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A Study of the Value of the High School General Educational Development Tests as Predictors of College Success

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A STUDY OF THE VALUE OF THE HIGH SCHOOL GENERAL EDUCATIONAL DEVELOPMENT TESTS AS PREDICTORS OF COLLEGE SUCCESS

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This thesis, offered by George Edberg as a partial fulfillment of the requirements for the Degree of Master of Science in Education, is hereby approved by the Commitee under whom the work has been done.

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CHAPTER I

Statement of the Problem

The end of World War II released a tremendous number of men from military duty and precipitated the need for our society and economy to absorb this number in a comparatively short period of time. Many within this group had developed a real or a fancied desire for further education with the result that educational institutions throughout the country found their facilities taxed to the utmost, with the resultant need for a means of making available facilities function to the best possible level of efficiency.

Our educators were unanimous in their determination to provide every possible means whereby the returning veteran might acquire the training best suited to his interests, aptitudes, and abilities and to make every effort to compensate for the time spent in service wherever possible and practicable. One such attempt has been the use of the high school level General Educational Development tests for the purpose of (1) providing a more adequate basis for the educational and vocational guidance of those who have served in the armed forces, (2) assisting the schools in the appropriate placement in a program of general education of the students returning from military service, and (3) helping schools determine the amount of academic credit which should be granted a student for his educational experiences while in military service.

These tests were accordingly "designed to measure the extent to

which all of the past educational experiences of the individual tested -- including the experiences gained in military service -- have contributed to his general educational development, or to his ability to carry on successfully in a program of general education of the type which the academic high school and the first two years of liberal arts college aim to provide."[1]

While the American Council on Education has developed both college and high school level batteries of General Educational Development Tests, this study will deal only with the predictive value of the high school level battery when used with individuals who have completed less than the usual four years of high school. It will also compare this correlation with college success with that of the Ohio State University Psychological Test, Form 21.

The Ohio Psychological Test was used as a part of this study because it was administered almost routinely in the guidance centers, from which much of the material for this study was gathered, to all veterans who indicated a preference for an objective which seemed to preclude a liberal arts college level of training. It was also used because it is designed to evaluate that aspect of general intelligence usually referred to as scholastic aptitude and is of the work-limit or power type generally considered a more accurate appraiser of a student's scholastic potential than a similar time-limit test.

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[1] American Council on Education, Examiner's Manual, Tests of General Educational Development, High School Level, 1944, p.4

It was felt that in using this test as a means of comparison, an instrument would be used whose validity was well established, since "The criterion used for the validation of the Ohio Psychological Test - Form 21 - was in the Point Hour Ratio of college freshmen, covering a period of three quarters (a full college year of thirty-six weeks). A validity coefficient of .68 was found, based upon 1030 cases. This coefficient is materially higher than those usually found in similar studies, a fact which justifies the extensive use of this test in situations where the highest possible academic prediction is required."[1]

The predictive value of the High School General Educational Development Tests has been discussed for some time by vocational advisors, college admission authorities and other interested persons who have been faced with the problem of determining which of the returning servicemen have sufficient academic promise to justify recommending that they attempt work on a liberal arts college level. Most individuals, whose duty it is to make such recommendations, have felt that the usual techniques for determining probability of success in college lack their normal validity when used with veterans who have less than four years of high school preparatory training and who have been away from a school learning situation for a considerable period of time.

Is a vocabulary type test the best single means of measuring college aptitude of these men? Does the added maturity and sense of purpose which

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[1] The Ohio State University Psychological Test, Manual of Directions, 1941, p. 2

these men have acquired through military experiences affect their chances for success? Do the High School General Educational Development Tests measure significant areas which the vocabulary type test does not explore? Does the number of years of formal schooling completed, age, or marital status, have a bearing on college success? These are questions which this study seeks to answer.

In discussing admission policies with the authorities of the colleges used in this study, it was interesting to note that more or less arbitrary achievement levels on the High School General Educational Development Tests have been used for admission purposes. The College of St. Thomas has required a more or less specific achievement, based on the total score of the five tests, but for the most part, the High School Equivalence Certificate[1] has been accepted in lieu of a high school diploma and the veteran's candidacy has been handled in the same manner as that of a high school graduate with varying regard for the loss of scholastic aptitude resulting from his stay in military service.

