which the various criteria vary and to aid in determining whether separate predictive formulas would increase the efficiency of predicting freshman scholarship for particular groups of students.

Zero order correlations were calculated between each of the pairs of the predictor and criterion variables, for the total and for each group by size and type of school. The criterion variable, \( x_2 \), first semester grade point average, was not included in this aspect of the study. Table XXIII reports the correlation coefficients for the total group of 472 freshmen entering in 1958, 1959 and 1960, and for the group of 165 freshmen entering in 1960. As was done in the comparison of mean differences, greater emphasis was placed on the analysis and interpretation of the interrelationships of the latter group.

The significance of each individual correlation coefficient has been determined by using R. A. Fisher's Table V. A. "Values
TABLE XXIII

ZERO ORDER CORRELATIONS AND STANDARD ERRORS* FOR TOTAL POPULATION AND 1960 GROUP OF FRESHMEN

<table>
<thead>
<tr>
<th>Variables</th>
<th>Total (N=472)</th>
<th>1960 Group (N=165)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>r</td>
<td>S.E.</td>
</tr>
<tr>
<td>X₁ &amp; X₃</td>
<td>.61</td>
<td>.03</td>
</tr>
<tr>
<td>X₁ &amp; X₄</td>
<td>.56</td>
<td>.03</td>
</tr>
<tr>
<td>X₁ &amp; X₅</td>
<td>.39</td>
<td>.04</td>
</tr>
<tr>
<td>X₁ &amp; X₆</td>
<td>.46</td>
<td></td>
</tr>
<tr>
<td>X₁ &amp; X₇</td>
<td>.51</td>
<td></td>
</tr>
<tr>
<td>X₁ &amp; X₈</td>
<td>.32</td>
<td></td>
</tr>
<tr>
<td>X₃ &amp; X₄</td>
<td>.49</td>
<td>.04</td>
</tr>
<tr>
<td>X₃ &amp; X₅</td>
<td>.51</td>
<td>.03</td>
</tr>
<tr>
<td>X₄ &amp; X₅</td>
<td>.61</td>
<td>.03</td>
</tr>
</tbody>
</table>

* The standard errors were computed by the formula \( \sigma_r = \frac{1-r^2}{\sqrt{N-1}} \)

of the Correlation Coefficient for Different Levels of Significance*. The correlations listed in Table XXIII are all significant beyond the one per cent level.

---

The coefficients between high school average and freshman grades (.61, .59) are somewhat higher than the degree of association usually reported in the literature of prediction studies. The degree of relationship between SAT-V and college grades is similarly higher, for both groups, than is commonly found in such investigations, and above that reported by the College Board.

It will be noted that the standard error of the coefficients for the total group indicate a greater reliability in the measures of relationship determined for the larger group. Of perhaps more interest is the similarity of the respective coefficients for the single year and three year group of freshmen. The change in quality and homogeneity of the groups from year to year, reported in Chapter III, does not seem to affect substantially the interrelationships of these variables.

The significance of the difference between each pair of correlations was tested using the "z" transformation. Although none of differences are significant, there are some relationships worthy

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7See above, pp. 27-28.

8See above, p. 66.

of note. Although the difference is very slight, the SAT-V emerges to be the best predictor variable for the 1960 group, with high school average in second place. For the total group, however, and in more general practice, the positions are reversed. A high correlation (.66) exists between SAT-V and SAT-M scores, a higher value than either shares with freshman grade point average for the 1960 group. The correlations for SAT-M and high school average are higher for both groups than that of SAT-M with college grade average.

Table XXIV reports the coefficients for size of high school for the three year group of freshmen.

**TABLE XXIV**

CORRELATION COEFFICIENTS AND STANDARD ERRORS BY SIZE OF HIGH SCHOOL (N=472)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Large (N=146)</th>
<th>Medium (N=158)</th>
<th>Small (N=168)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>r</td>
<td>S.E.</td>
<td>r</td>
</tr>
<tr>
<td>X1 &amp; X3</td>
<td>.66</td>
<td>.05</td>
<td>.61</td>
</tr>
<tr>
<td>X1 &amp; X4</td>
<td>.60</td>
<td>.05</td>
<td>.60</td>
</tr>
<tr>
<td>X1 &amp; X5</td>
<td>.42</td>
<td>.07</td>
<td>.44</td>
</tr>
<tr>
<td>X3 &amp; X4</td>
<td>.49</td>
<td>.06</td>
<td>.52</td>
</tr>
<tr>
<td>X3 &amp; X5</td>
<td>.45</td>
<td>.07</td>
<td>.51</td>
</tr>
<tr>
<td>X4 &amp; X5</td>
<td>.59</td>
<td>.05</td>
<td>.64</td>
</tr>
</tbody>
</table>
All the correlations are significant beyond the one per cent level. Although there is a noticeable range, all differences are small enough to have occurred by chance alone more than five times in 100. The relative predictive value of the high school average is greatest for large high schools, and least for small schools. All three, however, are higher than commonly reported for such research. The relatively lower efficiency of each of the predictor variables for the small high school group is apparent. The relatively inferior predictive efficiency of the SAT-M is somewhat explainable by the liberal arts curriculum of the college, and the exclusively female population.

The inter-relationships of the predictor variables with each other are fairly uniform from group to group, with no consistent trend indicated in the pattern of minor fluctuations. The correlation coefficients between SAT-V and SAT-M, ranging from .59 to .64, are higher than the association shared by either with the criterion variable. This fact will be discussed in greater detail in connection with the 1960 group.

Table XXV reports the correlations with freshman grades of the above mentioned variables, as well as the three additional variables on which scores were obtained for the 1960 group.
### TABLE XXV

**CORRELATION COEFFICIENTS AND STANDARD ERRORS BY SIZE OF HIGH SCHOOL (1960 group)**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Large (N=52)</th>
<th>Medium (N=54)</th>
<th>Small (N=59)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>r</td>
<td>S.E.</td>
<td>r</td>
</tr>
<tr>
<td>$X_3$</td>
<td>.70</td>
<td>.07</td>
<td>.50</td>
</tr>
<tr>
<td>$X_4$</td>
<td>.76</td>
<td>.06</td>
<td>.58</td>
</tr>
<tr>
<td>$X_5$</td>
<td>.56</td>
<td>.10</td>
<td>.25**</td>
</tr>
<tr>
<td>$X_6$</td>
<td>.62</td>
<td>.09</td>
<td>.32*</td>
</tr>
<tr>
<td>$X_7$</td>
<td>.53</td>
<td>.10</td>
<td>.56</td>
</tr>
<tr>
<td>$X_8$</td>
<td>.24**</td>
<td>.13</td>
<td>.39</td>
</tr>
</tbody>
</table>

*not significant at the one per cent level  
**not significant at the five per cent level

The coefficients must be interpreted with caution, as the standard errors will indicate, in view of the relatively small number of cases on which they are based. Association of the independent variables with freshman grades is highest for the large high school group on four of the six variables; the coefficient of .76 is unusually high in regard to SAT-V. The status of the SAT-M has changed somewhat, although not significantly so. Its predictive efficiency has improved for the large group, and dropped for the medium and small to a level of association that could have
arisen by chance. The correlation of the spelling test is surprisingly high with freshman grades, being slightly better than the language test for medium and small schools, and noticeably better than the SAT-M for these two groups.

The study habits inventory, introduced in an attempt to discover a new and relevant source of variance not represented in the other predictor variables, is relatively inefficient in predicting college grade point average. This is particularly true of the large high school group, the coefficient of correlation with college grade average being small enough to be not significantly different from one that could have arisen by chance.

Although the differences in correlation of the Inventory with college grades by size of school are not significant, one can see a trend toward greater degree of relationship for the small school. It will be remembered that the Inventory is constructed on the rationale that it measures the variance in academic achievement not measured by ability and achievement tests. The higher correlations of the SAT-V and high school average with freshman grades, and the lower correlation of the SSHA with the same criterion, would indicate that less of the motivational correlate measured by the Inventory is reflected in its degree of association with grade average of the graduate of large high schools. Conversely, the
lower correlations of the SAT-V and high school average with freshman scholarship for the small and medium groups, accompanied by the higher correlation of the SSBA with freshman achievement for the graduates of those schools, would indicate that more of the motivational correlate of grades is accounted for by the Inventory with respect to this group. The differences, however, are so slight to make such a hypothesis extremely tentative; in fact, the data in general casts some doubt on the validity of the Inventory for this population.

Table XXVI reports only those ratios which were greater than

<table>
<thead>
<tr>
<th>Variable</th>
<th>Pair</th>
<th>Difference</th>
<th>z</th>
</tr>
</thead>
<tbody>
<tr>
<td>X₃</td>
<td>Large vs. Medium</td>
<td>.30</td>
<td>1.50</td>
</tr>
<tr>
<td>X₄</td>
<td>Large vs. Small</td>
<td>.49</td>
<td>2.51*</td>
</tr>
<tr>
<td>X₅</td>
<td>Large vs. Medium</td>
<td>.37</td>
<td>1.85</td>
</tr>
<tr>
<td>X₆</td>
<td>Large vs. Small</td>
<td>.30</td>
<td>1.54</td>
</tr>
<tr>
<td>X₅</td>
<td>Large vs. Medium</td>
<td>.37</td>
<td>1.85</td>
</tr>
<tr>
<td>X₆</td>
<td>Large vs. Small</td>
<td>.34</td>
<td>1.74</td>
</tr>
<tr>
<td>X₆</td>
<td>Large vs. Medium</td>
<td>.40</td>
<td>2.00*</td>
</tr>
</tbody>
</table>

*significant at the five per cent level
one for the tests of significance for corresponding pairs of coefficients between the predictor variables and freshman grades for the various sizes of schools.

In view of the small size of the groups involved, extreme caution should be observed in interpreting the results. Although the range of coefficients of each of the variables is noticeable, the only difference which approaches significance at the one per cent level is that between the correlations of SAT-V between the large and small schools. The difference between the graduates of large and medium schools with respect to the correlations of the SSHA with the criterion, it will be noted, is beyond the five per cent level of significance.

