THE UNIVERSITY OF DETROIT

A COMPARISON OF UNIVERSITY OF DETROIT HIGH SCHOOL STUDENTS AND STUDENTS FROM ALL OTHER HIGH SCHOOLS ON ENTRANCE TESTS AT THE UNIVERSITY OF DETROIT IN SEPTEMBER, 1952

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INTRODUCTION

Every educational system has as one of its primary aims the production of an individual who is adequately prepared to engage in the life activities which follow the period of training. The elementary schools attempt so to train their pupils in the use of basic skills, both academic and physical, that they may progress easily and profitably to the more advanced learning situations of the secondary school. The high school, in its turn, continues this training in basic skills but also places increased emphasis upon preparing the individual to meet the exigencies of adult life both in and outside the academic situation. Thus, in order to prepare the future adult for life outside the classroom, many secondary schools offer such courses as home economics, mental and physical hygiene, American government, typing, and family living. For those students who plan to continue their academic training beyond the high school, there are, of course, those subjects in which adequate preparation is necessary for advanced work in college and professional schools. Typical of such courses are advanced mathematics, literature, biology, chemistry, physics, and history. At the peak of the educational system are the

colleges, professional schools, and graduate schools, which have as their objective the final academic formation of the future citizens and professional men and women.

Efforts have been made on the part of most educational systems to discover the effectiveness of their academic training programs. A program of academic achievement testing is utilized in many elementary and secondary schools. Most colleges and universities administer a battery of achievement and aptitude tests to their incoming freshman classes to determine their preparation for college work. At the very highest level of the American educational system, the professional and graduate schools almost invariably require some sort of achievement or academic ability test before admission.

From this it can be seen that there is a persistent and keen desire in American education to determine as accurately as possible the results of its academic endeavor. This interest has even led to the establishment of organizations which have as their primary purpose the production and standardization of educational testing instruments. The Educational Testing Service is one such organization.[1]

Testing to assess the academic achievement of some specific groups of the American population has been

carried out on a national scale. Each year the Educational Records Bureau conducts a public school testing program to evaluate the academic achievement of pupils in the elementary and secondary public school systems. The same association has also conducted testing programs in the independent schools of the United States.[2] In contrast to the rather extensive studies of these educational groups, scarcely ever has a comparison of educational achievement of public and parochial school children been attempted. A search in the literature revealed only one such study.[3]

Within the framework of education conducted by Roman Catholic institutions for lay people in the United States, there exists a distinct system operated by the Jesuit Order. This system contains thirty-seven high schools for boys,[4] and twenty-six institutions of higher learning.[5] The Educational Association of this system has recently expressed the desire to compare the results of their program of education and training, particularly at the high school level, with that of students educated under other school systems.[6]

This thesis embodies an empirical and statistical investigation to determine the academic achievement of the graduates of one high school in this system.

NOTES

1. The Cooperative Achievement Tests: A Handbook, pp. 4-6.

2. An annual report of one such program is: Robert Jacobs, "Public School Testing Project Third Report," 1950 Achievement Testing Program in Independent Schools and Supplementary Studies, pp. 108-19.

3. Roger T. Lennon, "Comparison of the Educational Achievement of Public and Parochial Elementary School Pupils," Catholic Educational Review, XLVI (December, 1948), 647-52.

4. John F. Sullivan, S.J., "Standardized Tests Measure Jesuit College Preparation," Jesuit Educational Quarterly, XVI (January, 1954), 153.

5. University of Detroit Bulletin, XLI (January, 1954), 111.

6. Sullivan, op. cit., pp. 149-51.

CHAPTER I

THE PROBLEM

Statement of the Problem

The problem to be investigated in this thesis is that of determining whether students educated in a typical American Jesuit high school are better prepared academically for college than students educated in other high schools as determined by the results obtained from a battery of standardized entrance tests of basic abilities and achievement.

At one time the Jesuit educational system had the reputation of being the best in Europe. Now that other distinctly different systems of education have been developed abroad and in the United States, and more convenient and exact tools for evaluation of academic preparation have been developed, it is deemed worth while to investigate the relative effectiveness of Jesuit training. Moreover, it would appear that such a study is worthy of investigation by reason of its possible contribution ultimately to a better understanding of principles of education and the psychology of learning. Such a conclusion can be arrived at by the following inference. If it can be shown by the present investigation

that the graduates from one Jesuit high school do significantly better on standardized achievement tests than graduates of other high schools, and this study is further substantiated and supported by more extensive studies in the other Jesuit high schools (as will be suggested later), then it must be concluded that the graduates of Jesuit high schools constitute a population which is significantly superior in achievement to other high school graduates. Now there are many possible causes which might produce this superior achievement, for example, higher socio-economic home conditions, a more favorable teacher-student ratio in the high schools, and so forth. However, it might be discovered as a result of further investigations in which such factors are held constant that the superior achievement is due to the peculiar curriculum and pedagogical methods and techniques employed in Jesuit high schools. Such definite and empirical proof may appear quite removed from the present investigation, but this comparatively small study is an initial step necessary to future work in this area.

Hypothesis

In order to act as a guide for the present investigation, an hypothesis may be suggested concerning the academic preparation of Jesuit high school graduates.

It is thus suggested, by way of hypothesis, that the graduates of Jesuit high schools are better prepared academically than graduates of non-Jesuit high schools as demonstrated by significantly superior scores attained on standardized achievement and basic abilities tests.

Review of Literature

As has been mentioned in the "Introduction," although achievement testing programs and studies are prevelent in the area of public and independent schools in the United States, published studies in the area of Catholic elementary and secondary educational achievement are rare. Narrowing the field of achievement testing to the specific area under consideration in this study reduces the number of similar investigations to negligibility. A review of educational and psychological literature of the past twenty years revealed the publication of only one study dealing with the academic preparation of Jesuit trained high school graduates.[1] Father John F. Sullivan, S.J., in a recent article appearing in the Jesuit Educational Quarterly remarked on this poverty of follow up studies on the academic achievement of Jesuit high school graduates:

> It is a strange phenomenon, then, that American Jesuit high schools, zealous as they are for classroom testing, have never made an equally intensive examination of the results

> of their secondary school training as a whole. Such an examination would require a careful follow-up study of graduates to determine the extent to which their preparation for life and for college had been adequate.[2]

The one study which has been made on the academic achievement of Jesuit high school graduates employed the questionnaire method of sampling opinions of deans in Jesuit colleges and universities. The deans were asked to evaluate the preparation of the Jesuit high school graduates for college. The questionnaire was distributed by the central office of the Jesuit Educational Association. Father Bernert, a member of the Commission on Secondary Schools, analyzed and summarized the replies to arrive at the following three conclusions:

> (1) Graduates of Jesuit high schools are, in general, somewhat better equipped for collegiate work than graduates of other high schools; (2) The two areas that show the most notable weaknesses are mathematics and the social sciences; and (3) There is enough solid interest in the subject to warrant a complete statistical study of the entire subject of Jesuit high school graduates' performance in Jesuit colleges and universities.[3]

Such conclusions tend to lend support to our initial hypothesis, but accurate, scientific data concerning the present problem can be obtained only by the use of the statistical method. It is in this distinctness of methodology that the present study differs from the Bernert investigation.

Origin of the Problem

The Bernert study provided the first tangible data obtained concerning the academic preparation of Jesuit high school graduates. The subject of investigation was felt to be of such importance by the Board of Governors of the Jesuit Educational Association that it should be continued by a complete statistical study.[4]

The Commission on Secondary Schools of the Jesuit Educational Association decided that the rather extensive investigation could most properly be conducted by "a Jesuit who is seeking an interesting and worthwhile problem for a doctorate dissertation in the field of education and who has had adequate training in statistics."[5] Such a study is now under way. While awaiting the appearance of such an investigator, however, the Commission decided to obtain advice from competent authorities concerning the proper procedures which should be used and to test these procedures in a "pilot" study.[6] At the instance of Father John F. Sullivan, S.J., Principal of the University of Detroit High School and a member of the Commission on Secondary Schools, the present "pilot" study was undertaken at the University of Detroit. A summary of the statistical data was provided Father Sullivan in advance of the completion of the writing of this thesis as such was desired for an educational

report. These data appeared in Father Sullivan's article, "Standardized Tests Measure Jesuit College Preparation," in the January, 1954, issue of the Jesuit Educational Quarterly.[7]

Source of Data

In September, 1952, the entering freshman class at the University of Detroit was given a battery of placement tests. These tests will be described in some detail in the following section. The data involved in this study consist of the scores achieved on these tests by 1,246 entering freshmen in the liberal arts, engineering, and commerce colleges. The entire entering freshman class totaled 1,522.[8] Therefore, there were 276 freshmen for whom no placement tests results appear in this study. There are several explanations possible to account for these missing scores. Some failed to be tested because they entered college during the summer session or too late in the fall. The test results of other students had to be excluded because they received their high school training outside the United States.

Our comparison involves two groups. In one group were those who had graduated from the University of Detroit High School, conducted by the Jesuits in Detroit, Michigan, and in the other group were those who had

graduated from all other high schools. These two groups will hereafter be termed the "U. of D. High School group" and the "all others group" respectively. The U. of D. High School group consisted of 107 freshmen, and the "all others group" totaled 1,139.

The group of 107 University of Detroit High School graduates constitute the sample of Jesuit educated high school graduates in whose academic preparation we are interested. That this group is representative of the classes graduated from Jesuit high schools seems to be indicated by two facts. First, by means of a national survey made of Jesuit secondary education by the Jesuit Educational Association, it was determined that 67.6 per cent of the members of Jesuit high school graduating classes enter Catholic colleges and universities.[9] The June, 1952, graduating class from the University of Detroit High School had 165 members.[10] Of these, 107, or 64.8 per cent, entered the University of Detroit in the fall of the same year. Undoubtedly a few of the graduates entered other Catholic colleges, so the 64.8 per cent compares very favorably with the national norm of 67.6 per cent. Therefore, in terms of the percentage of high school graduates going on to college, the University of Detroit High School group is typical of other Jesuit high schools.