The need for a study to determine what validity, if any, these tests might have, has been felt ever since the end of the war, but no study has been possible until a sufficiently large number of cases tested have had time to establish a usable college record. While the college records of the cases to be examined will still be too meager to justify conclusive decisions, the value of the study will continue to decrease as more and

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[1] A veteran has been eligible for a High School Equivalence Certificate if he has achieved a standard score of thirty-five or more on each of the five General Educational Development Tests, or has achieved a total standard score of two hundred forty-five or more on the battery.

and more of the returning veterans make decisions as to the type of training they will pursue.

Criteria Used for the Selection of Cases

The study reported here was based upon the college success of veteran students who are non-high-school graduates and who are, or have been, attending the University of Minnesota, Hamline University, Macalester College, or the College of St. Thomas. The prime purpose of the study was to gain as much information as possible about the value of the High School General Educational Development Tests when used as predictors of college success. College success, in this case, is understood to mean adequate progress on a liberal arts college level. In order that the findings and conclusions might be sufficiently definitive, the following criteria were used for the group selected:

1. Each case must have completed less than the usual four years of high school or preparatory training.
2. Each case must have college grade data covering at least one semester, or two quarters of work, unless he was dropped for lack of adequate progress.[1]
3. Each case file must contain data on the General Development Tests, the High School Level, and the Ohio Psychological Test, Form 21.

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[1] Grade data for less than two quarters of work at the University of Minnesota was used in two instances where the student had dropped out before finishing the second quarter of work. These cases were included because the study was designed to measure as nearly as possible, the success of all of the veterans who had attempted work on a liberal arts college level.

Method Used in the Collection of the Data

The veteran's registers, which are maintained by the St. Paul Department of Education, the University of Minnesota, and the Fort Snelling Veterans Guidance Centers, were used to obtain the names of veterans who had not completed high school and who had selected objectives for which liberal arts college training seemed a likely prerequisite. The name, age, date of advisement, marital status, school grade completed, and vocational objective of each of these veterans was placed upon a specially prepared card.[1] Approximately five hundred fifty cards were prepared from these registers.

These cards were then checked against the student registers of the University of Minnesota, Macalester College, College of St. Thomas, and Hamline University, from the summer of 1945 through the fall of 1947, for evidence of attendance. At this point, eighty-three cases at the University of Minnesota; twenty-three cases at the College of St. Thomas; sixteen cases at Macalester College; and seventeen cases at Hamline University had been verified.

Using the individual student record files at the schools, all college grade data available were placed on each veteran's card. The reason for withdrawal was also noted when the veteran had dropped out of school and when this information was contained in his file. Lack of sufficient college grade data, inability to make a positive association between the record file and the veteran's card, and evidence that the veteran was a

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[1] See Appendix B

high school graduate, further reduced the number of cases at this point to seventy-eight at the University of Minnesota, twenty at the College of St. Thomas, fourteen at Macalester College, and thirteen at Hamline University.

The final step in the collection of data consisted of referring to the veterans' advisement and training files for data on High School General Educational Development Test scores and the scores achieved on the Ohio Psychological Test. The files used for this purpose were found at the three guidance centers where the cases originated, and at the Minneapolis Regional Office and the Minneapolis Local Office of the Veterans Administration. Due to the fact that some of the records were incomplete and others could not be located, a further decrease in the number of usable cases resulted at this point. Now there remained only sixty-four cases at the University of Minnesota, Sixteen at the College of St. Thomas, seven at Macalester College, and eight at Hamline University. This study deals with the data obtained from these ninety-five cases.

In order to maintain a more homogeneous group, the 64 cases at the University of Minnesota will be considered separately and on the basis of the Science, Literature and Arts College standards. The college grade data for the seventeen veterans who have trained at the University of Minnesota, General College, will be revised downward one honor point to conform with this standard. While this revision may appear rather empirical, it must be remembered that the veterans who began their training in the General College, must maintain approximately a "B" average in order to be

eligible for transfer to the Science, Literature and Arts College. Further, Mr. Vaughn, Assistant Dean of the General College, stated that this revision is compatible with the results of surveys which he has made and seems consistent with the marking system used by instructors who have both General College and Science, Literature and Arts College students in their classes.