These conditions lead to the hypothesis that, although the predictor variables act differently as predictors of collegiate success for graduates of small, medium and large high schools, even the largest of the differences between comparable coefficients fails to approach significance; i.e., a set of differences of as great or greater magnitude might have occurred by chance alone more than five times in 100. It is clear that classification by size produced no significant change in the level of relationships between grade and variables. It also suggests that the spelling test has higher predictive validity for the medium and small groups.
than does the SAT–M. Finally, the analysis has revealed that we can expect less accuracy in predicting freshman grades for the graduates of small high schools, on the basis of the relationships disclosed here.

A single brief comparison of the differences in correlation of the predictor variables with freshman grades by type of high school is reported in Table XXVII. Coefficients for the combined group of freshmen, because they show even less divergence, are not reported.

**TABLE XXVII**

**CORRELATION COEFFICIENTS, STANDARD ERRORS, AND "Z" VALUES BY TYPE OF HIGH SCHOOL (1960 Group)**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Public (N=74)</th>
<th>Catholic (N=91)</th>
<th>z</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>r</td>
<td>S.E.</td>
<td>r</td>
</tr>
<tr>
<td>X₁ &amp; X₃</td>
<td>.63</td>
<td>.07</td>
<td>.57</td>
</tr>
<tr>
<td>X₁ &amp; X₄</td>
<td>.70</td>
<td>.06</td>
<td>.53</td>
</tr>
<tr>
<td>X₁ &amp; X₅</td>
<td>.49</td>
<td>.09</td>
<td>.32</td>
</tr>
<tr>
<td>X₁ &amp; X₆</td>
<td>.56</td>
<td>.08</td>
<td>.35</td>
</tr>
<tr>
<td>X₁ &amp; X₇</td>
<td>.53</td>
<td>.08</td>
<td>.50</td>
</tr>
<tr>
<td>X₁ &amp; X₈</td>
<td>.28</td>
<td>.11</td>
<td>.36</td>
</tr>
</tbody>
</table>

Although there is less contrast between the relationships when the 1960 freshman group is dichotomized by type of high school
than when categorized by size, there is consistently higher association for the public high school graduates between freshman grades and five of the seven variables. None of the differences are significant, however, and the standard errors are fairly large; any conclusions, therefore, must be extremely tentative.

An explanation of this pattern may include mention of the motivational factors previously cited in this chapter. The public school graduate who comes to Barry College may be even more serious of purpose, more definite in her vocational plans, and more disposed to work to the limits of her ability than the Catholic high school graduate. There may be a deeper appreciation of the values of Catholic liberal arts education in the girl who, after four years of education in a public high school, selects a college characterized by a small campus and student body, an atmosphere of mutual interest and friendliness, an academic climate of small classes and close pupil-teacher relationships. These reasons may be applicable to the trends by size also.

Evaluating the results of the zero order correlation analysis generally, it is possible to make some statement about the general predictive efficiency of the independent variables. High school average and SAT-V are both very effective in predicting freshman grades in all comparisons which have been drawn in this investiga-
tion, and in comparison with the results of other research. Al-
though both are somewhat less effective in predicting college scho-
larship for graduates of small schools, the differences are not
significant. The correlations of the English and spelling tests
with freshman grades both indicate greater predictive efficiency
than does the SAT-M, a fact which is not surprising when the parti-
cular curriculum and student body are considered.

There are also some differences in the inter-correlations be-
tween some of these variables used in predicting freshman grade
point average. Table XXVIII lists the coefficients and standard
errors of the intercorrelations among the predictor variables by
size of high school for the 1960 group of freshmen.

The tendency toward high correlation existing between SAT-V
and SAT-M, previously mentioned in connection with the 1960 group
as a whole, is repeated here, particularly in the large and small
groups. The high relationship between SAT-V and the English and
spelling test scores, and the equally high interrelationships of
the spelling and English tests indicate the presence of a common
factor of verbal skill, and will probably mean that more than one
of them will have only minimal usefulness in improving the effi-
ciency of prediction when used in common.

The lowest correlation coefficients throughout the table are
### TABLE XXVIII

**INTER-CORRELATIONS AND STANDARD ERRORS OF THE PREDICTOR VARIABLES BY SIZE OF HIGH SCHOOL (N=165)**

<table>
<thead>
<tr>
<th>Variable Pair</th>
<th>Large (N=52)</th>
<th>Medium (N=54)</th>
<th>Small (N=59)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>r</td>
<td>S.E.</td>
<td>r</td>
</tr>
<tr>
<td>$X_3 \times X_4$</td>
<td>.64</td>
<td>.08</td>
<td>.38</td>
</tr>
<tr>
<td>$X_3 \times X_5$</td>
<td>.51</td>
<td>.10</td>
<td>.42</td>
</tr>
<tr>
<td>$X_3 \times X_6$</td>
<td>.53</td>
<td>.10</td>
<td>.50</td>
</tr>
<tr>
<td>$X_3 \times X_7$</td>
<td>.44</td>
<td>.11</td>
<td>.52</td>
</tr>
<tr>
<td>$X_3 \times X_8$</td>
<td>.41</td>
<td>.12</td>
<td>.29*</td>
</tr>
<tr>
<td>$X_4 \times X_5$</td>
<td>.71</td>
<td>.07</td>
<td>.55</td>
</tr>
<tr>
<td>$X_4 \times X_6$</td>
<td>.69</td>
<td>.07</td>
<td>.54</td>
</tr>
<tr>
<td>$X_4 \times X_7$</td>
<td>.53</td>
<td>.10</td>
<td>.44</td>
</tr>
<tr>
<td>$X_4 \times X_8$</td>
<td>.30**</td>
<td>.13</td>
<td>.14***</td>
</tr>
<tr>
<td>$X_5 \times X_6$</td>
<td>.54</td>
<td>.10</td>
<td>.39</td>
</tr>
<tr>
<td>$X_5 \times X_7$</td>
<td>.34**</td>
<td>.12</td>
<td>.34*</td>
</tr>
<tr>
<td>$X_5 \times X_8$</td>
<td>.29**</td>
<td>.13</td>
<td>.01***</td>
</tr>
<tr>
<td>$X_6 \times X_7$</td>
<td>.60</td>
<td>.09</td>
<td>.48</td>
</tr>
<tr>
<td>$X_6 \times X_8$</td>
<td>.44</td>
<td>.11</td>
<td>.12***</td>
</tr>
<tr>
<td>$X_7 \times X_8$</td>
<td>.29*</td>
<td>.13</td>
<td>.30*</td>
</tr>
</tbody>
</table>

*not significant at the one per cent level

**not significant at the five per cent level

***not significant at the ten per cent level
those of the SSHA with the other variables, a fact which would further substantiate the hypothesis that the inventory measures an element of grades which is independent of achievement or ability.

The technique of partial correlation was employed to further examine the extent of the interrelationships of the variables. By computing first order partial correlations and thus eliminating the effect of high school average, SAT-V and SSHA, it was possible to note the change from the original zero order correlations of these variables with college grades. Table XXIX reports the zero order correlations between freshman average and the two most effective predictors (high school average and SAT-V), and the partial correlations with the effect of each of the latter separately removed. The interaction of SSHA with these relationships is also contained in the table.

By partialing out the effect of SAT-V, the correlations between high school and college performance are lowered to a greater degree for the public and the large high school groups than for the respective corresponding groups. The only correlation which is reduced to a level below that required for significance at the one per cent level is that for the small high school, between college average and verbal scholastic aptitude when the influence of high school average is nullified. With the influence of high school
TABLE XXIX

ZERO ORDER AND FIRST ORDER PARTIAL CORRELATIONS* OF PREDICTOR VARIABLES AND CRITERION FOR SUB-GROUPS OF 1960 FRESHMAN CLASS

<table>
<thead>
<tr>
<th>Variables</th>
<th>Public N=74</th>
<th>Catholic N=91</th>
<th>Large N=52</th>
<th>Medium N=54</th>
<th>Small N=59</th>
</tr>
</thead>
<tbody>
<tr>
<td>$r_{X_1 X_3}$</td>
<td>.63</td>
<td>.57</td>
<td>.70</td>
<td>.50</td>
<td>.58</td>
</tr>
<tr>
<td>$r_{X_1 X_3 X_4}$</td>
<td>.37</td>
<td>.45</td>
<td>.41</td>
<td>.37</td>
<td>.46</td>
</tr>
<tr>
<td>$r_{X_1 X_4}$</td>
<td>.70</td>
<td>.53</td>
<td>.76</td>
<td>.56</td>
<td>.47</td>
</tr>
<tr>
<td>$r_{X_1 X_4 X_3}$</td>
<td>.52</td>
<td>.38</td>
<td>.57</td>
<td>.48</td>
<td>.28**</td>
</tr>
<tr>
<td>$r_{X_1 X_3}$</td>
<td>.63</td>
<td>.57</td>
<td>.70</td>
<td>.50</td>
<td>.58</td>
</tr>
<tr>
<td>$r_{X_1 X_3 X_8}$</td>
<td>.59</td>
<td>.50</td>
<td>.68</td>
<td>.44</td>
<td>.48</td>
</tr>
<tr>
<td>$r_{X_1 X_4}$</td>
<td>.70</td>
<td>.52</td>
<td>.76</td>
<td>.56</td>
<td>.47</td>
</tr>
<tr>
<td>$r_{X_1 X_4 X_8}$</td>
<td>.68</td>
<td>.45</td>
<td>.74</td>
<td>.55</td>
<td>.35</td>
</tr>
</tbody>
</table>

*significant tested by the formula $t = \frac{r \sqrt{N-3}}{\sqrt{1 - r^2}}$

**not significant at .01 level

average nullified, the relationship between SAT-V and college average, however, drops fairly uniformly for each group. Partialing

---

out the effect of SSA results in no change in the relationships between college average and high school average.

The above data indicated that there is somewhat stronger association of the verbal factor common to both high school and college grades for the graduate of large high schools than for the one from medium or small high schools; the same trend is noted for the public-Catholic difference. The effects of partialing out, by removing the influence, make the groups more similar with respect to the corresponding relationships.