Second, Father John F. Sullivan, S.J., Principal of the University of Detroit High School, made the following comment when speaking of this U. of D. High School sample group: "The group from the U. of D. High was sufficiently large and well distributed according to high school ranking to provide a typical sample of the high school graduating classes."[11] Thus, it seems likely that our sample is representative of Jesuit educated high school graduates.

In our study, therefore, there are two disparate groups with reference to the systems under which they received their academic high school preparation. The U. of D. High School group was educated under the Jesuit secondary system, and the "all others group" was trained, for the most part, under non-Jesuit secondary systems. This latter group was educated under several secondary school systems--public, dioceasan parochial, and secondary school systems of other religious orders.

It should be noted that there may have been a few students in the "all others group" who received their high school preparation in a Jesuit high school other than the University of Detroit. These could not be more than a handful, however, and, in view of the size of the "all others group," 1,139, their importance statistically is insignificant.

Materials

The tests administered to the entire group of 1,246 freshmen were the following:

(1) The American Council on Education Psychological Examination for College Freshmen, 1946 Edition.

(2) The Mathematics Pre-Test for College Students, Form X, published by the Cooperative Test Division of the Educational Testing Service.

(3) The Cooperative English Test, Form Y, published by the Cooperative Test Division of the Educational Testing Service. This test consists of the following parts:

Test A: Mechanics of Expression

Test B: Effectiveness of Expression

(4) The Diagnostic Reading Tests, Survey Section, Form A, prepared by the Committee on Diagnostic Reading Tests and distributed by the Science Research Associates.

The American Council on Education Psychological Examination for College Freshmen, hereafter called the A.C.E. Psychological Examination, is a test of general ability constructed for the specific purpose of appraising the mental abilities most needed for the intellectual demands of college curricula.[12] The scale consists of

six subtests which are grouped into two general classes as follows:

(1) The linguistic tests which yield an "L" score:

Same-opposite (word meaning)

Completion (word definitions)

Verbal analogies

(2) The quantitative tests which yield a "Q" score:

Arithmetic problems

Figure analogies

Number series[13]

Three raw scores can be obtained from this instrument--an "L" score, a "Q" score, and a total score, which is the sum of the first two. These raw scores can be converted to percentile ranks. Separate distribution tables are furnished for various populations, for example, junior colleges, four-year liberal arts colleges, and teachers colleges.[14] In this study, when percentile ranks were used, they were taken from the tables for freshmen in 317 liberal arts colleges in the United States.[15] These tables appear on pages 11, 14, 15, and 16 of the manual for this test.[16]

Reviewers of this test generally hold it in high regard, as can be seen from their quoted statements. W. B. Commins in his review in Buros' The Third Mental Measurements Yearbook states: "This is perhaps the test

that one is likely to recommend to anyone who is looking for a 'good' intelligence test to give to a group of college freshmen."[17] Arthur E. Traxler comments:

> The American Council on Education Psychological Examination is without doubt the most widely used test of the academic aptitude of college freshmen. Each fall, this examination is administered to entering freshmen in several hundred colleges.[18]

Lee J. Cronbach in his, Essentials of Psychological Testing, has the following to say concerning the test's reliability: "Reliability is quite satisfactory for college groups. Few other tests are equally reliable for superior students."[19]

This description of the A.C.E. Psychological Examination should suffice for the present. Later in Chapter III we shall discuss the crucial question of the influence of academic training on the scores achieved on this test.

The Cooperative Mathematics Pre-Test for College Students, Form X, was designed by the Committee on Tests of the Mathematical Association of America. The present forms X and Y are adapted from the previous experimental forms A and B. The test requires forty minutes to administer and consists of forty items which sample knowledge of elementary and intermediate algebra and geometry. Each item is of the multiple-choice variety with

one correct and four incorrect answers provided.[20] This examination was designed to be used primarily as a supplementary guide in classifying beginning college students into appropriate college mathematics courses.[21]

Although national norms for entering college freshmen are available, the norms used in this study were local ones prepared by the staff at the University of Detroit "since they are based on approximately six times (6,927) the number of cases represented in the national norms."[22]

E. P. Starke, who is the sole reviewer of the present form of this test in Buros' Fourth Mental Measurements Yearbook, makes this comment concerning its predictive value:

> This reviewer feels that there probably is a poor correlation between scores on this test and subsequent performance in college mathematics courses. The test can be used to eliminate those who are unprepared for college science and mathematics but it will be of little use for predicting success in more advanced work.[23]

The ability of any of the measurements in this study to predict success in future courses, however, is not our primary concern, but rather their exactness in determining preparation or actual achievement. In this respect the reviewers of the experimental forms of this instrument evaluated it favorably. M. W. Richardson states: "The sampling of materials from secondary

mathematics is excellent."[24] S. S. Wilks comments:

> About one-tenth of the fifty items of each form deal with plane and solid geometry material, of the mensurational variety. The items of algebraic content form a rather thorough sampling of techniques through quadratics usually taught in secondary schools.[25]

Therefore, opinion would appear to indicate that this test validly measures preparation in secondary mathematics and thus fulfills our need.

The third instrument used in the testing of entering freshmen was the Cooperative English Test, which is composed of two parts: "Mechanics of Expression" and "Effectiveness of Expression." The "Mechanics of Expression" part contains 60 items of grammatical usage placed in sentences, 45 items of punctuation, and 24 items of capitalization, the latter two types introduced in running prose. Spelling is presented in 30 items, each of which consists of four words and a possible selection "none wrong." The test, "Effectiveness of Expression," contains three subtests. Part I measures sentence structure and style by the comparison of passages of prose placed in parallel columns and by choice of the best of four versions of the same sentence. Part II is a test of active vocabulary in which the student must guess the word intended by a definition, given cues as to the first letter and the length of the word. Part III measures the ability to organize by rearranging

disorganized paragraphs and by completing a partial outline.[26]

The norms used for the two parts of this English test in the statistical work of this study were those provided by the publishers of this test. They are in terms of scaled scores and are based on data gathered from 50,000 entering freshmen in ninety colleges throughout the nation. Separate norms are provided for distinct types of schools. The norms used in this investigation were those listed under the classification, "Type II," in the test manual since these norms were described as "most appropriate for students in typical liberal arts colleges."[27]

With regard to the evaluation of the Cooperative English Test, both praise and criticism can be found for it from the reviewers. The most common criticism of the test is that it does not measure the ability to use English effectively in speech and writing but rather the ability to proofread, reorganize, and criticize material already written.[28] Robert C. Pooly in his review in Buros' Third Mental Measurements Yearbook says:

> It does test the power to correct errors, to proofread, to organize or reorganize material composed by others. It does not test the power to compose English and should therefore be used cautiously in the placing of students in ability groups

> or in the sectioning and exemption of college freshmen.[29]

Chester W. Harris makes a similar observation:

> . . . objective type tests, such as the Cooperative tests of mechanics of expression and effectiveness of expression, do measure directly such skills as proofreading, error location, and criticism of written materials.[30]

Further criticism has been directed at the test because of the lack of adequate follow-up studies on the validity of the test. The only validity study referred to in the publisher's description of the tests is the 1939 study by McCullough and Flanagan with older forms of the test (Form OM and the 1937 Form).[31] In this study the English test was correlated with several criteria of ability to use English, one of which was the teacher's evaluation of the individual's excellence in using oral and written English. The product-moment coefficient of correlation between the English tests and the teacher's estimates was .53.[32] This is the only validity study to be found in the literature.

In commendation of the tests, however, the reviewers have the following comments to make. Harris says:

> The Cooperative tests of mechanics of expression and effectiveness are generally well-made tests that should be useful as measures of the kinds of skills suggested in this analysis [Harris' statement at top of this page].[33]

Pooley praises it in these words:

> The materials of the tests are well chosen and clearly presented. The directions are simple and concise and make clear to the student the purpose of the test. Dubious and controversial usage has been avoided; so far as is possible in an objective test, the materials of English have been cast into natural settings of sentences and paragraphs. Mechanics are tested functionally rather than in isolation from English expression. It is one of the best tests available in the field of English skills.[34]

Notwithstanding these appraisals, however, the deficiency of empirical validity studies should prompt users of the test to exercise caution in drawing conclusions on the basis of scores derived from it.

The last test in the battery administered to the entering freshmen at the University of Detroit is also the newest, being first published in 1947. The Diagnostic Reading Tests consist of a battery of nine tests grouped into five sections: a Survey Section and four special diagnostic sections. The intent of the authors of the tests was that persons scoring below the 30th percentile on the Survey Section be given other appropriate sections of the battery.[35] Only the Survey Section, however, was used with our group.

The Survey Section consists of three subtests: 1. "General Reading," 2. "Vocabulary," and 3. "Comprehension." From these, five raw scores can be derived: Score 1a. "Rate of Reading," Score 1b. "Story Comprehen-

sion," Score 2. "Vocabulary," Score 3. "Comprehension," and Score 4. "Total Comprehension."[36] For this study only scores 1a. "Rate of Reading," 2. "Vocabulary," and 4. "Total Comprehension," were used.

The three subtests of the Survey Section are described thus in the manual for the test: The purpose of the "General Reading" test is:

> . . . to measure the student's usual rate of reading story-type material with a generally simple vocabulary load and the extent to which the student comprehends what he reads at the rate recorded by the test.[37]

The vocabulary section:

> . . . is composed of sixty items drawn from general vocabulary and from the vocabularies of English, mathematics, science, and social studies. Each item consists of a definition followed by five words, one of which is an appropriate response for the definition.[38]

The final subtest, "Comprehension," is described as consisting of:

> . . . four selections of reading material similar to that found in textbooks in social studies and science. Each selection is followed by five questions based on the reading material in the selection.[39]

To derive the three scores used from this Survey Section, the raw scores of the "Rate of Reading" and the "Vocabulary" subtests were taken directly. The "Total Comprehension" score was derived by totaling all scores from all subtests except the rate of reading

score.[40]

The norms used for the Diagnostic Reading Tests, Survey Section, are those published in the manual for the test, which are based on 883 college freshmen in the arts and sciences college of the University of Denver.[41]

Since this is a relatively new test, mention should be made of its validity and reliability. Frances Oralind Triggs, chairman of the committee which prepared the Diagnostic Reading Tests, has presented validity and reliability coefficients. The average validity coefficients of the one hundred items on the Survey Section were found to be .54 for Form A, and .53 for Form B. The average reliability coefficient obtained for the "Rate of Reading" score was .80. That for the "Total Comprehension" score was .90.[42] The reliability figure for the "Vocabulary" subtest was .85.[43] The reliabilities given were determined by Kuder-Richardson Formula 21 and are high enough to indicate that the tests are satisfactorily reliable measures.[44]

As to the evaluation of the Diagnostic Reading Tests by reviewers, the comments of Henry Weitz and William W. Turnbull will be considered.