The college grade data for the students who attended the three state colleges can be considered sufficiently honogeneous from the standpoint of entrance requirements, type of instruction, and grading systems. The thirty-one cases in this category is not large enough to provide more than an opportunity to make some observations and comparisons which may be of interest.

Statistical Methods Used for Interpretation of Data

A linear conversion of the honor point average of each of the cases examined was made to a T-scale. An honor point average of 1.0 was assigned a T-score value of 50, and each tenth of an honor point was counted as one T-score. By using this system, a -1.0 honor point average, which represents complete scholastic failure, became a T-score of 30, and an honor point average of 3.0, which represents an "A" average, became a TOscore of 70.

All test data used were based on a standard T-score distribution since raw scores had been transmitted into T-scores on the records used. Data concerning the tests and the test norms used in this study may be found in Appendix A.

From the sixty-four cases at the University of Minnesota, the following information was derived:

1. The mean, median and the standard deviation of each of the General Educational Development Tests and of the average score on the five tests.
2. The mean, median and the standard deviation of the Ohio Psychological Test, Form 21.
3. The mean, median and the standard deviation of the T-scores representing the honor point averages of the cases used.
4. The correlation between the honor point averages and each of the five General Educational Development Test scores.
5. The correlation between the honor point average and the average score on the five General Educational Development Test scores.
6. The correlation between the honor point averages and the scores on the Ohio Psychological Test, Form 21.
7. The standard error of estimate in predicting honor point averages for each of the General Educational Development Tests, for the average of these tests and for the Ohio Psychological Test, Form 21.
8. The sampling error involved in each coefficient of correlation obtained.

CHAPTER II

Review of Literature Concerning the Use of the General Educational Development Tests

Judging by the veterans who have acquired High School Equivalence Certificates by means of the General Educational Development Tests at the three centers used in this study, the number of veterans who intend to use their certificates for college entrance is relatively small. For the most part, these veterans indicated that they were interested in securing a High School Equivalence Certificate because employers so often expressed a preference for men who were high school graduates or who had an equivalence certificate.

It would seem to be an unfortunate error to think of the General Educational Development Tests solely in terms of college admissions, although that is the only aspect of the tests which this study seeks to delineate. It was interesting to observe that there was little or no feeling on the part of school officials or educators contacted during the course of the survey who felt that these special diplomas, when properly designated, jeopardized special curricula or educational standards. The majority of colleges set their own admissions standards higher than those defined in the ordinary high school diploma or the equivalence certificate acquired on the basis of the tests. Some colleges have reported that they were delighted with the receipt of the General Educational Development Test results and that they felt more confident in using them than in using the

ordinary transcript of high school courses and grades.

A review of available literature indicates that no all-inclusive survey of college practices have been made, but three separate, partial surveys indicate that at least a majority, and perhaps many more, are using the General Educational Development results in determining admissions of veterans who are non-high-school graduates. These surveys have been:

1. That made by Carter V. Good[1] reported in 1945, where 1446 colleges and universities were polled. Eighty-nine per cent indicated acceptance of military training and service school training; eighty-three per cent, United States Armed Forces Institute correspondence courses; fifty-four per cent, General Educational Development Tests; and sixty-three per cent, United States Armed Forces Institute subject-matter examinations.
2. A less formal study based on oral responses obtained in some twenty regional meetings of the staff of the Commission on Accreditation with college officers in 1946 and 1947[2]. About eighty-five per cent of the college representatives attending these meetings indicated their readiness to recognize the results

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1 A Guide to Colleges and Universities and Professional Schools in the United States, Compiled under the direction of Carter V. Good (American Council on Education, Washington, D.C., 1945)

2 Commission on Accreditation of Service Experience, "Progress Report - February, 1947", Mimeographed, 5 pages

of these tests as a primary educational factor in determining admission of veterans.

3. A study in 1947 by the Commission on Accreditation[1] was based on replies from sixty-eight registrars, representing a cross-section from the United States. Eighty-four per cent of these sixty-eight used General Educational Development Test results for admissions either in whole or in part.