The final aspect of the study was a consideration of the sample in terms of standard partial regression coefficients, coefficients of multiple correlation, and regression equations. In the course of developing regression equations to predict academic success it was possible to show how the independent variables of high school average and SAT-V change as predictors for students from different sizes of schools.

In view of the fact that classification of the data by size and type of school produced very few significant differences, either in central tendency or homogeneity and equally few changes in the interrelationships among the variables, the decision was made to develop a single index to predict scholarship for all freshmen entering Barry College. Also, because of the heterogeneity of the
data for the successive years, the data for 1960 only was used in this part of the analysis.

The multiple regression technique provides a means of combining two or more sets of data to form a best-weighted prediction based on all of the data available. Such a combined prediction usually an improvement over the predictions made on the basis of a single variable, is due to the fact that the multiple regression equation maximizes the relationships that already exist between each predictor and the criterion, by giving the best weightings of the predictors to use in making a combination.

Multiple correlation coefficients, beta coefficients and standard errors of estimate were computed first between college grade average and various combinations of predictors, two at a time. The beta coefficients, or standard partial regression coefficients, give the contributions of the variables without regard to the units employed in reporting the data, as they are expressed in terms of standard scores. The standard errors of estimate give an indication of the margin of error that exists with a knowledge of the predictor variables, i.e., we can conclude that two-thirds of the obtained values will lie within the range of predicted values indicated by the standard error of estimate.

In computing the multiple correlation with three variables,
the following formula was used:  

\[ R_{1.23}^2 = \frac{r_{12}^2 + r_{13}^2 - (2r_{12}r_{13}r_{23})}{1 - r_{23}^2} \]

The beta coefficients, or standard partial regression coefficients were computed using the formulas:  

\[ \beta_{12.3} = \frac{r_{12} - (r_{13}r_{23})}{1 - r_{23}^2} \]

and

\[ \beta_{13.2} = \frac{r_{13} - (r_{12}r_{23})}{1 - r_{23}^2} \]

The standard errors of estimate were computed using the formula:  

\[ \sigma_{1.23} = \sigma_1 \sqrt{1 - R_{1.23}^2} \]

Table XXX reports the multiple correlations, beta coefficients, and standard errors of estimate for these combinations.

The magnitude of the multiple correlation coefficients is greatest for the combination of SAT-V and high school average. The effect of high school average combined with other test variables results in somewhat lower association with the criterion, with the study habits and spelling tests working about equally well. The

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11Guilford, p. 393.

12Ibid., p. 394.

13Ibid., p. 398.
### TABLE XXX

BETA COEFFICIENTS, MULTIPLE CORRELATION COEFFICIENTS AND STANDARD ERRORS OF ESTIMATES FOR VARIOUS COMBINATIONS OF TWO PREDICTOR VARIABLES AND FRESHMAN AVERAGE (N=165)

<table>
<thead>
<tr>
<th>Variables combined</th>
<th>$\beta_2$</th>
<th>$\beta_3$</th>
<th>$R$</th>
<th>S.E. of est.</th>
</tr>
</thead>
<tbody>
<tr>
<td>$X_3 &amp; X_4$</td>
<td>.3848</td>
<td>.4306</td>
<td>.70</td>
<td>.426</td>
</tr>
<tr>
<td>$X_3 &amp; X_5$</td>
<td>.5268</td>
<td>.1224</td>
<td>.603</td>
<td>.478</td>
</tr>
<tr>
<td>$X_3 &amp; X_6$</td>
<td>.4834</td>
<td>.2369</td>
<td>.63</td>
<td>.465</td>
</tr>
<tr>
<td>$X_3 &amp; X_7$</td>
<td>.4512</td>
<td>.3056</td>
<td>.65</td>
<td>.453</td>
</tr>
<tr>
<td>$X_3 &amp; X_8$</td>
<td>.5489</td>
<td>.1150</td>
<td>.65</td>
<td>.454</td>
</tr>
<tr>
<td>$X_4 &amp; X_5$</td>
<td>.3895</td>
<td>.3368</td>
<td>.66</td>
<td>.448</td>
</tr>
<tr>
<td>$X_4 &amp; X_6$</td>
<td>.5648</td>
<td>.0154</td>
<td>.63</td>
<td>.464</td>
</tr>
<tr>
<td>$X_4 &amp; X_7$</td>
<td>.5205</td>
<td>.1525</td>
<td>.62</td>
<td>.468</td>
</tr>
<tr>
<td>$X_4 &amp; X_8$</td>
<td>.4715</td>
<td>.2792</td>
<td>.66</td>
<td>.452</td>
</tr>
<tr>
<td>$X_6 &amp; X_7$</td>
<td>.2539</td>
<td>.3748</td>
<td>.555</td>
<td>.496</td>
</tr>
<tr>
<td>$X_6 &amp; X_8$</td>
<td>.4002</td>
<td>.2080</td>
<td>.50</td>
<td>.518</td>
</tr>
<tr>
<td>$X_7 &amp; X_8$</td>
<td>.4579</td>
<td>.1834</td>
<td>.54</td>
<td>.502</td>
</tr>
</tbody>
</table>

Addition of SAT-M or English increases the zero order correlation of high school average with freshman grades by a negligible amount.

The magnitude of the multiple correlation coefficients of the various test scores with college grade average is somewhat lower, a fact testifying to the greater efficiency of the high school
average in predicting college grades. The most effective combinations are the SAT-V with the SAT-M and the SAT-V with spelling, the efficiency of the first resulting from the preponderance of common elements, and the second from the lack of common elements between the predictor variables, as their zero order intercorrelations indicate.

Although the beta coefficients cannot be compared directly from one combination to another, their magnitude does give the order of importance of the variables within a single team. It will be noted that the SAT-V has a consistently larger beta weight in each combination in which it appears, even when it is the second variable combined with high school average.

The combination of high school average and SAT-V was selected for the computations to show the nature and extent of change effected in the multiple R and beta weights when the data were classified by size of high school. Table XXXI reports the beta coefficients, multiple correlation coefficients and standard errors of estimate for the total group, and for each of the sub-groups.

Consistent with the trends shown by the zero order correlations of predictor variables with criterion, the efficiency of prediction is greatest for the large group; also evident is the greater contribution of high school average to the criterion for
TABLE XXXI

BETA COEFFICIENTS, MULTIPLE CORRELATION COEFFICIENTS AND STANDARD ERRORS OF ESTIMATE FOR DIFFERENT SIZES OF SCHOOLS FOR PREDICTOR VARIABLES AND FRESHMAN GRADES

<table>
<thead>
<tr>
<th></th>
<th>$\beta_2$ (HSA)</th>
<th>$\beta_3$ (SAT-V)</th>
<th>R</th>
<th>$\sigma_{x_1 \cdot x_3 \cdot x_4}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small</td>
<td>.4614</td>
<td>.2577</td>
<td>.625</td>
<td>.4213</td>
</tr>
<tr>
<td>Medium</td>
<td>.3362</td>
<td>.4328</td>
<td>.64</td>
<td>.401</td>
</tr>
<tr>
<td>Large</td>
<td>.3448</td>
<td>.5393</td>
<td>.805</td>
<td>.419</td>
</tr>
<tr>
<td>Total</td>
<td>.3848</td>
<td>.4206</td>
<td>.70</td>
<td>.426</td>
</tr>
</tbody>
</table>

The graduates of small high schools. The reversal of this trend is noted for the medium and to an even greater degree for the large high school group.

To show the effect of using the above data in practical situations for admission and guidance purposes for specific individuals, the standard partial regression coefficients were translated into partial regression coefficients using the raw scores. The partial regression coefficients and the constant term were combined in the form of an equation for each size group and for the total.

The partial regression coefficients were determined by using the formulas:

$$b_{12.3} = \left( \frac{\sigma_1}{\sigma_2} \right) \beta_{12.3}$$

and
The "a" coefficient, or constant term, was found by the general formula:

\[ a = M_1 - (b_{12} \cdot M_2) - (b_{13} \cdot M_3) \]

The prediction equations are as follows:

**Small:** \( x_1' = -0.2168 + (0.4891)x_2 + (0.0015)x_3 \)

**Medium:** \( x_1' = -0.5169 + (0.3470)x_2 + (0.0026)x_3 \)

**Large:** \( x_1' = -1.5349 + (0.5661)x_2 + (0.0040)x_3 \)

**Total:** \( x_1' = -0.7947 + (0.4688)x_2 + (0.0038)x_3 \)

These formulas can be used for predicting the first year grade point average from the multiple combination of two independent variables: high school average and SAT-V. That is, if an individual's scores for the two independent variables, \( x_2 \) and \( x_3 \) are given, the most likely grade point average which she may be expected to earn for the first year of course work at Barry College may be predicted by using the above partial regression equations or prediction formulas. The predicted score is the most likely value as it is the expected average or true mean score for all individuals with the given \( x_2 \) and \( x_3 \) scores in the population.

The relative effects of the formulas can best be judged by the results they produce. Predicted results for the average student or a student with similar ranks on all of the variables would
not differ greatly using the different equations. In general, it is the extreme cases in which gross differences are likely to appear when different prediction equations are used. The records of students with extreme measures (i.e., scores such that the differences would be emphasized) were selected to illustrate the varying results of the formulas. Predicted grade point averages were computed for each student using each of the four partial regression equations in turn.

The procedure used in computing predicted averages is illustrated with one individual, using the equation for small schools. The first student, I, has a high school average of 2.75 and a SAT-V score of 333. Substituting these two values in the partial regression equation or prediction formula for small high schools, a value of 1.63 is obtained as the most likely first year grade average for student I. The predicted averages for the five students are listed in Table XXXII.