Weitz, admitting that a battery of reading tests for diagnostic purposes is desirable, nevertheless

maintains that this test battery does not achieve its purpose. Some of the reasons given for this observation are that: (1) "the reliability information supplied by the authors suggests that many subtests are not sufficiently reliable for individual diagnosis,"[45] and (2) "some of the sections appear to be based upon hypotheses which are not supported by the data thus far presented."[46] Weitz concludes his analysis of the Survey Section with the comment that it "has very limited value as an independent measure of the separate reading skills accounted for in the subtests,"[47] but adds that "the use of the total score, as a general device for screening students with reading handicaps is acceptable."[48]

Turnbull is much more commendatory of the Diagnostic Reading Tests in his review:

> The strength of the entire battery is clearly the fact that it was planned as a unit: one section supports and supplements another. The authors of the plan are to be congratulated upon it. The test materials are reasonably good in the main, with inevitable lapses of detail.[49]

With specific reference to the section of the battery in which we are interested, Turnbull states: ". . . the Survey Section stands already as one of the better instruments for the evaluation of overall reading ability."[50]

In view of this last review, the fact that the tests

were prepared by a committee of experts in the field of reading skills, and the relatively high validity and reliability coefficients, it appears that the Diagnostic Reading Tests are at least as good as, if not better than, any available instruments for measuring achievement in reading skills.

All the measuring instruments used in the present investigation have now been examined. With the exception of the A.C.E. Psychological Examination, all the tests are measurements of achievement or basic abilities which are highly influenced by school training. This is a necessary attribute of tests for such a study as the present one, which is attempting to evaluate the academic preparation of freshmen. Tests of intelligence, however, should be independent of previous training. As for the A.C.E. Psychological Examination, which is usually considered an intelligence test, it will later be shown that an individual's score on this test is subject to change with added academic training.

So much for preliminary considerations. We are now prepared to examine the data obtained by means of the above instruments from our discrete groups of entering freshmen at the University of Detroit.

NOTES

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12. Frank S. Freeman, The Theory and Practice of Psychological Testing, p. 225.

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17. W. B. Commins, "American Council on Education Psychological Examination for College Freshmen," The Third Mental Measurements Yearbook, edited by Oscar Krisen Buros, p. 297.

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23. Starke, op. cit., p. 486.

24. Marion W. Richardson, "Cooperative Mathematics Test for College Students: Pre-Test for First Year Students, Experimental Forms A and B," The Nineteen Thirty Eight Mental Measurements Yearbook of the School of Education Rutgers University, edited by Oscar Krisen Buros, p. 117.

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26. Robert C. Pooley, "Cooperative English Tests: Lower and Higher Levels," The Third Mental Measurements Yearbook, edited by Oscar Krisen Buros, p. 223.

27. Cooperative English Test, Percentile Ranks for High School and College Students, p. 9.

28. Chester W. Harris, "Cooperative English Tests: Lower and Higher Levels," The Fourth Mental Measurements Yearbook, edited by Oscar Krisen Buros, p. 300.

29. Pooley, op. cit., p. 223.

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33. Harris, op. cit., p. 301.

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43. William W. Turnbull, "Diagnostic Reading Tests," The Fourth Mental Measurements Yearbook, edited by Oscar Krisen Buros, p. 572.

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48. Ibid.

49. Turnbull, op. cit., p. 574.

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CHAPTER II

PRESENTATION OF RESULTS

The tests utilized in this study were administered and scored by the personnel of the University of Detroit's Psychological Service Center. The data for the present study were obtained from its files.

The raw scores were used in all instances except for the English and the mathematics tests. For these it was necessary to deal with the scaled scores since such were used in the construction of the national norms.

The first statistical measures computed were the median scores for each test. The results of these computations for the two groups of this study along with the medians for the normative groups are presented in Table I. It will be recalled from the previous discussion that national norms rather than local ones have been used for all tests except the Mathematics Pre-Test.

An examination of Table I reveals two main facts concerning the groups compared. First, it can be observed that on six of the nine tests the U. of D. High School group achieved median scores higher than those of the normative groups. These tests were the three parts of the A.C.E. Psychological Examination, the

TABLE I

MEDIANS OF U. OF D. HIGH SCHOOL GRADUATES AND GRADUATES FROM ALL OTHER HIGH SCHOOLS ON ENTRANCE TESTS AT THE UNIVERSITY OF DETROIT, SEPTEMBER, 1952; COMPARED WITH THE NORMATIVE GROUP MEDIANS

	Normative Group	U. of D. High	Other Schools
A.C.E. Psychological			
Linguistic (L)	61.00	64.86	58.33
Quantitative (Q)	37.50	43.60	39.88
Total	103.00	108.54	98.04
Mathematics Pre-Test	17.00*	20.23	15.01
Cooperative English			
Mech. of Expression	55.00*	53.12	45.72
Effect. of Expression	55.00	52.50	49.77
Diagnostic Reading			
Rate	290.00	276.50	256.08
Vocabulary	42.00*	45.05	37.72
Comprehension	72.00*	76.50	68.66

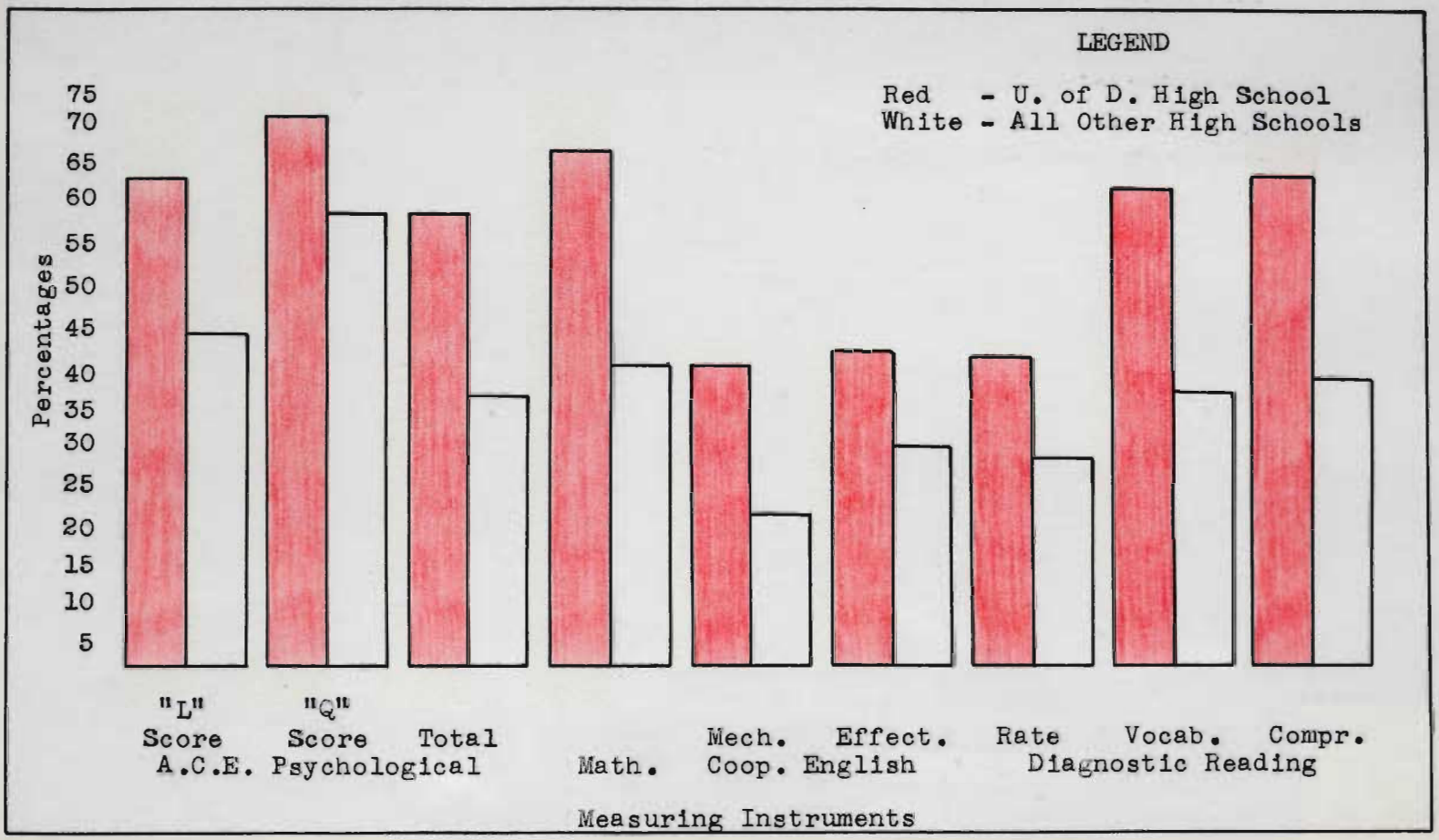
* The median is between the given number and the next whole number. No finer division was given in the norms.

Mathematics Pre-Test, and the "Vocabulary" and "Comprehension" subtests of the Diagnostic Reading Tests. On the two parts of the Cooperative English Test and the "Rate of Reading" subtest, however, the U. of D. High School group obtained median scores below those of the normative groups. Second, on all tests the U. of D. High School group achieved higher median scores than did the graduates from other high schools. Both of these basic observations must be subjected to further statistical analysis before they can be properly evaluated. The results of these analyses are presented in Tables II and III and Figure 1.