Several follow-up studies of the use of the General Educational Development Tests for admissions purposes have been made to date. A study at the University of Wisconsin[2] was concerned with several measures of probable university scholastic success: Namely, the American Council on Education Psychological Examination, the number of high school units completed prior to admission for degree work, and the five High School General Educational Development tests. Based upon an analysis of this data, the following generalizations and conclusions were reported:

1. There is no apparent relationship between grade-point averages and the number of high school units completed.
2. Of the measures used, the best in determining and predicting University success seems to be first, Test Number 1, Correctness and Effectiveness of Expression,

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1 Summary of Responses from Sixty-Eight Registrars to Questions Pertaining to the Granting of College Credit for Accreditation of Service Experience, Compiled by Floydine D. Miscompbell, Commission on Accreditation, Mimeographed, 18 pages, (Washington, D.C., Fall, 1947)

2 E.E. Milligan, L. Joseph Lins, and Kenneth Little, "The Success of Non-High School Graduates in Degree Programs at the University of Wisconsin", School and Society, January 10, 1948, p.27-29

of the General Educational Development Test battery; next, the composite of the five General Educational Development Tests; and thirdly, the American Council on Education Psychological Examinations.

3. There is no apparent relationship between the number of high school units completed and university success.

A study to determine the relationship between the scores achieved on the College Level General Educational Development and the honor-point ratio of first term freshmen in the General College of the University of Minnesota[1] led to the following conclusions:

1. The total General Educational Development Test score is better than any of the individual tests as a predictor of scholastic success for the sixty cases used.
2. Test Number 2, social science, is the best individual General Educational Development Test as a predictor of scholastic success for the sample used.
3. Of the measures studied and reported on to date, the total General Educational Development Test score shows promise of being one of the best single predictors of scholastic success.

Other studies on the predictive value of the College Level General

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1 Robert Collis and Gilbert Wren, "The G.E.D. Test on Prediction of Scholastic Success", Journal of Educational and Psychological Measurement, Spring, 1947

Educational Development Tests at MacMurray College,[1] Yale University,[2] and Harvard University[3] indicate essentially the same findings as did the study at the University of Minnesota, but point out that these tests do not serve well in determining admissions to scientific and engineering schools because they omit the measure of higher mathematics, mechanical drawing and descriptive geometry, which are basic requirements for such schools.

Further studies dealing with veterans admitted to liberal arts colleges on the basis of High School General Educational Development Tests include one conducted by Phil H. Putnam[4] at the Vanport Extension Center, Oregon State System of Higher Education; one by Edward C. Roeber,[5] Director of Guidance and Counseling at Kansas State Teachers College, Pittsburg, Kansas; and one by Robert H. Owens,[6] Supervisor of Veterans Education in the Cleveland schools.

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1 "A Study of the Validity of the Armed Forces Tests of General Educational Development in the Field of Social Studies", Educational and Psychological Measurement, Summer, 1946

2 "Trial at Yale University of the Armed Forces Institute General Educational Development Tests", Educational and Psychological Measurement, Winter, 1945, p. 261-70

3 "Evidence on the Validity of the Armed Forces Institute Tests of General Educational Development (College Level)", Educational and Psychological Measurement, Winter, 1945, p. 321-333

4 "Report: Scholastic Achievement of G.E.D. Students at the Vanport Extension Center", School and Society, August 30, 1947, p. 161-163

5 "A Summary of the Achievement (on College Level) of Kansas State Teachers College Veterans Passing the G.E.D. Tests for a Certificate of High School Equivalency". Mimeographed, Kansas State Teachers College, April, 1947

6 Second Annual Report, June, 1946, Mimeographed and distributed by Cleveland Public Schools, 1947

Mr. Putnam[1] reported that the veterans who had been accepted for college work on the basis of High School General Educational Development Tests, made slightly higher grades than students who had been admitted on the usual basis and who were high school graduates from accredited high schools. He also reported that student mortality was slightly higher in the veteran group than in the non-veteran group.