For student I, whose high school average is superior, and whose SAT-V score is well below average, the predicted scores reflect the relative importance of the high school average for the small group and the contrasting importance of SAT-V for the large group. That is, using the equation for small schools where the high school average was found to have somewhat greater importance,
<table>
<thead>
<tr>
<th>Student</th>
<th>Predictor scores</th>
<th>Predicted Grade Point Average</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>HSA</td>
<td>SAT-V</td>
</tr>
<tr>
<td>I</td>
<td>2.75</td>
<td>333</td>
</tr>
<tr>
<td>II</td>
<td>1.60</td>
<td>608</td>
</tr>
<tr>
<td>III</td>
<td>2.97</td>
<td>389</td>
</tr>
<tr>
<td>IV</td>
<td>2.74</td>
<td>694</td>
</tr>
<tr>
<td>V</td>
<td>1.02</td>
<td>344</td>
</tr>
</tbody>
</table>

The predicted grade point average is slightly higher; using the equation for large schools, in which the SAT-V has relatively greater weight than the high school average, the predicted average is lower.

Student II, with an average high school average but an excellent SAT-V score, would obtain a higher predicted grade average if from a large high school, because of the relatively greater weight placed on high school average for that group; she would obtain a slightly lower predicted score as predicted by the formula for medium schools, and a lower one using the formula for small schools.

The greatest discrepancy occurs in the predicted grades for
student IV, who is excellent in both predictive measures. In addition to the contrasting beta weights for the various formulas, the factor of degree of association is probably causative. The R for the large schools is .80, compared with the .62 for the small schools; this fact would tend to make the predictions for the latter group closer to the mean, while those of the former will be relatively closer to the actual score.

With the exception of Student IV, the differences are all under .4 of a grade point. Moreover, the predictions resulting from the use of the formula for the total group of 1960 freshmen, (column 5) tend to produce predicted grade averages which would deviate at the most .2 or .3 of a grade point.

The results indicate that, although somewhat more accuracy of prediction is attained by using three separate regression equations, the gain in accuracy would probably not be justified on the basis of the time consumed in developing and applying the equations.

The application of correlation and regression techniques thus far has further clarified the relationships which were noticed in the zero order and partial regression analysis -- that the interrelationships among the predictor variables differ between students from large and small high schools, but not to a significant degree.

In developing, therefore, a single prediction equation for all
prospective Barry College freshmen, on the basis of the data on
the class entering in 1960, a further examination was made of the
interrelationships of the predictor variables in order to maximize
the usefulness of the data available.

Further analysis of the relative predictive power of the
several variables was performed by multiple regression involving
additional variables. The purpose of this last phase of the re-
search was to determine the value of adding variables to the multi-
ple correlation to attain greater accuracy in prediction. The sta-
tistical procedure followed for the computation of the multiple
correlation coefficients involving more than three variables fol-
low the Dolittle method as illustrated by Guilford.14

Beta coefficients, multiple correlation coefficients and stan-
dard errors of estimate were computed for several combinations of
three predictor variables. Following the practice of ordering the
variables in accordance with the magnitude of the criterion cor-
relation, the variables of high school average and SAT-V were in-
cluded in each team. The results are reported in Table XXXIII.

It is clear that the addition of one predictor effects no
substantial increase in the multiple correlation. The action of

14Guilford, p. 405-11.
TABLE XXXIII

BETA COEFFICIENTS, MULTIPLE CORRELATION COEFFICIENTS AND STANDARD ERRORS OF ESTIMATE FOR VARIOUS COMBINATIONS OF THREE PREDICTOR VARIABLES AND FRESHMAN AVERAGE (N=165)

<table>
<thead>
<tr>
<th>Variables combined</th>
<th>$\beta_2$</th>
<th>$\beta_3$</th>
<th>$\beta_4$</th>
<th>R</th>
<th>S.E. of est.</th>
</tr>
</thead>
<tbody>
<tr>
<td>$X_3$, $X_4$, $X_7$</td>
<td>.3324</td>
<td>.3550</td>
<td>.1841</td>
<td>.713</td>
<td>.4187</td>
</tr>
<tr>
<td>$X_3$, $X_4$, $X_5$</td>
<td>.4258</td>
<td>.4998</td>
<td>-.1507</td>
<td>.705</td>
<td>.4241</td>
</tr>
<tr>
<td>$X_3$, $X_4$, $X_6$</td>
<td>.3722</td>
<td>.3935</td>
<td>.0567</td>
<td>.697</td>
<td>.4265</td>
</tr>
<tr>
<td>$X_3$, $X_4$, $X_9$</td>
<td>.3658</td>
<td>.4116</td>
<td>.0628</td>
<td>.699</td>
<td>.4271</td>
</tr>
</tbody>
</table>

SAT-M as a suppression variable is indicated by the negative beta weight it receives when combined with high school average and SAT-V. The high correlation between the two College Board scholastic aptitude tests (.66) indicates a high degree of common elements; the lower correlation of the mathematical test with the criterion indicates that this variance is not shared by the criterion. Accordingly, the function of the SAT-M in the regression equation is to suppress whatever variance in the other two variables may not be represented in the criterion but which may be in some variable that does not otherwise correlate with the grade point average. Thus, something is being suppressed by the SAT-M, and the net effect is a slight gain in the multiple R.

Table XXXIV, listing the beta coefficients, multiple correla-
tions and standard errors of estimate for various combinations of four predictor variables, shows the extremely small increases in the multiple correlation gained by adding one more predictor to the term.

**TABLE XXXIV**

**BETA COEFFICIENTS, MULTIPLE CORRELATION COEFFICIENTS AND STANDARD ERRORS OF ESTIMATE FOR VARIOUS COMBINATIONS OF FOUR PREDICTOR VARIABLES AND FRESHMAN AVERAGE**

<table>
<thead>
<tr>
<th>Variables combined</th>
<th>$\beta_2$</th>
<th>$\beta_3$</th>
<th>$\beta_4$</th>
<th>$\beta_5$</th>
<th>R</th>
<th>S.E. of est.</th>
</tr>
</thead>
<tbody>
<tr>
<td>$X_3, X_4, X_5, X_7$</td>
<td>.3757</td>
<td>.4363</td>
<td>-.1549</td>
<td>.1817</td>
<td>.721</td>
<td>.41</td>
</tr>
<tr>
<td>$X_3, X_4, X_7, X_8$</td>
<td>.3205</td>
<td>.3507</td>
<td>.1787</td>
<td>.0441</td>
<td>.714</td>
<td>.42</td>
</tr>
<tr>
<td>$X_3, X_4, X_5, X_6$</td>
<td>.4126</td>
<td>.4691</td>
<td>-.1585</td>
<td>.0708</td>
<td>.703</td>
<td>.42</td>
</tr>
</tbody>
</table>

The most outstanding fact indicated by the data of the last three tables is the greater contribution of the SAT-V in every team of predictors in which it appears. The lower contributions of the English test are due in part to its high correlation with the SAT-V (.59). The study skills inventory is of little value in any of the combinations. Also to be noted is the fact that the comparatively useless variables are the later ones in each combination, a fact due largely to the practice of arranging the variables by the magnitude of the criterion correlation.

The phenomenon of diminishing returns in regard to increase
of the multiple correlation with the addition of predictor variables is also apparent from an inspection of the various multiple correlations. Although the addition of each variable raises the multiple correlation, some do so only very little. Guilford, in discussing the hypothetical limiting factor of perfecting prediction, states that "from a practical standpoint, it is always a question of whether the trouble of uncovering and using new descriptive attributes is justified by the gains in predictive accuracy that result."\textsuperscript{15}

As the data in Table XXXV indicates, the multiple correlation coefficient is raised only .001 by adding the spelling scores to the team of predictor variables; the coefficient is increased by an additional .001 by the use of all six predictor variables.

The extensive research done by Hills on admissions and guidance research in Georgia colleges\textsuperscript{16} on the extent to which freshman grades could be improved by using achievement tests in addition to College Board scores and high school record is relevant to the data just presented. Use of five or six of the STEP tests

\textsuperscript{15}Guilford, p. 362.

TABLE XXXV

BETA COEFFICIENTS, MULTIPLE CORRELATION COEFFICIENTS AND STANDARD ERRORS OF ESTIMATE FOR COMBINATIONS OF FIVE AND SIX VARIABLES (1960 group)

<table>
<thead>
<tr>
<th>Predictor Variables</th>
<th>Beta Coefficients</th>
</tr>
</thead>
<tbody>
<tr>
<td>X3</td>
<td>.3734</td>
</tr>
<tr>
<td>X4</td>
<td>.4319</td>
</tr>
<tr>
<td>X5</td>
<td>.1559</td>
</tr>
<tr>
<td>X6</td>
<td>.0085</td>
</tr>
<tr>
<td>X8</td>
<td>.0342</td>
</tr>
<tr>
<td>X9</td>
<td>.1842</td>
</tr>
<tr>
<td>Multiple R</td>
<td>.721</td>
</tr>
<tr>
<td>Standard error of estimate</td>
<td>.41</td>
</tr>
</tbody>
</table>

added .03 to the multiple correlation; using four STEP tests added .02 to the correlation; using five STEP tests, the Cooperative Math Achievement, the Barrett Ryan English Test and the Otis Mental Ability Test added .11 to the multiple R. The author concludes that the increase attained is very expensive, in terms of testing time, as well as admissions office time for applying an involved prediction equation to each applicant.

The combination of variables which is most efficient in terms of testing time, and ranking high in terms of relationship with
the criterion is the team of high school average and College Board scores. Expressed in partial regression coefficients and combined with the constant term, the multiple regression equation for the prediction of freshman average is

\[ x_1 = -0.6834 + (0.5188) x_2 + (0.0033) x_3 - (0.0010) x_4 \]

The equation may readily be used in predicting the freshman grade point average for a given Barry College applicant, and in interpreting the predicted score. Although the qualitative decision of admittance may be made with reference to the size and type of high school from which the student has graduated, the quantitative fact of her predicted grade point average will not be modified significantly by these factors.
CHAPTER V
SUMMARY AND CONCLUSIONS

This investigation has been concerned with the relation of size and type of high school from which a person is graduated to her subsequent success in college. The problem can be stated in the form of the following questions:

1. What differences are there among students graduated from large, medium and small high schools and between public and Catholic high school graduates with respect to the variables: a) verbal and mathematical scholastic aptitude (SAT-V and SAT-M); b) high school average; c) English usage; d) spelling; e) study habits and attitudes (SSHA); and f) the criterion of collegiate success, first year grade point average?