Figure 1 contains a graphic representation of the percentages of U. of D. High School graduates and the graduates from all other high schools who equaled or exceeded the medians of the normative groups on the tests used. From the concept of the median itself, it is obvious that in the normative group 50 per cent of the cases fell above the median and 50 per cent fell below it. Therefore, if the groups in this study were simply equal to the normative groups in distribution of achievement and basic abilities, a similar occurrence should be observed. But, as is indicated by Figure 1, approximately 60 per cent or more of the U. of D. High School group equaled or exceeded the medians of the norm-

FIGURE 1.

PERCENTAGES OF THE U. OF D. HIGH SCHOOL GRADUATES AND GRADUATES FROM ALL OTHER HIGH SCHOOLS WHO EQUALED OR EXCEEDED THE MEDIANS OF THE NORMATIVE GROUPS



ative groups on the six tests mentioned above as having higher medians for the U. of D. High School group than for the normative groups. On only three tests, the two parts of the Cooperative English Test and the "Rate of Reading," did the U. of D. High School group have lower percentages attaining the median than did the normative groups. On these tests 7 to 9 per cent fewer of the U. of D. High School graduates attained the median than did the students in the normative groups.

In regard to our major concern, the comparison of the scores achieved by the two groups of this study, Figure 1 indicates the universal superiority of the U. of D. High School group over the "all others group" in the percentage attaining or exceeding the norm median. In every test, the bar representing the former group is higher than the bar representing the latter group. Table II contains the results of the statistical treatment utilized to determine the extent and significance of the differences between the percentages of those who equaled or exceeded the norm medians in the two groups of this study.

Since it is with regard to Table II that the first occasion arises to refer to the concept of significance, it would be well to consider what is meant by this term, since there will be need of using it several times in

TABLE II

THE PERCENTAGES EQUALING OR EXCEEDING THE MEDIANS OF THE NORMATIVE GROUPS, THE DIFFERENCES BETWEEN THE PERCENTAGES, AND THEIR PROBABILITY, OF THE U. OF D. HIGH SCHOOL GROUP AND THE "ALL OTHERS GROUP" ON ENTRANCE TESTS

Test	(1) U. of D. High	(2) Other Schools	(3) Difference	(4) S.E. of Diff.	(5) Critical Ratio	(6) Probability (Chances in 100)
A.C.E. Psychological						
Linguistic (L)	64	44	20	4.79	4.17	.01*
Quantitative (Q)	72	59	13	4.58	2.83	.50
Total	59	37	22	4.89	4.69	.01*
Mathematics Pre-Test	68	41	27	4.69	5.75	.01*
Cooperative English						
Mech. of Expression	41	22	19	4.79	3.96	.01*
Effect. of Expression	43	31	12	5.00	2.40	1.60
Diagnostic Reading						
Rate	42	29	13	5.00	2.60	.90
Vocabulary	63	38	25	4.69	5.33	.01*
Comprehension	64	39	25	4.79	5.22	.01*

* The probability was better than .01 in 100.

the statistical work of this study. In almost all educational and psychological studies in which there is an attempt to gain some specific knowledge about a group of individuals, the investigator must content himself with the examination and study of a sample selected from the larger group about which he desires knowledge. Any computational measure derived from such a sample is known as a statistic.[1] Some such measures are the median, the mean, and the standard deviation. A statistic derived from a sample is an approximation of what the corresponding true measure would have been had the entire population been studied. There are certain statistical techniques, known as sampling error formulas, which may be applied to the obtained statistics "to determine quantitatively how nearly these obtained facts are likely to approximate the true facts."[2] Such statistical techniques are known as tests of significance.

When a question as to the significance of a mean, a median, a percentage, or a difference is asked in statistics, an attempt is being made to determine how closely the obtained measure approximates the true measure which would have been obtained had the entire population been included.[3] Therefore, when the significance is sought for any statistic in this study, an attempt is being made to know whether chance factors in the U. of

D. High School group or the "all others group" are operating to produce the obtained statistic or whether the measure may be relied upon with a high degree of confidence as being a close approximation to the true measure. In our study the true measures would have had to be derived in the following manner. For the U. of D. High School group the total population would have consisted of all the graduates from the University of Detroit High School who have gone on to the University of Detroit. The total population of the "all others group" would have included the students in all previous entering freshmen classes at the University of Detroit excluding, of course, the graduates of the University of Detroit High School. Our sample has consisted of the test scores of entering freshmen of only one semester--September, 1952.

Since all the measures of significance in this study will be in reference to the significance of obtained differences, the meaning of this specific type of significance will be considered here. E. F. Lindquist has explained this concept well in the following passage:

> When we say that a difference is significant, we mean that it is too large to be reasonably attributed to chance (sampling error) alone, and that we are highly confident (or "practically certain") that the two populations <u>differ</u> in the trait measured.[4]

Significance may be expressed in several different ways.

One way is in terms of levels of confidence. When it is said that a difference is "significant at the 1 per cent level," what is meant is that a difference as large as, or larger than, the obtained one could have occurred from chance variation in the selection of the two samples only 1 per cent of the time or once in a hundred times. The same rule applies to other frequently used levels such as the 5 per cent level of confidence and the 2 per cent level of confidence.[5]

Another manner of expressing significance is to state that there are so many chances in a hundred that the obtained measure may have resulted from chance variation in the sample. If it is said that there are five chances in a hundred that a measure as large as the obtained one could have resulted from chance variation in the sample, then the same thing is meant as in the statement that the obtained measure is significant at the 5 per cent level of confidence. Likewise, to say that there is one chance in a hundred that the obtained measure resulted from chance is the same as saying that the measure is significant at the 1 per cent level of confidence. The figure which represents the "chances in one hundred" that an obtained measure may have occurred by chance factors will be referred to in this study as the "probability figure."

Now that we have a clear understanding of the concept of significance, we can examine Table II which was introduced on page 29. Table II contains the basic data which are graphically represented in Figure 1 in addition to further statistical computations which make more meaningful the characteristics of the two groups of this study. The amounts of difference between the percentages of those who equaled or exceeded the norm medians in the two groups of this study, along with the probability that such differences could have occurred by chance, are set forth in this table.

A comparison of these percentages and their differences reveals that from 12 to 27 per cent more of the U. of D. High School group surpassed the medians of the normative groups than did the "all others group." An examination of the "Probability" column of Table II shows that six of the differences are significant at better than the .01 per cent level of confidence, two at the 1 per cent level, and one at the 2 per cent level. It can be noted that in the six cases where the significance is at the .01 per cent level the chances of differences as large as, or larger than, the obtained ones occurring by chance are less than one in ten thousand.

The significant points to be summarized from Table

II are the following: (1) The percentage of the students in the U. of D. High School group who equaled or exceeded the medians of the normative groups surpassed on every test the percentages of the "all others group." (2) The differences between these percentages were relatively large, ranging from 12 to 27 per cent. (3) Six of the differences between the percentages were found to be significant at better than the .01 per cent level of confidence, two at the 1 per cent level, and one at the 2 per cent level. (4) The degree and the universality of the superiority of the U. of D. High School group to the "all others group" lends supporting evidence to the hypothesis that the former group is better prepared for college than the group educated in non-Jesuit high schools.

The next group of data to be considered are an elaboration and refinement of the basic data presented previously in Table I. Table III contains the medians, the differences between the medians, their probability, and the necessary intermediate statistics of the two groups of this investigation. In the discussion just completed, the relative percentages of these groups who equaled or surpassed the medians of the normative groups were examined and evaluated. In the present discussion the actual medians achieved by this study's groups will

TABLE III

THE MEDIANS, THE DIFFERENCES BETWEEN THE MEDIANS, AND THEIR PROBABILITY, OF THE U. OF D. HIGH SCHOOL GROUP AND THE "ALL OTHERS GROUP" ON ENTRANCE TESTS

Test	(1) U. of D. High	(2) Other Schools	(3) Difference	(4) S.E. of Diff.	(5) Critical Ratio	(6) Probability (Chances in 100)
A.C.E. Psychological						
Linguistic (L)	64.86	58.33	6.53	1.69	3.86	.01*
Quantitative (Q)	43.60	39.88	3.72	1.34	2.78	.50
Total	108.54	98.04	10.50	2.71	3.87	.01*
Mathematics Pre-Test	20.23	15.01	5.22	1.05	4.97	.01*
Cooperative English						
Mech. of Expression	53.12	45.72	7.40	1.04	7.12	.01*
Effect. of Expression	52.50	49.77	2.73	1.18	2.31	2.00
Diagnostic Reading						
Rate	276.50	256.08	20.42	6.80	3.00	.30
Vocabulary	45.05	37.72	7.33	1.17	6.26	.01*
Comprehension	76.50	68.66	7.84	1.45	5.41	.01*

* The probability was better than .01 in 100.

be similarly analyzed. In interpreting the data of Table III it can first be noticed that the median scores achieved by the U. of D. High School group were higher on every test than the median scores obtained on the same tests by the "all others group." Thus, by employing one of the most frequently used measures of central tendency, the median, the same phenomenon is seen to occur as in the examination of percentages--the U. of D. High School group consistently did better than the "all others group."

The group differences on the various tests cannot be meaningfully compared directly, because the test scores are not in comparable scales. This is very evident from a comparison of the scores for the Mathematics Pre-Test and the "Rate of Reading" subtest. These respective scores for the U. of D. High School group are 20.23 and 276.50. Therefore, to say that the differences between the medians of our two groups ranged from 2.73 to 20.42, or that the average difference was 7.96, although true, is not meaningful. This difficulty was not encountered in the differences of Figure 1 and Table II because the scores had been converted into a scale which could be compared, that of percentages. It is true that the difference may be meaningfully examined in reference to each test taken alone, and the size of the difference

noted; for example, the difference of 5.22 on the Mathematics Pre-Test in reference to the medians of 20.23 and 15.01. Such an examination reveals that this difference is great with reference to the median scores for this test and indicative of a significant superiority on the part of the U. of D. High School group. The differences may not be compared meaningfully from one test to another, however. This same difference of 5.22 if observed on the "Rate of Reading" subtest would certainly not indicate a marked superiority of the U. of D. High School group in the basic ability measured. The above statement of the uselessness of computations of the range or the average of the differences was based on such observations.