On the basis of his study at the Kansas State Teachers College, Dr. Roeber states:

> "The State Teachers College Admissions Committee decided upon a policy which they believed would protect the best interests of the veterans. In order to enter Kansas State Teachers College on the basis of General Educational Development Tests, a veteran must average at least 45, with no score less than 40. The final test of whether such a policy is wise will depend upon the achievement of those veterans who have been admitted to Kansas State Teachers College on this basis. Their record up to the second semester, 1946-1947, makes it evident that their marks are distributed normally; and, unless freshman marks are badly skewed toward the higher grades, it would appear that the General Educational Development Tests veterans fare as well as other veterans. There seems to be sufficient evidence to warrant the continuation of present policies concerning the General Educational Development Tests. It is also evident that the veterans have received marks in most departments quite in line with normal expectations. Experience thus far has confirmed the wisdom of the Admissions Committee."[2]

As a result of his study, Dr. Owens states:

> "During the past two years there has been considerable discussion by some school administrators to the effect

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1 "Report: Scholastic Achievement of G.E.D. Students at the Vanport Extension Center", School and Society, August 30, 1947, p. 161-163

2 "A Summary of the Achievement (on College Level) of Kansas State Teachers College Veterans Passing the G.E.D. Tests for a Certificate of High School Equivalency." Mimeographed, Kansas State Teachers College, April, 1947

> that the General Educational Development Tests were too easy and that high school seniors with the same mental ability would rank much higher than veterans on the tests. To check the soundness of these statements, the scores made by seniors were compared with the scores made by veterans with comparable levels of mental alertness. (Mental Alertness was tested by the California Mental Maturity Test.) Average standard scores on the General Educational Development Tests were used. The groups were so arranged that each provided equal numbers in each mental ability range. When this equalization was established, it was apparent from the figures that the veterans compared favorably with the high school seniors and that the norms originally established by the American Council on Education for General Educational Development Tests are sound. Approximately one hundred seventy-five pairs of veterans and seniors were included in this study."[1]

In summarizing the content of published research pertaining to follow-up studies admitted on the basis of General Educational Development Test results, three points become quite evident: 1. Institutions set a critical level that agrees with previously established levels for their own clientele; 2. in the matter of college grades, veterans admitted on a General Educational Development Test basis appear to be at least holding their own in competition with other students; and 3. the General Educational Development Test total score is proving to be as good, or better, as a predictor of scholastic success than measures previously used.

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[1] Second Annual Report, June, 1946, Mimeographed and distributed by the Cleveland Public Schools, 1947

CHAPTER III

Correlation Statistics

As stated in previous paragraphs, the data consist of sixty-four cases for which data were available on honor point averages at the University of Minnesota, the six scores, including the average score, for the High School General Educational Development Tests and the scores on the Ohio Psychological Test, Form 21. From these data, a grouped frequency distribution was constructed for each of the eight areas. The statistical procedures used to obtain the mean, median and the standard deviation, were based on this distribution. The Pearson Product Moment Method of Correlation was used. The statistical procedures and the results obtained for each of the eight areas will be taken up in order with attention first directed toward the data on college progress as represented by honor point averages.

Honor Point Averages Achieved at the University of Minnesota, Based on Science, Literature, and Arts College Standards

The mean of the honor point averages was found to be 47.8; the median score was found to be 48.8; and the standard deviation of the distribution was 7.46. Reference is made to Table I, page 18, where arithmetical computation is provided. The honor point average will be referred to as variable "y" in all statistical computations that follow.

Table I

Arithmetical Computation
Honor Point Averages

Group	Frequency	Deviation	Fd	Fd^2
62-64	3	6	18	108
59-61	3	5	15	75
56-58	3	4	12	48
53-55	5	3	15	45
50-52	14	2	28	56
47-49	13	1	13	13
44-46	8	0	0	0
41-43	4	-1	-4	4
38-40	5	-2	-10	20
35-37	1	-3	-3	9
32-34	1	-4	-4	16
29-31	4	-5	-20	100
Total	64		60	494

$$\frac{\Sigma Fd}{N} = .94 \qquad \left[\frac{\Sigma Fd}{N}\right]^2 = .88 \qquad \sqrt{\frac{\Sigma Fd^2}{N} - \left[\frac{\Sigma Fd}{N}\right]^2} = \sqrt{7.72 - .88} = 2.60$$

Standard Deviation = 3 x 2.60 = 7.8

Mean = 45 + (3 x .94) = 47.8 Median = 43.5 + 6.4 = 48.9

High School General Educational Development Test Number 1 and its Correlation with Honor Point Averages

A mean of 50.66, a median of 50.6, and a standard deviation of 6.69 were found for the scores on Test Number 1. The correlation between the scores on this test and the honor point averages was found to be +.58. The standard error of estimate was computed as 5.59 and the sampling error involved in the coefficient of correlation was found to be .080. Reference is made to Table II, page 20, where all arithmetical computations are provided. The scores on Test Number 1 are represented by variable "x_1", and the honor point average is represented by variable "y" in all statistical computations.