2. What is the relation of size or type of high school to the interrelationships between the variables of high school average, aptitude and achievement test scores, and freshman grade point average?

3. What is the relative importance of the above variables in predicting freshman grade point average at Barry College for the
graduates of small, medium and large high schools?

PROCEDURE

The institution in which the present investigation was conducted is a Catholic liberal arts college located in Miami, Florida. Drawing students almost equally from local and non-local high schools, Barry College has a student population of approximately 500 girls. The student body, although predominantly Catholic in religion (85%), is fairly equally divided with respect to public and Catholic high school background. The curriculum of the college, integrated by theology and Thomistic philosophy, is planned to provide both a broad background in the liberal arts for all students, regardless of field of specialization and a firm foundation in professional and vocational training in several specific sequences. There is an emphasis on both spiritual and intellectual formation to prepare the student for full Christian womanhood in whatever field she may enter.

The population studied consisted of all freshmen matriculating during the fall semester of 1958, 1959 and 1960 who were entering college for the first time and on whom complete data were available. Information collected from the Office of the Registrar for all students included the predictor variables of high school average and College Board scholastic aptitude scores; the criterion variable
of college grade point average, and the details of size and type of high school. For the group who matriculated in 1960, additional information was obtained by a specially planned testing program during the week of freshman orientation. This data consisted of scores in English usage and spelling yielded by the California Language Test, Advanced, and scores on the Brown-Holtzman Survey of Study Habits and Attitudes. All data were recorded on coding sheets and punched on IBM cards. The means, standard deviations and correlations were computed on the IBM 650 computer system.

The index used for size of high school was the size of the high school graduating class. The range in size was wide:—from a small Catholic high school in northern Florida which graduated nine students to a large public school in Miami which graduated 1,064 students. The population included in the study consisted of 472 students, coming from 129 Catholic and 80 public high schools. Eighty-nine per cent of the Catholic high schools in the sample had graduating classes of less than fifty, whereas sixty-four per cent of the public high schools had senior classes of over 150 pupils. Forty-three per cent of the public high school graduates came from ten per cent of the public high schools, principally those in the Miami area; there was, however, no comparable concentration of Catholic high school graduates.
The grouping by high school size was made according to the following plan: those high schools in which the graduating class was under 100 were classified as small; 100–300, as medium; and over 300, as large. The grouping by type was dichotomous, i.e., either public or Catholic. The very few students who had graduated from secular private schools were eliminated from the study, as were foreign students.

THE RESULTS:

Tests of the homogeneity of the groups by year of entrance yielded very interesting information. Differences at the one per cent level of significance were discovered between mean scores on SAT-M and on freshman average; at the five per cent level, between mean scores of SAT-V. There were also differences significant at the five per cent level in regard to variability of high school average and SAT-V. The quality of the successive groups, as indicated by scholastic aptitude and high school record, increased consistently, and in some cases significantly; on the other hand, the performance in college of the 1960 class was significantly lower. This inconsistency was explained by environmental factors in the community and by changes in grading practices within the institution. Because of this condition of marked change in quality and homogeneity of classes of succeeding years, greater emphasis was
placed throughout the study on the analysis of the data for the 1960 group. Reflecting more accurately the immediate past, the 1960 data would provide a more valid basis for predicting happenings in the immediate future.

The groups formed on the basis of type of high school were homogeneous with respect to all the variables. The groups formed on the basis of size of high school showed no differences significant at the one per cent level between means on any of the variables. Differences were observed on the five per cent level in favor of the small over the medium schools on mean high school average and mean first semester grade point average. Differences in variability were discovered, indicating that the graduates of large high schools have greater spread than either of the other groups. The only such difference significant at the one per cent level, however, was that of high school average.

The comparison of means and standard deviations, therefore, offered no evidence that differences among the variables by high school size or type were either significant or prognostically useful. Any consistent trends were explainable in terms of differences within the individual girl with respect to motivation, socioeconomic factors, and attitudes toward higher education, rather than to qualities inherent in the high school environment. The
almost striking similarity of the groups was offered as evidence that the population of the American Catholic secondary school is broadly typical of the average American secondary school pupil. The specific pattern of academic subjects included in the college admission requirements was cited as a factor instrumental in achieving some measure of homogeneity in the entering college population.

The comparison of intercorrelations among the predictors and of their correlation with the criterion likewise showed some differences, none of which reached the one per cent level of significance. Differences at the five per cent level were noted between the large and small high schools on SAT-V and between the large and medium on English usage. Although most of the correlations between the predictor variables and collegiate grade point average were above .40, the coefficients ranged from .24 to .76. Of the 120 first order correlation coefficients computed, only eight were found to be non-significant, two at the one per cent level and six at the five per cent level. In general, these instances of non-significance occurred with the 1960 sub-groups by size, where frequencies were relatively small and standard errors relatively large. All of the cases concerned combinations of SSHA, SAT-M, or English scores, principally for the small and medium groups.
The most outstanding fact disclosed in the pattern of correlations was the consistently larger correlation coefficients for large schools between each of the variables and the criterion. A rather unusual phenomenon was the superiority of the SAT-V over high school average as the best single predictor of college grade point average for the large and medium groups. For the small group, however, the traditional superiority of the high school average was maintained. Explanations offered for both relationships drew on attitudinal and motivational factors again; i.e., the graduate of the large high school who selects a small college such as Barry may have much more carefully thought out plans for her education, greater seriousness of purpose, and more complete identification with the aims and objectives of the college than the graduate of a small high school. The total college environment, therefore, was proposed as a factor significant in attracting the more serious and well-prepared, though not necessarily more gifted student of the large public high school.

An analysis by partial correlation techniques of the interrelationships of high school average, SAT-V and college grade point average, in which the predictor variables were held constant, one at a time, somewhat confirmed this trend. Partialing out the effect of SAT-V resulted in lower correlations between the high
school average and college performance for the public and the
large high school group; nullifying the effect of high school
average, however, resulted in a fairly uniform drop, although
slight, in the association of SAT-V with college grades for all
groups.

The coefficients of multiple correlation by size of high
school ranged from .62 to .70 for a combination of two predictor
variables. The standard partial regression weights ranged from
.2577 to .4614. An inspection of the beta weights for the various
combinations indicated again the superiority of the SAT-V for the
medium and large high school, and of the high school average for
the small high school. Regression equations were developed for
the large, medium, small and total groups, and were used to pre-
dict most likely grade point averages for five given students. All
the differences but one between the predicted grade point averages
were .4 of a grade point or less. Using the regression equation
developed for the total 1960 group of freshmen resulted in predict-
ed grade point averages which would not have deviated more than
.2 or .3 of a grade point from that obtained by using the formula
for a particular size of school. The conclusion was that no
serious loss in predictive power would result from using the single
prediction formula for all freshmen.
The coefficients of multiple correlation for a combination of three predictor variables ranged from .697 to .703; those for four predictors, from .703 to .720. Using five predictors increased the coefficient by .001; using all six predictors resulted in a further increase of only .001. The usual phenomenon of a negligible increase in predictive efficiency resulting from the use of additional predictor variables was noted. The standard regression weights developed for several combinations of three or four variables were, again, consistently higher for SAT-V than for high school average, and were negative for SAT-M. The regression equation developed for use by the admissions office for all freshmen included the three predictor variables of high school average, SAT-V and SAT-M. It was recommended that the formula be used for all prospective freshmen to provide a reliable index of college performance.

CONCLUSIONS:

Because of the well known fact of variability among colleges, and also because of the fact of change within Barry College in the composition of the student body from year to year, any conclusions must be rather tentative. However, certain comments of possible practical value seem to be indicated.

1. There are no significant differences with respect to
scholastic aptitude, achievement in English or spelling, or high school average among students classified by size or type of high school at the time of their entrance to Barry College. The groups are likewise homogeneous with respect to grade point average at the completion of the freshman year.

2. Certain differences among the interrelationships of the variables, although neither significant nor prognostically useful, could well be considered by the admissions officer in interpreting the quantitative information yielded by the pre-college admission data and by the faculty adviser in understanding the student better and in guiding her throughout the freshman year:

a. The association between the predictor variables and college grade point average is consistently higher for students from large high schools.

b. The SAT-V consistently outranks high school average for effectiveness as a predictor of freshman grades for the student from the large or medium school; the high school average is the best single predictor for the student from the small high school.

c. These trends are indicated also, though to a lesser degree, between graduates of public and Catholic high schools.
LIMITATIONS:

The principal limitation of the study lies in the fact that the numbers involved were too small. Any gain in adding subjects by combining entering classes over a greater span of years, however, would result in a lowering of validity. An equally important limitation is one that is unfortunately true of most prediction studies—the lack of logical rigor and statistical methodology in analyzing the enormously complex factors hidden in such terms as scholastic aptitude, high school average, motivation, success in college, and high school environment, and in defining the problem itself.

SUGGESTIONS FOR FUTURE RESEARCH:

The following suggestions are made concerning future research that is needed in the area of prediction of college success:

1. Research dealing with the questions and problems that exist in determining the relationships between selected criteria and grades should be carried on continuously. The best weights to be assigned to the predictors will change from year to year if the quality and homogeneity of succeeding classes change. It would be wise to re-compute the intercorrelations and beta weights each year, to reflect changes in class average or variability for any of the factors and thus gain more accurate prediction. At least
bi-yearly checks should be made to note the validity of various criteria as they function with a constantly changing student body. Statistical prediction necessarily assumes that the samples from which the prediction equations are derived are representative of the populations of future students for whom predictions will be made. It also assumes that the conditions affecting predictor and criterion variables will remain stable. These assumptions should be kept in mind in applying prediction techniques for screening applicants, and the effectiveness of the techniques needs to be continuously reappraised.