If each of the differences is examined in reference to the size of the test score medians from which they were derived, it can be noticed that the relative magnitude would seem to indicate a marked superiority of the U. of D. High School graduates in several instances. This is particularly true with regard to the following six tests: the "L" and the total scores of the A.C.E. Psychological Examination, the Mathematics Pre-Test, the "Mechanics of Expression" subtest, and the "Vocabulary" and "Comprehension" subtests of the Diagnostic Reading Tests. However, it might be wondered if these

differences might be due to chance factors and would not occur in other sample groups from the total populations. If this were true, then there would be no real differences of ability and achievement in the parent populations. The only way in which this possibility may be ruled out is by employing a test of significance. This has been done and the results recorded in columns (4), (5), and (6) of Table III.

The differences between the medians of the two groups of this study were significant for all the entrance tests. An examination of the "Probability" column shows that six of the differences were significant at better than the .01 per cent level of confidence, two at the 1 per cent level, and one at the 2 per cent level. Thus, in regard to six of these differences, the chances of obtaining differences as large as, or larger than these are less than one in ten thousand.

The interpretation of the data presented in Table III can be summarized in the following statements: (1) The median scores achieved by the U. of D. High School group were higher on every one of the entrance tests than the median scores obtained on the same tests by the "all others group." (2) The relative magnitude of the differences between the median scores of these two groups was great enough to indicate marked superiority of basic

ability and achievement in the skills measured by the tests listed on page 37. (3) Six of the differences between the medians of the two groups were found to be significant at better than the .01 per cent level of confidence, two at the 1 per cent level, and one at the 2 per cent level. (4) The preceeding three statements lend further support to the initial hypothesis that the U. of D. High School group is better prepared academically than the "all others group" as evidenced by their significantly superior scores (here the median scores) on college entrance tests.

The last group of statistical data to be examined concerning the two groups of this research study have to do with their mean scores, the standard deviation of these means, the differences between the means of the two groups, and the significance of these differences. These data are presented in Table IV.

The first measures to be considered are the mean scores obtained by the two groups on the standardized tests. A comparison of the mean scores of this table with the median scores of Table III reveals that these two measures of central tendency are very similar in magnitude. Only on the "Rate of Reading" subtest is there a difference of more than one or two points between the corresponding median and mean scores for the

TABLE IV

THE MEANS, THE STANDARD DEVIATIONS OF THE MEANS, THE DIFFERENCES BETWEEN THE MEANS, AND THE PROBABILITY OF THESE DIFFERENCES, OF THE U. OF D. HIGH SCHOOL GROUP AND THE "ALL OTHERS GROUP" ON ENTRANCE TESTS

Test	(1) U. of D. High School		(2) All Other High Schools		(3)	(4)	(5)	(6)
	Mean	S.D.	Mean	S.D.	Difference	S.E. of Diff.	Critical Ratio	Probability (Chances in 100)
A.C.E. Psych.								
Linguistic	65.75	13.20	58.94	14.97	6.81	1.35	5.04	.01*
Quantitative	43.70	10.68	39.26	11.19	4.44	1.07	4.15	.01*
Total	109.43	21.08	98.17	22.80	11.26	2.16	5.21	.01*
Mathematics	20.87	8.25	15.54	8.47	5.33	.84	6.35	.01*
Coop. English								
Mech. of Expr.	52.44	8.04	47.06	9.62	5.38	.83	6.48	.01*
Effect. of Expr.	52.57	9.26	50.12	9.26	2.45	.94	2.61	.90
Diag. Reading								
Rate	280.48	53.68	260.98	50.42	19.50	5.42	3.60	.03
Vocabulary	43.45	9.21	38.14	8.72	5.31	.93	5.71	.01*
Comprehension	75.34	11.29	67.76	12.55	7.58	1.16	6.53	.01*

* The probability was better than .01 in 100.

tests. The close resemblance between these two statistical measures indicates that one is as good as the other as a representation of the central tendencies or average scores.

The second measures reported in Table IV are the standard deviations of the mean scores. The standard deviation of a group of measures refers to the variability of those measures or the manner in which the individual measures deviate from the mean of the distribution. When the standard deviation is interpreted by itself, it is most useful in making comparisons of the variability in two or more groups.[6] Thus, by applying this interpretation to the present study, it is found that the two groups are very similar in their variability. This is induced from the fact that the standard deviations of the two groups seldom differ more than one or one-and-a-half points.

Again as in the analysis of the medians, the magnitude of the differences between the means of the two groups of this study would indicate marked differences in achievement in the academic areas tested by several of the measuring instruments. The following tests demonstrate this marked difference: the "L" and the total scores of the A.C.E. Psychological Examination, the Mathematics Pre-Test, the "Mechanics of Ex-

pression" subtest of the Cooperative English Test, the "Vocabulary" and "Comprehension" subtests of the Diagnostic Reading Tests. In view of the similarity already observed between the size of the medians and means of this study's groups, it is only natural that the marked differences in achievement and basic skills should be observed on exactly the same tests.

A test of significance was applied to each of the observed differences to eliminate the possible operation of chance factors, and the results revealed even slightly higher confidence levels for the differences on some tests, namely, the "Effectiveness of Expression" and the "Rate of Reading" subtests, and the "Q" score of the A.C.E. Psychological Examination.

The interpretation of the data presented in Table IV can be summarized in the following statements: (1) The close correspondence in magnitude between the medians and the means of the two groups of this study indicates that both agree rather closely. (2) The similarity of the standard deviations of the means for the test scores of the two groups reveals the similarity in their variability. (3) The size of the differences between the mean scores achieved by the two groups indicate marked superiority of achievement by the U. of D. High School group on the tests mentioned on pages 41

and 42. (4) The differences between the means were found to be significant on every test. All the differences were significant at least at the 1 per cent level of confidence, all but two ("Effectiveness of Expression" and "Rate of Reading") had probabilities better than the .01 per cent level of confidence. (5) The preceeding statements in (3) and (4) give further supporting evidence for our hypothesis of the superior academic preparation of the U. of D. High School group in comparison with the "all others group" as evidenced here by their significantly superior mean scores on the college entrance tests.

The last examination to be made of the data of this study requires the comparison of all three tables which record differences between statistical measures derived for our two groups. These are Tables II, III, and IV. By examining the difference column of each of these tables it can be noted that the differences between our two groups are greater for the "L" than for the "Q" part of the A.C.E. Psychological Examination for each of the statistical measures: percentages, medians, and means. The differences in linguistic scores were almost twice as large as the differences in quantitative scores for the percentages equaling or exceeding the norm medians and the actual medians, and one-and-

a-half times as large for the means. This reveals that the observed differences between our two groups on the total score of the A.C.E. Psychological Examination is caused much more by the "L" part of the test than the "Q" part. Therefore, the U. of D. High School group shows greater superiority to the "all others group" on the linguistic part of the above test than it does on the quantitative part.

NOTES

1. Allen L. Edwards, *Statistical Analysis for Students in Psychology and Education*, p. 51.

2. E. F. Lindquist, *A First Course in Statistics*, p. 2.

3. G. Milton Smith, *A Simplified Guide to Statistics*, pp. 52-53.

4. Lindquist, *op. cit.*, pp. 130-31.

5. *Ibid.*, p. 130.

6. *Ibid.*, p. 79.

CHAPTER III

SUMMARY AND CONCLUSIONS

This final chapter of the thesis consists of the discussion of four main topics: (1) a summary of the results of the investigation, (2) the conclusions drawn from these findings, (3) two special problems which have arisen in this study, and (4) suggestions for future research allied to the present one.

Summary of Data

The summary of the results will be divided into two categories. The first will consist of all the findings resulting from the comparisons of the U. of D. High School group with the normative groups, and the second part will contain the comparisons of the U. of D. High School group with the "all others group."

Upon examining the results obtained by the U. of D. High School group in relation to those of the normative groups, the following relationships were discovered: (1) On six of the nine tests used the U. of D. High School group achieved median scores higher than those of the normative groups. These tests were the three parts of the A.C.E. Psychological Examination, the

Mathematics Pre-Test, and the "Vocabulary" and "Comprehension" subtests of the Diagnostic Reading Tests. (2) On the two parts of the Cooperative English Test and the "Rate of Reading" subtest, the U. of D. High School group obtained median scores below those of the normative groups. (3) Approximately 60 per cent or more of the U. of D. High School group equaled or exceeded the medians of the normative groups on the six tests mentioned in (1) above. (4) On the three tests listed in (2) above, the U. of D. High School group had lower percentages attaining the median than did the normative groups. On these tests 7 to 9 per cent fewer of the U. of D. High School graduates attained the median than did the individuals making up the normative groups.

In comparing the results obtained by the U. of D. High School group with those of the "all others group," the following findings were perceived: (1) On all tests the U. of D. High School graduates achieved higher median scores than did the graduates from other high schools. The relative magnitude of the differences between the median scores of these two groups was great enough to indicate marked superiority of basic ability and achievement in the skills measured by the following tests: the "L" and the total scores of the A.C.E. Psychological Examination, the Mathematics Pre-Test, the

"Mechanics of Expression" subtest, and the "Vocabulary" and "Comprehension" subtests of the Diagnostic Reading Tests. The differences between the two groups of this study were significant for all tests. Six of the differences were significant at better than the .01 per cent level of confidence, two at the 1 per cent level, and one at the 2 per cent level. (2) The percentages of students equaling or exceeding the medians of the normative groups were greater for the U. of D. High School group than for the "all others group" on every test. The differences between these percentages for our two groups were relatively large, ranging from 12 to 27 per cent, and all were found to be significant. Six of the differences were significant at better than the .01 per cent level of confidence, two at the 1 per cent level, and one at the 2 per cent level. (3) The close correspondence in magnitude between the medians and the means of the two groups of this study indicates that one is as good as the other as a measure of the central tendency. The similarity of the standard deviations of the means for the test scores of the two groups reveals the similarity in their variability. The size of the differences between the mean scores obtained by the two groups indicates marked superiority of achievement by the U. of D. High School group on the tests mentioned in (1) above. The differences between the means of our two

groups were found to be significant on every test. All the differences were significant at least at the 1 per cent level of confidence, all but two ("Effectiveness of Expression" and "Rate of Reading") had probabilities better than the .01 per cent level of confidence. (4) The U. of D. High School group demonstrated greater superiority to the "all others group" on the linguistic part of the A.C.E. Psychological Examination than it did on the quantitative part.