From these figures it may be observed that the true coefficient of correlation lies somewhere between .38 and .78 at the five per cent confidence level. Similarly, the two per cent confidence level is .36 to .80, and the one per cent confidence level .34 to .82.

Testing the significance of this correlation by means of the null hypothesis[1], it may be observed that the coefficient required for significance with an "N" of 64 is .246 at the five per cent level and .320 at the one per cent level. Since the "r" obtained in this case is .58 and considerably greater than the second of these values, it may be concluded that the null hypothesis is disproved and that the correlation between the scores on Test Number 1 and college grades is significant.

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[1] See page 33.

Table II

Arithmetical Computation
High School General Educational Development Test Number 1
Correlated with Honor Point Averages

Group	Frequency	Deviation	Fd	Fd^2
67-69	1	6	6	36
64-66	1	5	5	25
61-63	2	4	8	32
58-60	6	3	18	54
55-57	10	2	20	40
52-54	8	1	8	8
49-51	14	0	0	0
46-48	8	-1	-8	8
43-45	4	-2	-8	16
40-42	6	-3	-18	54
37-39	3	-4	-12	48
34-36	1	-5	-5	25
Total	64		14	346

$\frac{\Sigma Fd}{N} = .22 \quad \left[\frac{\Sigma Fd}{N}\right]^2 = .0484 \quad \frac{\Sigma Fd^2}{N} = 5.41 \quad \sqrt{5.41 - .05} = 2.31$

Standard Deviation = 3 x 2.31 = 6.9

Mean = 50 + (3 x .22) = 50.66 Median = 48.5 + 2.1 = 50.6

$$r_{x_2y} = \frac{\frac{\Sigma x_1 y}{N} - (Mx_1)(My)}{(\sigma x_1)(\sigma y)} = \frac{\frac{156972}{64} - (50.66)(47.9)}{(6.9)(7.8)} = .58$$

$$\sigma_{x_1y} = \sigma x_1 \sqrt{1 - r^2 x_1 y} = 6.9 \sqrt{1 - .34} = 5.59$$

$$\sigma_r = \frac{1 - r^2}{\sqrt{N}} = \frac{1 - (.58)^2}{\sqrt{64}} = \frac{.66}{8} = .082$$

High School General Educational Development Test Number 2 and its Correlation with the Honor Point Averages

A mean of 59.4, a median of 58.3 and a standard deviation of 6.9 were found for the scores on Test Number 2. The correlation between the scores on this test and the honor point averages is represented by the coefficient +.68. The standard error of estimate was computed as 3.71 and the sampling error involved in the coefficient of correlation was found to be .067. Reference is made to Table III, page 22, where all arithmetical computations are provided. The scores on Test Number 2 are represented by variable "x_2" and the honor point average is represented by the variable "y" in all statistical computations.

From the above data it may be observed that the true coefficient of correlation lies somewhere between .52 and .84 at the five per cent level. Similarly, the two per cent confidence level is .50 to .86 and the one per cent confidence level .48 to .88.

Considering the coefficient of correlation of .68, which was obtained in this case, it may be observed that the relationship between the scores achieved on G.E.D. Test Number 2 and honor point averages is much greater than the .320 necessary to disprove the null hypothesis at the one per cent level. From this observation, it may be concluded that this test is a valid instrument for predicting college success when used under similar circumstances.

Table III

Arithmetical Computation
High School General Educational Development Test Number 2
Correlated with Honor Point Averages

Group	Frequency	Deviation	Fd	Fd^2
74-76	2	6	12	72
71-73	1	5	5	25
68-70	8	4	32	128
65-67	5	3	15	45
62-64	5	2	10	20
59-61	10	1	10	10
56-58	17	0	0	0
53-55	5	-1	-5	5
50-52	7	-2	-14	28
47-49	2	-3	-6	18
44-46	2	-4	-8	32
Total	64		51	383

$\frac{\Sigma Fd}{N} = .79 \quad \left[\frac{\Sigma Fd}{N}\right]^2 = .62 \quad \frac{\Sigma Fd^2}{N} = 5.98 \quad \sqrt{5.98 - .62} = 2.3$