2. Means should be developed of identifying non-intellective factors involved in college success and of determining the nature and extent of their relationship. The research of Myers¹ on biographical factors and academic achievement is an attempt to predict scholarship from non-intellective factors available from data in the college personnel records; he achieved a correlation coefficient of .26 and .29 between a combination of personal data with freshman grades for two successive classes in a woman's liberal arts college. The very recently published research along the same

line by the College Board\(^2\) on a Fordham University population is a unique contribution in its development of a criterion variable rooted in clearly defined college objectives in terms of character, intellectual development, personality and leadership. Both studies represent attempts to broaden the narrowly academic element in both predictor and criterion variables; the College Board study illustrates the development of a carefully defined criterion of college success in terms of explicitly stated objectives of a given institution.

3. Through the medium of research, more adequate means of communication between the college administration and faculty and the admissions office should be developed.\(^3\) There is some indication in the findings of this study that the faculty's concept of what constitutes the ideal student may be unrealistic, considering the present admission selection. Two lines of research activity are suggested: 1) a more intensive program of communicating to the faculty as clearly as possible the range of achievement of successful applicants and successful students in the college, whether or not

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\(^2\)Anne Anastasi, et al., The Validation of a Biographical Inventory as a Predictor of College Success (New York, 1960).

the student's abilities fit the college's aspirations; and 2) cooperative development of a definition by the administration and faculty of the college's philosophy and purposes. If the faculty's idea of what constitutes the ideal student is obtained in some measurable way, as in the Fordham study, for example, the college can define more realistically the level of ability that can be accommodated within these purposes.

4. The validity of the high school record should be increased by intensive analysis of specific high schools. By accumulating data on the performance in college of graduates of various high schools from which students are admitted, the "true" significance of a student's high school record can be more accurately evaluated.

5. The nature and extent of motivation, attitudes and values as predictive factors should be investigated. Of particular value would be the identification of such traits as intellectual curiosity, willingness to conform, persistence, leadership, emotional stability and values regarding higher education in general and Catholic higher education in particular; of equal value would be the determination of their relation to collegiate success.

6. The college environment should be studied as a criterion variable. The research of Pace indicates that colleges differ greatly in the patterns of environmental press, i.e., the system of
pressures or influences which define the psychological-educational character of the environment. Research is needed to analyze such factors as personnel practices, rules and regulations, teaching methods, study requirements, features and facilities, and the whole network of events and activities and relationships to be found on a college campus. Prediction research would, of course, explore the relationship between type of college environment and type of student.

7. Extensive case studies of those individuals whose degree of academic success is most contradictory to what would be expected on the basis of known criteria should be conducted.

It is true that the cost in time and money expended to obtain and interpret criterion and predictor scores and to conduct research in the prediction of college success is great. Much greater, however, are the costs in time and personnel that are often necessary to work with students who are competing in a scholastic environment that is not suited to their educational and psychological needs and desires.

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APPENDIX I

SAMPLES OF THE TESTS USED IN THIS STUDY

A. The California Language Test (Advanced)

B. The Brown-Holtzman Survey of Study Habits and Attitudes
INSTRUCTIONS TO STUDENTS:

This is a test of your achievement in reading, mathematics, and language. In taking the first part you will show how many words you know and how well you understand what you read. No one is expected to do the whole test correctly, but you should answer as many items as you can. Work as fast as you can without making mistakes.

DO NOT WRITE OR MARK ON THIS TEST BOOKLET UNLESS TOLD TO DO SO BY THE EXAMINER.
INSTRUCTIONS TO STUDENTS:

This is a language test. In taking it you will show what you know about capitalization, punctuation, and words and sentences, and how well you can spell. No one is expected to do the whole test correctly, but you should answer as many items as you can. Work as fast as you can without making mistakes.

DO NOT WRITE OR MARK ON THIS TEST BOOKLET UNLESS TOLD TO DO SO BY THE EXAMINER.
DIRECTIONS: In most lines of the story and sentences below, four words have a number above the first letter. If ONE of the letters should be a capital, mark its number. If none of the four letters should be a capital, mark N, which stands for None. Not more than one letter with a number over it should be a capital on any one line.

SAMPLE:  A. The winner of the race was tom.  
          \[Correct Test Booklet Mark: 4 A\]  
          \[Correct Answer Sheet Mark: A\]

SAMPLE:  B. He is one of my best friends.  
          \[Correct Test Booklet Mark: N B\]  
          \[Correct Answer Sheet Mark: B\]

In Sample A, the “t” in “tom,” which has a 4 above it, should be a capital. Notice how the 4 has been marked. In Sample B, none of the letters with numbers above them should be capitals, so the N has been marked.

STORY

1. One of the most interesting courses
   \[Correct Test Booklet Mark: 1\]  
   \[Correct Answer Sheet Mark: 1\]

2. at valley High School is the one I’m taking in English literature. It is taught by the
   \[Correct Test Booklet Mark: 2\]  
   \[Correct Answer Sheet Mark: 2\]

3. popular and able miss Rinehart, who has had many poems published in harper’s and other excellent
   \[Correct Test Booklet Mark: 3\]  
   \[Correct Answer Sheet Mark: 3\]

4. magazines. she has even written a textbook
   \[Correct Test Booklet Mark: 4\]  
   \[Correct Answer Sheet Mark: 4\]

5. on the subject which my friend, carol, in philadelphia says she is using in her studies.
   \[Correct Test Booklet Mark: 5\]  
   \[Correct Answer Sheet Mark: 5\]

6. My teacher has traveled all over the civilized
   \[Correct Test Booklet Mark: 6\]  
   \[Correct Answer Sheet Mark: 6\]

7. world. Every friday she tells us something about her experiences in cairo and other foreign
   \[Correct Test Booklet Mark: 7\]  
   \[Correct Answer Sheet Mark: 7\]

8. cities. Last week she said, “who would like
   \[Correct Test Booklet Mark: 8\]  
   \[Correct Answer Sheet Mark: 8\]
12. to go on a tour this summer? I am organizing

13. a trip to England, including Stratford-on-avon.

14. There we will see The taming of the Shrew and
other famous plays written by William Shakespeare.”

15. many of us are so excited about the idea that we

16. can hardly wait until july.

17. When I asked my father if I could go, he said,

18. with a wink at dr. Jones, our next door neighbor,

19. “Aren’t you afraid you’ll get lost in the tower

20. of London or fall in the river Thames, my dear?”

21. I said, “no, not at all. Why, even our

22. pretty new French teacher, whose name is

23. Mrs. Flora h. Sutton, told me I am more adult

24. than any of the girls in the language Club.”

25. My aunt Ruth is visiting us from the

26. east. She says it is easy to see that I will

27. probably be more interested in literature than

28. history when I go to Longview college.
28. James saw the game. we won easily. 

Later on our friend asked Helen Robertson 

29. to secure a map for the trip. 

30. Labor Day falls on a Monday in September. 

31. He speaks English with great fluency. 

32. Treasure Island is a good book. 

33. William asked, "in what classrooms do 

34. your German and Science classes meet?" 

35. The merchant of Venice is a play by Shakespeare. 

36. In 1814 Napoleon the Great was imprisoned 

37. on the tiny island of Elba. 

38. He attended the University of Wisconsin in 

Madison. 

39. The Senate and the house constitute our 

Congress. 

40. The captain cried, "don't give up the ship!"

STOP NOW WAIT FOR FURTHER INSTRUCTIONS
DIRECTIONS: In the letter and story below, most lines have a number, such as 41, 42, or 43. If a punctuation mark is needed where the number is, make a black mark within the pair of dotted lines under the punctuation mark needed. If no punctuation is needed, make a black mark under the N, which stands for None. Show either apostrophes or single quotation marks in the fourth column. Only one answer should be given for each line.

SAMPLE: C. Mary, will you come with us?  

SAMPLE: D. The bus is leaving at ten o'clock.

In Sample C, a comma is needed at 1 after the word “Mary,” so a mark has been made under the comma in answer row 1. In sample D, no punctuation mark is needed at 2, so the N has been marked in answer row 2. If you are using an answer sheet, do not mark on this page.

1821 Market Street  
Dayton, Ohio  
November 16, 1956

Mr. Walter H. Miller  
Holiday Greeting Card Company  
4129 Washington Avenue  
New York 99 New York

Dear Mr. Miller,

Last week’s shipment of Christmas cards arrived in excellent condition. I think I already have most of them sold to friends, neighbors, and relatives. No, it will not be necessary to send me another box. I think I have made all the sales I can for this year’s holidays.
When Dad saw how much money I was making, he said, "I'll be expecting a new pipe from you for Christmas."

As for your question about which styles were popular, people showed the most interest in the following 121a, 248c, 261b, and 289a. Many of my new customers said they d never seen such pretty cards. My Aunt Sue, when she saw 121a, said, "That card reminds me of the famous poem that goes, 'The stockings were hung by the chimney with care,' and so on."

Mr. Miller thought I would put my order in earlier next year and your company could send the cards some time in October. If so, do you think I d sell more? Mother thinks so and suggested I ask you, even though December 25, 1957, is a long way off.

It is now 7:00 P.M., and the movie called "The Story of G.I. Joe" is on TV, but I'd better start delivering cards. Incidentally, the money I collect tonight and tomorrow will be sent to you Monday.

Sincerely yours,

Roger Brown
Last week, upon Ted's return from his vacation he and his father visited Jack and Henry.

Jack said, "Will you tell us about your trip?"

Ted answered, "We had a wonderful time except for one day." Continuing Ted said, "We were in a rowboat. Suddenly a storm blew up and our boat turned over. I was in danger of drowning, but my father yelled, 'Don't struggle!' and, because I turned over on my back I floated until they saved me."

Ted's father then said, "I was sorry to yell, 'Don't struggle,' but I had to make you hear. A storm's fury is always dangerous, so aren't you glad I yelled?"
DIRECTIONS: Mark the number of the correct or better word in each sentence below.

SAMPLE:  E. She (1 ain't 2 isn't) as tall as Betty.

In Sample E, the word in parentheses with the 2 by it, "isn't," is the better word. Notice how the 2 has been marked.

81. If he had (1 went 2 gone) then, he would have been on time.

82. The word "Hurrah!" is (1 an interjection 2 a conjunction).

83. (1 Isn’t 2 Aren’t) the baskets filled with flowers?