Conclusions

From a comparison of the statistical measures derived from the scores achieved on the battery of standardized entrance tests of basic abilities and achievement administered to the entering freshmen class in September, 1952, at the University of Detroit, the following conclusions can be drawn.

In regard to the comparison of the U. of D. High School graduates with the normative groups it was discovered that:

1. The U. of D. High School graduates are superior to the normative groups in the basic abilities and achievements tested in the following examinations: the A.C.E. Psychological Examination, the Mathematics Pre-Test, and the "Vocabulary" and "Comprehension" subtests of the Diagnostic Reading Tests. This superiority of

the U. of D. High School graduates is demonstrated by their higher mean and median scores achieved on the above tests, and the higher percentage of their members equaling or exceeding the median of the normative groups than the individuals in those groups themselves.

2. The U. of D. High School graduates are inferior to the normative groups in the basic abilities and achievements measured in the Cooperative English Test and the "Rate of Reading" subtest of the Diagnostic Reading Tests. This inferiority of the U. of D. High School graduates was induced from the lower medians achieved by them on the English and reading tests than the medians obtained by those in the normative groups.

3. Since it has been shown previously that it is likely that the graduates of the University of Detroit High School are typical of graduates of other Jesuit high schools, it can be concluded tentatively that such graduates are better prepared academically for college than the individuals composing the normative groups in the basic abilities and achievements measured by those tests listed in 1. above. Jesuit graduates are not as well prepared for college as the normative groups in those abilities tested by the instruments listed in 2. above.

In regard to the major concern of this investigation,

the comparison of the achievements of the graduates of the University of Detroit High School and the graduates of all other high schools, our findings seem to warrant the following conclusions:

1. The Jesuit trained high school graduates demonstrated superior academic preparation for college to the graduates of other high schools by the attainment of higher medians, means, and percentages equaling or exceeding the norm median, on all tests of the battery of standardized achievement and basic abilities tests.

2. Marked superiority of the Jesuit graduates over the graduates of other high schools was indicated by the magnitude of the differences of the average scores obtained by the two groups on the following tests: the "L" and the total scores of the A.C.E. Psychological Examination, the Mathematics Pre-Test, the "Mechanics of Expression" subtest, and the "Vocabulary" and "Comprehension" subtests of the Diagnostic Reading Tests.

3. All obtained differences between the medians, the percentages equaling or exceeding the norm medians, and the means for the two groups of this study were found to be significant at high levels of confidence. Most of these differences were significant at better than the .01 per cent level of confidence, while the remaining were significant at the 1 or 2 per cent levels

of confidence.

4. In view of the three statements made above as conclusions from the findings of this investigation, it is possible to state that the problem of this thesis has been solved. A student educated in a typical American Jesuit High school is probably better prepared academically for college than the average college entrant from other schools. This has been demonstrated by the significantly superior scores attained on standardized achievement and basic abilities tests by our sample group of Jesuit high school graduates.

Special Problems Allied to this Study

The findings of this investigation have brought forth two problems which can not be solved with the data at hand. In this section these two problems will be discussed briefly and tentative solutions offered in lieu of more scientific answers which should result from future investigations.

The first new problem which has arisen revolves around the cardinal question of the present study. This investigation attempted to solve the problem of whether or not graduates of Jesuit high schools are better prepared academically for college than graduates of other high schools. The results from standardized

tests taken by sample groups of the two populations demonstrated that Jesuit graduates are of superior academic preparation. This finding gives rise to another question, however, as to the cause of the high achievement of Jesuit high school graduates on standardized entrance tests. Is the observed superiority due to high natural intellectual ability, or is it due to the peculiar type of high school preparation these graduates have received? It should be noted that this is not the same problem set forth in this thesis. It was the purpose of this thesis only to discover whether Jesuit high school graduates do demonstrate superior preparation for college, not to determine the causes of that superiority if discovered. Some of the findings of this study, nevertheless, immediately suggest this new problem.

One of the standardized tests administered to our samples is generally accepted by psychologists and educators as being a measure of intellectual ability. Thus, the following facts discovered from the application of this test, the A.C.E. Psychological Examination, would seem to indicate that the superior performance of the Jesuit trained graduates was due to superior innate intellectual ability rather than the high school preparation they had received. The difference between the

medians of our two groups on the psychological test was 10.50 points: the difference between means was 11.26 points, and 22 per cent more of the Jesuit group equaled or exceeded the national median than did the non-Jesuit graduates.

It should first be stated that the only positive method of determining whether the superior achievement of the Jesuit graduates was due to innate intellectual ability or high school preparation would be to obtain their pre-high school I.Q. scores and compare them with corresponding measures of the non-Jesuit group or entering college freshmen in general. However, awaiting such an empirical investigation, certain evidence may be presented which tends to support the position that the superior achievement is due to the peculiar type of Jesuit high school preparation.

First, many empirical studies in the fields of psychology and education have shown that the scores achieved on the A.C.E. Psychological Examination, and especially on the linguistic part of this test, are greatly affected by the previous training of the individual. Most of the investigations have employed the retest method in which an initial examination was given with one form of the psychological test and then a second examination was given with a different form after

an intervening period of a number of years of high school or college training. In 1940, Hunter gave the 1936 edition to the seniors, the 1937 edition to the juniors, and the 1938 edition to the sophomores at Converse College in South Carolina. The members of each class had been previously tested at the beginning of the freshman year. The percentile gains of the 276 women averaged from 23 to 31 points for the three groups.[1] Livesay retested fifty University of Hawaii students at the end of their senior year with the 1931 edition. The senior mean of 199.5 was significantly larger than the previous freshman mean of 154.7.[2] McConnell gave the 1927 edition of this psychological test to 70 members of a Cornell College class when freshmen and the 1928 edition to this group as seniors. After the 1927 scores had been transmuted into the 1928 equivalents, the freshman mean was found to be 144.78, and the senior mean 185.2.[3] Flory tested a Lawrence College freshman class with the 1934 edition and retested 74 of the students in the senior year. A mean gain in percentile rank of 8.6 points was found.[4] Sister Florence Louise, using different forms of the A.C.E. Psychological Examination, tested 288 students of three classes at Marygrove College in Detroit when they were freshmen and forty months later when they were seniors. The

freshmen's mean percentile ranks were 47, 48, and 51 respectively, while the seniors' mean percentiles were 75, 75, and 77. All the gains were significant.[5]

Two of the most recent studies on this topic are those of Shuey and Silvey. Shuey tested 108 students at the beginning of their freshman year at Randolph-Macom Women's College and again in their senior year. The editions used were the 1944 and the 1947 respectively. The mean percentile ranks achieved by these students as freshmen were 72.7, 76.2, and 78.0, respectively, on the "Q," "L," and total test scores. The percentile ranks obtained by these students as seniors were 87.4, 89.0, and 89.0 respectively. All the increases were significant.[6] Silvey's study was made in 1948 at Iowa State Teachers College. Students classified as sophomores repeated a part of the placement test battery given all entering freshmen. Silvey noted not only a mean raw score gain of 18.76 points on the A.C.E. Psychological Examination, but also significantly different gains on the "Q" and "L" score parts of the test. The mean "L" score gain was 13.25 whereas the mean "Q" score gain was only 5.50.[7] Similar differential gains between the linguistic and the quantitative parts of this test after periods of education or training have been noted by other investi-

gators.[8] Silvey concluded from his study that: "The gains in 'measured scholastic ability' for both men and women had high statistical significance."[9] He further stated that "in our indirect way of measuring mental ability we cannot ignore the effect of achievement in arriving at a level, or score."[10]

From the above studies it can be seen readily that increased training and education invariably produced average gains in the scores achieved by groups taking the A.C.E. Psychological Examination. Many studies have further disclosed that the linguistic part of the test is affected more by training than is the quantitative part as reflected in the larger mean gains in the "L" scores. Thus, the A.C.E. Psychological Examination is not merely a test of intellectual ability, which remains relatively constant over the years, but it is also a test of achievement, which is greatly affected by training and education. Silvey, in his last statement above, commented on this very point. Therefore, the fact that the U. of D. High School group achieved higher mean and median scores than the graduates from other high schools in our study does not necessarily indicate that the former group is natively more intelligent than the latter. The same differences could very possibly be caused by superior

high school preparation. Lacking the pre-high school intelligence scores of the individuals composing our sample groups, we can make no positive statement of the comparative "pure" mental ability or intellectual level of our sample groups. However, it can be concluded that it is just as likely that the higher A.C.E. Psychological Examination scores attained by the U. of D. High School group were caused by their high school preparation as by superior innate intellectual ability. This is particularly true since it was discovered that the difference between the scores of our two groups was greater for the "L" scores than it was for the "Q" scores. Studies have often demonstrated that the "L" score is markedly affected by previous training.

Besides the studies showing changes in the A.C.E. scores after training, another type of investigation has demonstrated the closeness of relationship between this examination and tests of achievement. Typical of this sort of study is the one made by Edward Furst,[11] who found the following correlations between "Q" and "L" scores on the A.C.E. Psychological Examination and achievement in specific areas:

Test	Q	L
Understanding of the meaning of words	.31	.81
Detecting errors in sentence structure	.32	.51
Knowledge of facts about the physical sciences	.17	.46
Knowledge of structure and language of mathematics	.35	.47

It can be noted here, as before, that it is the "L" score which shows the highest correlation with the type of material learned in school. This study lends further support to the position that superior scores on the A.C.E., and particularly on the linguistic part, probably reflect superior academic preparation.

The second problem brought forth but left unsolved by the present investigation concerns the scores obtained by the U. of D. High School graduates on the Cooperative English Test. It will be recalled from the analysis of the data of Table I and Figure 1 in Chapter II that the only tests on which the U. of D. High School graduates received lower median scores than the normative groups were the two parts of the English test and the "Rate of Reading" subtest. The score on the latter is not too difficult to understand when it is realized that Jesuit training tends "to emphasize comprehension and analysis more than speed in reading."[12] The failure

of the majority of the U. of D. High School group to equal or exceed the norm median in the English tests, however, is more difficult to explain. It is particularly difficult to understand this failure in view of the findings discussed below.