Standard Deviation = 3 x 2.3 = 6.9

Mean = 57 + (3 x .79) = 59.4 Median = 55.5 + 2.8 = 58.3

$$r_{x_2y} = \frac{\frac{\Sigma x_2 y}{N} - (Mx_2)(My)}{(\sigma x_2)(\sigma y)} = \frac{\frac{184118}{64} - (59.4)(47.8)}{(6.9)(7.8)} = .68$$

$$\sigma x_2 y = \sigma x_2 \sqrt{1 - r^2 x_2 y} = 6.9\sqrt{1 - (.68)^2} = 5.15$$

$$\sigma r = \frac{1 - r^2}{\sqrt{N}} \quad \frac{1 - (.68)^2}{\sqrt{64}} = .067$$

High School General Educational Development Test Number 3 and its Correlation with Honor Point Averages

A mean of 60.4, a median of 60.2 and a standard deviation of 7.76 were found for the scores on Test Number 3. The correlation between the scores achieved on this test and the honor point averages is represented by the coefficient .70. The standard error of estimate was computed as 5.36 and the sampling error involved in the coefficient of correlation was found to be .064. Reference is made to Table IV, page 24, where all arithmetical computations are provided. The scores on Test Number 3 are represented by variable "x_3" and the honor point averages are represented by variable "y" in all statistical computations.

From the above data it may be observed that, with an unlimited sample, the true coefficient of correlation lies somewhere between .55 and .85 at the five per cent level of confidence. Similarly, the two per cent confidence level is .54 to .86 and the one per cent confidence level is .52 to .88.

Considering the coefficient of correlation of .70 which was obtained in this case, it may be observed that the relationship between the scores achieved on G.E.D. Test Number 3 and the honor point averages is much greater than the .320 necessary to disprove the null hypothesis at the one per cent level. From this observation, it may be concluded that the relationship is significant and that this test may be considered to be a valid instrument for predicting college success when used under similar circumstances.

Table IV

Arithmetical Computations
High School General Educational Development Test Number 3
Correlated with Honor Point Averages

Group	Frequency	Deviation	Fd	Fd^2
74-76	3	5	15	75
71-73	2	4	8	32
68-70	6	3	18	54
65-67	7	2	14	28
62-64	6	1	6	6
59-61	18	0	0	0
56-58	14	-1	-14	14
53-55	1	-2	-2	4
50-52	1	-3	-3	9
47-49	2	-4	-8	32
44-46	1	-5	-5	25
41-43	1	-6	-6	36
38-40	2	-7	-14	98
Total	64		9	413

$\frac{\Sigma Fd}{N} = .14 \qquad \left[\frac{\Sigma Fd}{N}\right]^2 = .02 \qquad \frac{\Sigma Fd^2}{N} = 6.45 \qquad \sqrt{6.45 - .02} = 2.5$

Standard Deviation = 3 x 2.5 = 7.5

Mean = 60 + (3 x .14) = 60.4 Median = 58.5 + 1.7 = 60.2

$$r_{x_3y} \frac{\frac{\Sigma x_3 y}{N} - (Mx_3)(My)}{(\sigma x_3)(\sigma y)} = \frac{\frac{187422}{64} - (60.4)(47.8)}{(7.5)(7.8)} = .70$$

$$\sigma_{x_3y} = \sigma x_3 \sqrt{1 - r^2 x_3 y} = 7.5\sqrt{1 - (.70)^2} = 7.5 \times .7141 = 5.36$$

$$\sigma r = \frac{1 - r^2}{\sqrt{N}} = \frac{1 - (.70)^2}{\sqrt{64}} = \frac{.51}{8} = .064$$

High School General Educational Development Test Number 4 and its Correlation with the Honor Point Averages

A mean of 59.1, a median of 61.0 and a standard deviation of 7.76 were found for the scores on Test Number 4. The correlation between the scores achieved on this test and the honor point averages is represented by the coefficient .69. The standard error of estimate was computed as 6.06 and the sampling error involved in the coefficient of correlation was found to be .065. Reference is made to Table V, page 26, where all arithmetical computations are provided. The scores on Test Number 4 are represented by the variable "x_4" and the honor point averages are represented by the variable "y" in all statistical computations.