84. My sister and (1 I 2 myself) will be glad to contribute.

85. There are (1 eight 2 five) different parts of speech.

86. His son (1 run 2 ran) the newspaper as his father did.

87. Every evening we saw her (1 setting 2 sitting) there alone.

88. A sentence that asks a question is called (1 a declarative 2 an interrogative) sentence.

89. In “Leaving the curb, he hailed a taxi,” the words “Leaving” and “hailed” are both (1 verbs 2 nouns).

90. When you finish, (1 lay 2 lie) the violin on the table.

91. “Candy” is (1 the subject 2 the object) of the sentence below: Ivan bought candy with his money.

92. (1 Him 2 He) and I are taking the same courses.

93. A word (1 can 2 cannot) be used as more than one part of speech.

94. According to the report, he is thought (1 to have been elected 2 to be elected).

95. The word “at” as used in “at home” is (1 a preposition 2 an adjective).
<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>96. In “Dancing is fun,” the word “Dancing” is a (1 verb 2 noun).</td>
<td>96</td>
</tr>
<tr>
<td>97. An adjective clause which limits the meaning to a particular noun or pronoun is called a (1 restrictive 2 nonrestrictive) clause.</td>
<td>97</td>
</tr>
<tr>
<td>98. You (1 can’t 2 can) hardly see the road in this fog.</td>
<td>98</td>
</tr>
<tr>
<td>99. The word “group” is a (1 collective 2 proper) noun.</td>
<td>99</td>
</tr>
<tr>
<td>100. He asked what had (1 become 2 became) of the old school.</td>
<td>100</td>
</tr>
<tr>
<td>101. (1 Whom 2 Who) is going to be the speaker at the banquet?</td>
<td>101</td>
</tr>
<tr>
<td>102. In “among the ancient ruins,” the word “ancient” is an (1 adjective 2 adverb).</td>
<td>102</td>
</tr>
<tr>
<td>103. A participle is a form of (1 a verb 2 an adverb).</td>
<td>103</td>
</tr>
<tr>
<td>104. Every dancer knew (1 their 2 his) place on the stage.</td>
<td>104</td>
</tr>
<tr>
<td>105. It will be divided equally between you and (1 I 2 me).</td>
<td>105</td>
</tr>
<tr>
<td>106. A pronoun agrees with its antecedent in number, gender, and (1 degree 2 person).</td>
<td>106</td>
</tr>
<tr>
<td>107. In “Long live the King,” the word “Long” is an (1 adjective 2 adverb).</td>
<td>107</td>
</tr>
<tr>
<td>108. The possessive case of the pronoun “they” is (1 their 2 them).</td>
<td>108</td>
</tr>
<tr>
<td>109. An infinitive is a form of (1 an adjective 2 a verb).</td>
<td>109</td>
</tr>
<tr>
<td>110. In “an able man,” the word “an” is (1 an adjective 2 a conjunction).</td>
<td>110</td>
</tr>
<tr>
<td>111. The snake raised (1 its 2 it’s) ugly head.</td>
<td>111</td>
</tr>
<tr>
<td>112. “Me” is the (1 direct 2 indirect) object in the sentence below: Walter gave me a ticket.</td>
<td>112</td>
</tr>
<tr>
<td>113. Neither of our dogs (1 has 2 have) ever won a blue ribbon.</td>
<td>113</td>
</tr>
<tr>
<td>114. A clause that expresses a complete thought is called (1 a dependent, or subordinate 2 an independent, or principal) clause.</td>
<td>114</td>
</tr>
<tr>
<td>115. The nominative case of the pronoun “me” is (1 my or mine 2 I).</td>
<td>115</td>
</tr>
<tr>
<td>116. The sentence below is (1 compound 2 complex): He visited his friends who live in the country.</td>
<td>116</td>
</tr>
</tbody>
</table>
117. In the sentence below, "when you will arrive" is (1 a clause 2 a phrase):

   Regarding your proposal, we need to know when you will arrive.

118. Neither he nor the quarterback (1 were 2 was) to blame.

119. The past participle of "blow" is (1 blown 2 blew).

120. The possessive case of the pronoun "I" is (1 me 2 my or mine).

121. A phrase (1 does not 2 does) need to have a subject and a predicate.

122. Give this to (1 whoever 2 whom­ever) you see first.

123. He has already (1 drunk 2 drank) more than his share.

124. The word "they" is a (1 relative 2 personal) pronoun.

125. In "The diamond sparkled," the verb "sparkled" is (1 transitive 2 intransitive).

126. He (1 ought not 2 hadn't ought) to go if he's sick.

127. The superlative degree of "bad" is (1 worse 2 worst).

128. Degree is related to (1 adjectives 2 pronouns).

129. Realizing that his capture was inevitable and being too weak from lack of food to sustain his flight much longer, the escaped criminal, whose heart was beating with fear.

130. The familiar way the plot was constructed gave us the impression we had seen the movie before.

131. Remembering the statement of our friends in our endeavor to overcome the difficulty.

132. The feeling that he had been there before haunted his every step.

133. In the laundry room, with tubs and clothes baskets piled full of clothes all ready to hang out as soon as the sun came out.

134. In the anteroom, with the prisoner impatiently awaiting the appearance of the jury in whose hands his destiny rested.

135. According to one of our greatest actresses, to run the gauntlet of emotions before an unsympathetic first-night audience in a play of little consequence requires not only a wealth of acting ability but "a lot of nerve."
136. Like all fairy tales which begin with "Once upon a time" and end with "they lived happily ever after," the story being read to the orphan children, in spite of a certain air of originality.

YES NO 136

137. Making sure that all the windows and doors were locked before they said farewell to the house that had been their family's for fifty years.

YES NO 137

138. To enjoy most fully riding through the country for days without stopping calls for a keener interest in widespread fields which vary with the seasons, in trees which shed their leaves or are budding, and in the sky, sometimes clear and again cloudy, than most weary travelers possess.

YES NO 138

139. The Latin passage which begins with "All Gaul is divided into three parts," having been translated with varying degrees of accuracy by language students throughout the years.

YES NO 139

140. When new subjects are presented without a satisfactory background of skill, knowledge, or experience so that the pupil must hope to succeed not by intelligence, study, and application, but by rote, memory, guesswork, or devices which deceive teachers as to the true state of affairs.

YES NO 140
DIRECTIONS: Each line in this test contains four spelling words and the word, None. These words are numbered 1, 2, 3, 4, and the None is numbered 5. In some of the lines, one word is misspelled. In others, no word is misspelled. If there is a misspelled word, mark its number. If no word is misspelled, mark the 5.

<table>
<thead>
<tr>
<th>Sample</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Correct Test Booklet Mark</th>
<th>Correct Answer Sheet Mark</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAMPLE: F.</td>
<td>now</td>
<td>just</td>
<td>come</td>
<td>iron</td>
<td>None</td>
<td>4</td>
<td>F</td>
</tr>
<tr>
<td>SAMPLE: G.</td>
<td>go</td>
<td>see</td>
<td>do</td>
<td>may</td>
<td>None</td>
<td>5</td>
<td>G</td>
</tr>
</tbody>
</table>

| 141 | offense | receipt | emphasis | deem | None |
| 142 | approved | surprise | dreary | tractors | 5 |
| 143 | muzeum | malice | comparative | principal | 5 |
| 144 | successor | principles | parole | recognition | 5 |
| 145 | millinery | messenger | assignment | innocent | 5 |
| 146 | federal | drama | bandit | proffesion | 5 |
| 147 | apologize | herald | initiate | forfeit | 5 |
| 148 | sensus | judgment | merit | liking | 5 |
| 149 | mortal | postscript | differed | patriot | 5 |
| 150 | wobbly | magnificent | eligible | facilitate | 5 |
| 151 | uncertain | wearhouse | linen | exciting | 5 |
| 152 | proposal | tract | folkes | cucumbers | 5 |
| 153 | pierce | scandal | recitation | eliminate | 5 |
| 154 | conception | spineless | obedient | together | 5 |
| 155 | admiral | fragrant | crocheting | chemistry | 5 |
| 156 | invalid | ocassional | bankrupt | ambassador | 5 |
| 157 | apparently | squirrels | representitive | irrigation | 5 |
| 158 | salaries | regretting | confirmation | phase | 5 |
| 159 | sorority | rheumatic | requesition | procedure | 5 |
| 160 | vomit | infinate | criticism | competitors | 5 |
| 161 | existence | itimized | apricot | impede | 5 |
| 162 | warranted | continous | epistle | voluntary | 5 |
| 163 | possesed | whither | accounted | substantial | 5 |
| 164 | fraternity | kindergarden | reckon | acutely | 5 |
| 165 | undoubtedly | vouchers | duely | transferred | 5 |
| 166 | facinating | unconscious | tonnage | tuberculosis | 5 |
| 167 | voluntary | competent | fragrance | acquaintance | 5 |
| 168 | commodity | declension | beneficial | antitoxin | 5 |
| 169 | unanimous | cancelation | technical | strenuous | 5 |
| 170 | abandon | expenditure | mercantile | greatful | 5 |
The quick brown fox just came over to greet the lazy poodle.
DIRECTIONS

The purpose of this survey is to furnish an inventory of study habits and attitudes to serve as a foundation for self-improvement. If taken seriously, this inventory can help you obtain a better understanding of how to study properly. If you will honestly and thoughtfully mark all of the statements on the pages that follow, you will be able to learn many of your study faults. The value of this survey to you will be in direct proportion to the care with which you mark each statement. Since your answers will be treated with the strictest confidence, feel free to answer all questions frankly.

You will mark your answers on a separate answer sheet. Make no marks on this booklet. There are 75 statements in this questionnaire. For each statement a five-point scale is provided for indicating whether you rarely, sometimes, frequently, generally, or almost always do or feel as the statement suggests. You are to rate yourself on each statement by marking the space on your answer sheet that represents your answer choice. Thus, for example, you would mark space R on your answer sheet if you rarely follow the procedure described or if you feel that the statement is rarely true for you. In marking your answers, be sure that the number of the statement agrees with the number on the answer sheet. Make sure that your marks are heavy and black. Make no stray marks on the answer sheet and erase completely any mark that you wish to change.