1. Several studies have been made which indicate rather high correlations between scores on the A.C.E. Psychological Examination and scores on English achievement tests and grades in linguistic subjects. Margaret Seder correlated scores on the A.C.E. with those on the Cooperative Achievement Tests and found the highest correlations to be between the "L" and total scores of the former test and the Cooperative English Test. The correlations ranged from .72 for the English test and the total score of the A.C.E. to .77 between the English and the "L" score of the A.C.E.[13] Since the U. of D. High School group obtained superior A.C.E. scores, particularly on the linguistic part of this test, it is difficult to explain their lower attainment on the Cooperative English Test.

Brown and Wallace have correlated the A.C.E. with grades received in English and linguistic courses. Brown discovered a correlation of .54 between the "L" score of the A.C.E. and grades in linguistic subjects such as English, social sciences, and languages.[14] A

correlation of .49 was obtained by Wallace between the total score of the A.C.E. and grades in freshman college English.[15] Although these two correlations are smaller than those listed in the paragraph preceeding, yet, they still indicate a positive relationship between the A.C.E. Psychological Examination and achievement in English.

2. Investigations such as that by Robert Jacobs have revealed that differences in verbal and linguistic aptitude and achievement between public school college-preparatory groups and independent school groups generally favor the latter population.[16] Since the U. of D. High School is, of course, an independent school, according to the general tendency its graduates should on the average do better on English tests than the majority of the individuals composing the standardization groups for the Cooperative English Test because the majority of this group probably came from public schools.

3. The last line of reasoning is perhaps the least empirical, but nevertheless of some weight. Jesuit educators feel that training in languages is one of the strongest areas in their system of secondary education. As Father Sullivan comments: "There is scarcely any field that receives more attention in a Jesuit high school than language and especially the

vernacular."[17] With such emphasis upon English, it is unusual that our sample of Jesuit graduates should receive median scores below those of the normative group.

There seem to be only two explanations which can be tentatively offered to explain our obtained statistical measures. One is the possibility that the Cooperative English Test is not highly valid. It will be recalled that in the first chapter one of the criticisms of this test was its lack of adequate follow-up validity studies--only one being mentioned in the publisher's manual. The other possible explanation is that the lower achievement of the U. of D. High School graduates in comparison to the normative group may be a local phenomenon. This seems possible in view of the fact that the differences in the percentages equaling or exceeding the norm medians are of relatively the same size for our two sample groups on the Cooperative English Test as on the other tests of the placement battery. Thus, it may be that the standardization sample for this examination may have been "loaded" with individuals from selected schools which are markedly superior to the graduates from schools in this area in average achievement. However, a positive solution to this problem can be found only be means of future studies. One such possible investigation is

mentioned in the last paragraph of this thesis.

Suggestions for Future Research

Several problems have been mentioned in the preceeding section which have arisen during the course of the present investigation and are as yet unsolved. In this section those problems will be set forth as specific areas in which future research might be conducted.

First, since this thesis embodies the research carried on as a "pilot" study for a larger investigation of the academic preparation of Jesuit high school graduates, the most logical suggestion would be for that extended study to be made. It has come to the attention of the present investigator that this study has been started.

Second, the following problems aroused by this thesis might be examined:

1. In order to determine whether the superior achievement of Jesuit high school graduates is due to their peculiar academic high school preparation, to natively superior intellectual ability, or to a combination of both of these, a study could be made similar to the present one but adding the pre-high school intelligence scores of the Jesuit and non-Jesuit graduates included in the investigation.

2. Some English achievement examination other than the Cooperative test might be used to measure this basic ability of other Jesuit high school graduates. Such an investigation seems warranted by the presently unexplained level of attainment achieved by the Jesuit trained graduates of this study.

NOTES

1. E. C. Hunter, "Changes in Scores of College Students on the American Council Psychological Examination at Yearly Intervals During the College Course," Journal of Educational Research, XXXVI (December, 1942), 284-91.

2. T. M. Livesay, "Does Test Intelligence Increase at the College Level?" Journal of Educational Psychology, XXX (January, 1939), 63-68.

3. T. R. McConnell, "Changes in Scores on the Psychological Examination of the A.C.E. from Freshman to Senior Year," Journal of Educational Psychology, XXV (January, 1934), 66-69.

4. Charles D. Flory, "The Intellectual Growth of College Students," Journal of Educational Research, XXXIII (February, 1940), 443-51.

5. Sister Mary Florence Louise, "Mental Growth and Development at the College Level," Journal of Educational Psychology, XXXVIII (January, 1947), 65-83.

6. Audrey M. Shuey, "Improvement in Scores on the American Council Psychological Examination from Freshman to Senior Year," Journal of Educational Psychology, XXXIX (November, 1948), 424.

7. Herbert M. Silvey, "Changes in Test Scores After Two Years in College," Educational and Psychological Measurement, XI (Autumn, 1951), 494-95.

8. Melvin W. Barnes, "Gains in the A.C.E. Psychological Examination During the Freshman-Sophomore Years," School and Society, LVII (February, 1943), 250-52.

9. Ibid., p. 500.

10. Ibid., p. 501.

11. Edward J. Furst, "Relationship Between Tests of Critical Thinking and of Knowledge," Journal of Educational Research, XLIII (April, 1950), 623.

12. John F. Sullivan, S.J., "Standardized Tests Measure Jesuit College Preparation," Jesuit Educational Quarterly, XVI (January, 1954), 162.

13. Margaret Seder, "The Reliability and Validity of the American Council Psychological Examination, 1938 Edition," Journal of Educational Research, XXXIV (October, 1940), 98-99.

14. Hugh S. Brown, "Differential Prediction by the A.C.E.," Journal of Educational Research, XLIV (October, 1950), 117.

15. W. L. Wallace, "Differential Predictive Value of the A.C.E. Psychological Examination," School and Society, LXX (July, 1949), 24.

16. Robert Jacobs, "Public School Testing Project Third Report," 1950 Achievement Testing Program in Independent Schools and Supplementary Studies. Educational Records Bulletin, No. 54, p. 110.

17. Sullivan, op. cit., p. 162.

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Barnes, Melvin W. "Gains in the ACE Psychological Examination During the Freshman - Sophomore Years," School and Society, LVII (February, 1943), 250-52.

Study was made to determine if the "Q" score changes significantly after study of mathematics. Results were not significant. Thus, the "Q" score seems to be far more stable than the "L" score and less influenced by education or college training.

Bernert, Roman A., S.J. "College Deans Evaluate Jesuit High Schools," Jesuit Educational Quarterly, XV (October, 1952), 107-13.

Contains an evaluation of the academic preparation for college of Jesuit high school graduates by deans in Jesuit colleges and universities. The questionnaire method of sampling opinions was employed.

Brown, Hugh S. "Differential Prediction by the A.C.E.," Journal of Educational Research, XLIV (October, 1950), 115-21.

The three scores of the A.C.E., the "Q" score, the "L" score, and the total score, were correlated with grade point averages in quantitative and linguistic subjects. The highest correlations were found between the "L" score and linguistic subjects.

Commins, W. B. "American Council on Education Psychological Examination for College Freshmen," The Third Mental Measurements Yearbook, edited by Oscar Krisen Buros. New Brunswick (N.J.): Rutgers University Press, 1949. Pp. 296-97.

A general evaluation of the A.C.E. Psychological Examination. Commins' comments are favorable, but he feels that the division of the test into "L" and "Q" scores needs considerable study before their full significance becomes apparent.

The Cooperative Achievement Tests: A Handbook. New York: The Cooperative Test Service of the American Council on Education, 1936. Pp. 39.

This handbook contains a description of the nature and purposes of the Cooperative Test Service and their achievement tests.

Cooperative English Test, Percentile Ranks for High School and College Students. Princeton: Cooperative Test Division, Educational Testing Service, 1951. Pp. 9-10.

This manual contains the norms used in the present thesis for the Cooperative English Test. The norms are in terms of scaled scores and based on data gathered from 50,000 entering freshmen in ninety colleges throughout the nation.

Cronbach, Lee J. Essentials of Psychological Testing. New York: Harper & Brothers, Publishers, 1949. Pp. xiii + 475.

The section of this book treating the A.C.E. Psychological Examination explains the method of constructing the norms for this test. Also contains comments on the test's reliability.

Diagnostic Reading Tests, Survey Section, Directions for Administering. New York: The Committee on Diagnostic Reading Tests, Inc., 1948. Pp. 7.

Used to obtain a general description of this test with its various sections and also the norms which were based on 883 college freshmen in the arts and sciences college of the University of Denver.

Edwards, Allen L. Statistical Analysis for Students in Psychology and Education. New York: Rinehart & Company, Inc., 1953. Pp. xviii + 360.

This textbook in statistics along with those by Lindquist and Smith listed below was used to obtain the formulas needed for the statistical computations for the present research. These texts also provided the information on significance set forth in Chapter II.

Flory, Charles D. "The Intellectual Growth of College Students," Journal of Educational Research, XXXIII (February, 1940), 443-51.

A study containing a comparison of freshman and senior scores of 74 students at Lawrence college on the A.C.E. Psychological Examination. A significant gain in percentile rank was noted.

Freeman, Frank S. The Theory and Practice of Psychological Testing. London: Sir Isaac Pitman & Sons, Ltd., 1950. Pp. ix + 518.

Contains a general description of the A.C.E. Psychological Examination, a discussion of the various subtests, and the derivation of the "Q," "L," and total scores for this test. Also describes the various norms available.

Furst, Edward J. "Relationship Between Tests of Critical Thinking and of Knowledge," Journal of Educational Research, XLIII (April, 1950), 614-25.

Furst correlated the "Q" and "L" scores of the A.C.E. Psychological Examination with various tests of knowledge and achievement. He found considerably higher correlations between the "L" score and such tests than between the "Q" scores and achievement tests. Lends support to the position of this thesis that the superior A.C.E. "L" scores of the U. of D. High School graduates very probably reflect superior academic preparation.

Harris, Chester W. "Cooperative English Tests: Lower and Higher Levels," The Fourth Mental Measurements Yearbook, edited by Oscar Krisen Buros. Highland Park (N. J.): The Gryphon Press, 1953. Pp. 300-01.

Harris criticizes the Cooperative English Test in this review for two reasons: 1. The test measures the ability to proofread, locate errors, and criticize written materials rather than the ability to express oneself correctly in English. 2. There is a lack of adequate reliability studies to determine the value of this test.

Hunter, E. C. "Changes in Scores of College Students on the American Council Psychological Examination at Yearly Intervals During the College Course," Journal of Educational Research, XXXVI (December, 1942), 284-91.

Different editions of the A.C.E. Psychological Examination were administered to seniors, juniors, and sophomores who had been previously tested as freshmen at Converse College. Percentile gains from 23 to 31 points were found for the three groups.

Jacobs, Robert. "Public School Testing Project Third Report," 1950 Achievement Testing Program in Independent Schools and Supplementary Studies. Educational Records Bulletin No. 54. New York: Educational Records Bureau, 1950. Pp. 108-19.

It was discovered in this study that there appears to be a difference between public school college-preparatory groups and independent school groups in verbal and linguistic aptitude and achievement. The difference is in favor of the latter group. This study was pertinent to the present thesis in that the U. of D. High School graduates, an independent school group, fell below the national norms on the Cooperative English Test.

Lennon, Roger T. "Comparison of the Educational Achievement of Public and Parochial Elementary School Pupils," Catholic Educational Review, XLVI (December, 1948), 647-52.

One of the very few published studies comparing the educational achievement of public and parochial school students. The students of this study were of the elementary school level.

Lindquist, E. F. A First Course in Statistics. Revised edition. New York: Houghton Mifflin Company, 1942. Pp. xi / 242.

See annotation for Edwards above.

Livesay, T. M. "Does Test Intelligence Increase at the College Level?" Journal of Educational Psychology, XXX (January, 1939), 63-68.

Fifty University of Hawaii Students were retested by Livesay with the 1931 edition of the A.C.E. Psychological Examination. The senior mean was 199.5 as compared with the freshman mean of 154.7.

Louise, Sister Mary Florence. "Mental Growth and Development at the College Level," Journal of Educational Psychology, XXXVIII (January, 1947), 65-83.

In this study 288 students of three classes at Marygrove College in Detroit were tested with the A.C.E. Psychological Examination as freshmen and again as seniors. Mean percentile ranks rose from 47, 48, and 51 as freshmen to 75, 75, and 77 as seniors on the "Q," "L," and total scores.

McConnell, T. R. "Changes in Scores on the Psychological Examination of the A.C.E. from Freshman to Senior Year," Journal of Educational Psychology, XXV (January, 1934), 66-69.

McConnell tested 70 Cornell College freshmen with one form of the A.C.E. Psychological Examination and then retested them with another form as seniors. The mean scores rose from 144.78 to 185.2.

Mc Cullough, Constance M., and John C. Flanagan. "The Validity of the Machine-Scorable Cooperative English Test," Journal of Experimental Education, VII (March, 1939), 229-34.

Two early forms of the Cooperative English Test were correlated with several different criteria, such as the teacher's estimate of excellence in oral and written English, in an attempt to determine the validity of this testing instrument. The median coefficient of correlation was found to be .53, but the forms used in this study are no longer in print.

Mehok, William J., S.J. "An Analysis of National Statistics 1952-1953," Jesuit Educational Quarterly, XV (January, 1953), 175-82.

This article presents the national statistics for the Jesuit universities and colleges. The statistic used for the present study was the total number of students entering the University of Detroit as freshmen in September, 1952.

Mehok, William J., S.J. "Survey of Jesuit High Schools: Evaluation: 1946-1952," Jesuit Educational Quarterly, XIV (March, 1952), 209-18.

From this national survey of Jesuit secondary education was derived the percentage of Jesuit high school graduates who enter Catholic colleges and universities. This statistic was important in determining the representativeness of the U. of D. High School sample used in the present research.

Pooley, Robert C. "Cooperative English Tests: Lower and Higher Levels," The Third Mental Measurements Yearbook, edited by Oscar Krisen Buros. New Brunswick (N.J.): Rutgers University Press, 1949. Pp. 222-23.

A general description and evaluation of the Cooperative English Test. Although Pooley criticizes the test for not actually measuring the ability to use English effectively in speech and writing, yet, he states that it is one of the best tests available in the field of English skills.

Richardson, Marion W. "Cooperative Mathematics Test for College Students: Pre-Test for First Year Students, Experimental Forms A and B," The Nineteen Thirty Eight Mental Measurements Yearbook of the School of Education Rutgers University, edited by Oscar Krisen Buros. New Brunswick (N.J.): Rutgers University Press, 1938. P. 117.

A short but favorable review of the experimental forms of the present Cooperative Mathematics Pre-Test for College Students. Richardson believes the early forms contained an excellent sampling of secondary mathematics.

Seder, Margaret. "The Reliability and Validity of the American Council Psychological Examination, 1938 Edition," Journal of Educational Research, XXXIV (October, 1940), 90-101.

This study discovered relatively high correlations between the "L" score of the A.C.E. Psychological Examination and measured achievement in English, foreign language, history, and science. The highest correlations, ranging from .72 to .77, were between the "L" score and achievement in English.

Shuey, Audrey M. "Improvement in Scores on the American Council Psychological Examination from Freshman to Senior Year," Journal of Educational Psychology, XXXIX (November, 1948), 417-26.

Shuey tested 108 students as freshmen at Randolph-Macom Women's College and again when these same students were seniors. Significant mean percentile increases were discovered on all three scores of the A.C.E. Psychological Examination.

Silvey, Herbert M. "Changes in Test Scores After Two Years in College," Educational and Psychological Measurement, XI (Autumn, 1951), 494-502.

This investigator retested sophomores at Iowa State Teachers College with a different form of the A.C.E. Psychological Examination from the one used on the same students as freshmen. Not only was a mean raw score gain of 18.76 noted, but also differential gains on the "Q" and "L" score parts of the test. The mean "L" score gain was 13.25 whereas the mean "Q" score gain was only 5.50.

Smith, G. Milton. A Simplified Guide to Statistics. Revised edition. New York: Rinehart & Company, Inc., 1954. Pp. xiv + 109.

See annotation for Edwards above.

Starke, E. P. "Cooperative Mathematics Pre-Test for College Students," The Fourth Mental Measurements Yearbook, edited by Oscar Krisen Buros. Highland Park (N.J.): The Gryphon Press, 1953. Pp. 486-87.

This is one of the very few reviews of the present forms of the Cooperative Mathematics Pre-Test for College Students. Starke describes and evaluates the test. His major criticism of the instrument is that it would be of little value in predicting success in advanced mathematics courses.

Sullivan, John F., S.J. "Standardized Tests Measure Jesuit College Preparation," Jesuit Educational Quarterly, XVI (January, 1954), 149-63.

This article contains a description of a proposed investigation to determine the academic preparation for college of Jesuit trained high

school graduates. It also introduces the main findings of the present thesis which served as a "pilot" study for the more extensive proposed research. These statistics were furnished to Father Sullivan before the completion of the writing of this thesis.

Thurstone, L. L., and Thelma Gwinn Thurstone. Psychological Examination for College Freshmen: 1946 Norms. American Council on Education Studies, Council Staff Reports, Series V, Vol, XI, No. 11. Washington (D.C.): American Council on Education, 1947. Pp. 16.

This manual for the A.C.E. Psychological Examination contains a description of the various subtests, an interpretation of the meaning of scores derived from the test, and the norms themselves. The norms used for the present thesis were those taken from the tables compiled from the test results of freshmen in 317 liberal arts colleges. These tables appear on pages 11, 14, 15, and 16 of this manual.

Traxler, Arthur E. "Reliability and Validity of the Scores on the Six Parts of the American Council on Education Psychological Examination," 1952 Achievement Testing Program in Independent Schools and Supplementary Studies. Educational Records Bulletin, No. 58. New York: Educational Records Bureau, 1952. Pp. 71-79.

Contains a very favorable appraisal of the A.C.E. Psychological Examination. Traxler states that this is "without doubt the most widely used test of the academic aptitude of college freshmen."

Triggs, Frances Oralind. "Description of the Purposes and Functions of the Diagnostic Reading Tests," Educational and Psychological Measurement, VIII (Spring, 1948), 3-14.

Triggs, the chairman of the committee which prepared the Diagnostic Reading Tests, describes this instrument and its purposes. She also presents the average validity coefficients for the Survey Section and the average reliability coefficients for the three subtests of this section.

Turnbull, William W. "Diagnostic Reading Tests," The

Fourth Mental Measurements Yearbook, edited by Oscar Krisen Buros. Highland Park (N.J.): The Gryphon Press, 1953. Pp. 572-74.

This is the most commendatory review of the Diagnostic Reading Tests found by the present writer. The article contains a rather complete description of the parts of the tests, their validity and reliability coefficients, and a very favorable evaluation.

University of Detroit Bulletin: Graduate School, XLI (January, 1954), 111.

The number of Jesuit colleges and universities in the United States was determined from the list on page 111 of this bulletin.

Wallace, W. L. "Differential Predictive Value of the ACE Psychological Examination," School and Society, LXX (July, 1949), 23-25.

Wallace correlated the "Q," "L," and total scores of the A.C.E. Psychological Examination with the 18 most usual first year college courses. Although all correlations were relatively low, the highest was found to be between English and the total score.

Weitz, Henry. "Diagnostic Reading Tests," The Fourth Mental Measurements Yearbook, edited by Oscar Krisen Buros. Highland Park (N.J.): The Gryphon Press, 1953. Pp. 574-77.

In this review of the Diagnostic Reading Tests, the author gives a description of the entire battery and explains its purpose. He also analyzes the Survey Section in detail and evaluates it rather unfavorably. He comments that although it is inadequate as an independent measure of separate reading skills, it may be used as a screening device for detecting reading handicaps.

Wilks, S. S. "Cooperative Mathematics Test for College Students: Pre-Test for First Year Students, Experimental Forms A and B," The Nineteen Thirty Eight Mental Measurements Yearbook of the School of Education Rutgers University, edited by Oscar Krisen Buros. New

Brunswick (N.J.): Rutgers University Press, 1938. P. 117.

A short review of the experimental form of the present Cooperative Mathematics Pre-Test for College Students.