To aid you in answering this questionnaire, the terms have been defined on a percentage basis as follows:

R—RARELY means from 0 to 15 per cent of the time.
S—SOMETIMES means from 16 to 35 per cent of the time.
F—FREQUENTLY means from 36 to 65 per cent of the time.
G—GENERALLY means from 66 to 85 per cent of the time.
A—ALMOST ALWAYS means from 86 to 100 per cent of the time.

Remember, you are asked to rate yourself, not in accordance with what you think you should do or feel, or as you think others might do or feel, but as you yourself are in the habit of doing and feeling. When you cannot answer a statement on the basis of actual experience, mark the statement according to what you would be most likely to do if the situation should arise.

There are no “right” or “wrong” answers to these statements, and there is no time limit for this questionnaire. Work as rapidly as you can without being careless, and do not spend too much time on any one statement. Please do not omit any of the statements.
1. I feel that teachers do not understand the student's problems.
2. My dislike for a certain teacher causes me to neglect my school work.
3. I feel that I would study harder if I were given more freedom to choose courses that I like.
4. Whether I like a course or not, I still work hard to make a good grade.
5. When my assigned homework is extra long or unusually difficult, I become discouraged and either quit in disgust or skip hurriedly through the assignment, studying only the easier parts of the lesson.
6. In preparing reports, themes, term papers, etc., I make certain that I clearly understand what is wanted before I begin work.
7. Difficulty in expressing myself in writing slows me down on reports, themes, examinations, and other work to be turned in.
8. My teachers criticize my written reports as being hastily written or poorly organized.
9. I feel that teachers allow their personal like or dislike for a student to influence their grading unduly.
10. I lose interest in my studies after the first few days or weeks.
11. I memorize grammatical rules, definitions of technical terms, formulas, etc., without really understanding them.
12. I give special attention to neatness on themes, reports, and other work to be turned in.
13. I take it easy and let my assignments collect for the first two or three weeks of a new semester.
14. I hesitate to ask the teacher for further explanation of an assignment that is not clear to me.
15. Lack of interest in my school work makes it difficult for me to keep my attention focused on assigned reading.
16. Unless I really like a course, I believe in doing only enough to get a passing grade.
17. I get nervous and confused when taking an examination and fail to answer questions to the best of my ability.
18. I have trouble with the mechanics of English composition.
19. When I get behind in my school work for some unavoidable reason, I make up back assignments without prompting from the teacher.
20. I feel confused and undecided as to what my goal in life should be.
21. Some of my courses are so uninteresting that I have to "force" myself to do the assignments.
22. When I am under pressure, my work is inferior in quality.
23. Daydreaming about dates, future plans, etc., distracts my attention from my lesson while I am studying.
24. I believe that having a good time and getting one's full share of fun out of life is just as important as studying.
25. Even though an assignment is dull and boring, I stick to it until it is completed.
26. In taking reading notes, I tend to take down material which later turns out to be unimportant.
27. In taking class notes, I try to copy down the teacher's exact words as closely as possible.
28. I keep all the notes for each subject together, carefully arranging them in some logical order.
29. When I am having difficulty with my school work, I try to talk over the trouble with the teacher.
30. I feel that my grades are a fairly accurate reflection of my ability.
31. I feel that it is not worth the time, money, and effort one must expend to get a college education.
32. Difficulty in assembling ideas with order and clearness within a brief amount of time results in my doing poorly on examinations.
33. Some of my classes are so boring that I spend the class period drawing pictures, writing letters, or daydreaming instead of listening to the teacher.
34. I lay aside returned examinations, reports, and homework assignments without bothering to correct errors noted by the instructor.
35. I keep my place of study business-like and cleared of unnecessary or distracting items such as pictures, letters, mementos, etc.
36. Telephone calls, people coming in and out of my room, "bull-sessions" with my roommate, etc., interrupt me while I am trying to study.
37. It takes a long time for me to get warmed up to
38. I am unable to concentrate well because of periods of restlessness, moodiness, or "having the blues."

39. I put off writing themes, reports, term papers, etc., until the last minute.

40. I feel that I am taking courses that are of little practical value to me.

41. When I sit down to study I find myself too tired, bored, or sleepy to study efficiently.

42. I strive to develop a sincere interest in every course I take.

43. The prestige of having a college education provides my main motive for going to college.

44. I think that maybe I should drop out of school and get a job.

45. I carefully study the figures, graphs, and tables in a reading assignment.

46. Prolonged reading or study gives me a headache.

47. After reading several pages of an assignment, I am unable to recall what I have just read.

48. I cut classes whenever there is something I'd rather do or whenever I need to cram for a test.

49. I waste too much time "chewing the fat," reading magazines, listening to the radio, going to the movies, etc., for the good of my studies.

50. My studying is done in a random, unplanned manner and is impelled mostly by the demands of approaching classes.

51. "Extracurricular activities" — dating, clubs, athletics, fraternity and sorority activities, etc. — cause me to get behind in my school work.

52. I utilize the vacant hours between classes for studying so as to reduce the evening's work.

53. Problems outside of school — financial difficulties, being in love, conflict with parents, etc. — cause me to neglect my school work.

54. I am on time with written assignments.

55. I have difficulty in picking out the important points of a reading assignment — points that are later asked on examinations.

56. When in doubt about the proper form for a written report, I refer to an approved model to provide a pattern to follow.

57. I like to have the radio playing while I'm pre-

58. When reading a long assignment, I stop periodically and mentally review the main facts and theories that have been presented.

59. I seem to accomplish very little in relation to the amount of time I spend studying.

60. I prefer to sit in the back of the classroom.

61. With me, studying is a hit-or-miss proposition depending on the mood I'm in.

62. I study three or more hours per day outside of class.

63. Before each study period I set up a goal as to how much material I will cover.

64. I can concentrate on a reading assignment for only a short while before the words become a meaningless jumble.

65. I am interrupted by distracting noises while I am studying.

66. I copy the diagrams, drawings, tables, and other illustrations that the instructor puts on the blackboard.

67. I keep my assignments up to date by doing my work regularly from day to day.

68. I prefer to study my lessons alone rather than with others.

69. I lose points on true-false or multiple-choice examinations because I change my original answer only to discover later that I was right the first time.

70. When preparing for an examination I arrange facts to be learned in some logical order — order of importance, order of presentation in class or textbook, order of time in history, etc.

71. I am careless of spelling and in the mechanics of English composition when answering examination questions.

72. Although I work until the last possible minute, I am unable to finish examinations within the allotted time.

73. If time is available, I take a few minutes to check over my answers before turning in my examination paper.

74. When test papers or written assignments are returned, I find that my grade was lowered by careless mistakes.

75. I think that questionnaires such as this are foolish.
APPENDIX II

SAMPLES OF THE MORE IMPORTANT FORMS USED IN THIS STUDY

A. Data sheet, one of which was used for each individual

B. Fortran data sheet, which was used to summarize the
data for machine tabulation

C. Two IBM cards, one used for recording the data and
one to transmit the computational instructions to
the computer system
SAMPLE OF DATA SHEET USED TO COLLECT INFORMATION ON EACH INDIVIDUAL IN THE STUDY

<table>
<thead>
<tr>
<th>Year entered</th>
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<th>Separation (date and reason)</th>
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<tr>
<td>High school rank</td>
<td>High school average</td>
<td>Size of grad. class</td>
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<tr>
<td>CEEB (verbal)</td>
<td>CEEB (mathematical)</td>
<td>Status of school</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Location of high school</td>
</tr>
<tr>
<td>Study habits</td>
<td></td>
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</table>

College Performance:

<table>
<thead>
<tr>
<th>Semester</th>
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<th>Grade points</th>
<th>G.P. Average</th>
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<td></td>
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<tr>
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<td>IV</td>
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<tr>
<td>Totals</td>
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</table>
SAMPLE OF THE IBM CARD USED FOR EACH INDIVIDUAL IN THE STUDY. AN EXPLANATION OF THE CODING SYSTEM IS IN CHAPTER III.
APPENDIX III

MACHINE LISTINGS OF DATA

A. A sample of the machine tabulation sheets on which the basic data for each individual was printed

B. A sample of the machine sheet listing the basic statistical computations
### SAMPLE OF MACHINE SHEET LISTING THE DATA FOR ALL INDIVIDUALS IN THE STUDY

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**Note:** The table above lists the basic statistical computations for a sample of machine sheet.
Basic requirements for all degree candidates, irrespective of their field of concentration.

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<td>Theology 101-102, 212, 313, 414, 409, 410</td>
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<td>(students who intern take only one quarter of Theo. 409, and thus earn only 7 s.h. in upper biennium Theology) (Non-Catholic students are permitted to take two years of Character Education (4 s.h.) in place of Theology)</td>
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<td>Language minimum of 12 s.h. for any degree. B.A. students are required to have a minimum of 6 hrs. in Latin, including a translation course. A candidate for a B.A. degree, therefore, may fulfill the language requirement in one of two ways: 1. 12 hours of Latin, or 2. 12 hours of modern language and 6 hours of Latin, including a translation course (total in this case is 18 hours of language)</td>
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<td>Math or Science All candidates for degree must have at least one year of math or science. Students preparing to teach on any level must have a year of biological or physical science.</td>
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<td>Education All candidates for degree must take Education 469—Mental Health</td>
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<td>Physical Education All Students are required to take physical education for two years</td>
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Minimum total of semester hours for degree candidates is 128 academic hours, plus 4 in physical education. Fifty-one of these must be in the upper biennium (junior - senior level).
Approval Sheet

The dissertation submitted by Sister James Claudia Hinds, O.P., M.A. has been read and approved by three members of the Department of Education.

The final copies have been examined by the director of the dissertation and the signature which appears below verifies the fact that any necessary changes have been incorporated, and that the dissertation is now given final approval with reference to content, form, and mechanical accuracy.

The dissertation is therefore accepted in partial fulfillment of the requirements for the Degree of Doctor of Education.

Aug 10, 1962

Signature of Adviser