From the above data it may be observed that, with an unlimited sample, the true coefficient of correlation lies somewhere between .53 and .85 at the five per cent level of confidence. Similarly, the two per cent confidence level is .52 to .86 and the one per cent level is .51 to .87.

Testing the significance of the correlation obtained between Test Number 4 and the honor point averages by means of the null hypothesis, it may be observed that the coefficient of .69 which was obtained is far greater than the "r" of .320 necessary to disprove the null hypothesis at the one per cent level. From this observation, it may be concluded that the relationship is significant well beyond chance, and that this test may be considered to be a valid instrument for predicting college success when used under similar circumstances.

Table V

Arithmetical Computation
High School General Educational Development Test Number 4
Correlated with Honor Point Averages

Group	Frequency	Deviation	Fd	Fd^2
75-77	1	6	6	36
72-74	1	5	5	25
69-71	6	4	24	96
66-68	10	3	30	90
63-65	10	2	20	40
60-62	6	1	6	6
57-59	4	0	0	0
54-56	8	-1	-8	8
51-53	5	-2	-10	20
48-50	8	-3	-24	72
45-47	2	-4	-8	32
42-44	1	-5	-5	25
39-41	2	-6	-12	72
Total	64		24	522

$\frac{\Sigma Fd}{N} = .38 \quad \left[\frac{\Sigma Fd}{N}\right]^2 = .14 \quad \frac{\Sigma Fd^2}{N} = 8.16 \quad \sqrt{8.16 - .14} = 2.8$

Standard Deviation = 3 x 2.8 = 8.4

Mean = 58 + (3 x .38) = 59.1 Median = 56.5 + 4.5 = 61.0

$$r_{x_4y} = \frac{\frac{\Sigma x_4 y} - (Mx_4)(My)}{N}}{(\sigma x_4)(\sigma y)} = \frac{\frac{183775}{64} - (59.1)(47.8)}{(8.4)(7.8)} = .69$$

$$\sigma x_4 y = \sigma x_4 \sqrt{1 - r^2 x_4 y} = 8.4\sqrt{1 - (.69)^2} = 8.4 \times 7211 = 6.06$$

$$\sigma r = \frac{1 - r^2}{\sqrt{N}} = \frac{1 - (.69)^2}{\sqrt{64}} = \frac{.52}{8} = .065$$

High School General Educational Development Test Number 5 and its Correlation with the Honor Point Averages

A mean of 59.0, a median of 60.8 and a standard deviation of 8.4 were found for the scores on Test Number 5. The coefficient of correlation between the scores on this test and the honor point averages was found to be .47. The standard error of estimate computed was 7.42 and the sampling error involved in the coefficient of correlation was found to be .097. Reference is made to Table VI, page 28, where all arithmetical computations are provided. The scores on Test Number 5 are represented by variable "x_5" and the honor point averages are represented by variable "y" in all statistical computations.

From the above data it may be observed that, with an unlimited sample, the true coefficient of correlation lies somewhere between .23 and .71 at the five per cent level of confidence. Similarly, the two per cent level of confidence is .21 to .73 and the one per cent confidence is .18 to .76.

Testing the significance of this correlation by means of the null hypothesis, it may be observed that the coefficient of .47 which was obtained is greater than the "r" of .320 which is necessary to disprove the hypothesis at the five per cent level of significance. However, it may also be observed that the true coefficient of correlation at the five per cent level of confidence and beyond may be too low to have significance beyond chance.

Table VI

Arithmetical Computation
High School General Educational Development Test Number 5
Correlated with Honor Point Averages

Group	Frequency	Deviation	Fd	Fd^2
72-74	6	5	30	150
69-71	1	4	4	16
66-68	6	3	18	54
63-65	8	2	16	32
60-62	14	1	14	14
57-59	7	0	0	0
54-56	5	-1	-5	5
51-53	8	-2	-16	32
48-50	1	-3	-3	9
45-47	6	-4	-24	96
42-44	1	-5	-5	25
39-41	0	-6	0	0
36-38	0	-7	0	0
33-35	1	-8	-8	64
Total	64		21	497

$\frac{\Sigma Fd}{N} = .33 \qquad \left[\frac{\Sigma Fd}{N}\right]^2 = .11 \qquad \frac{\Sigma Fd^2}{N} = 7.77 \qquad \sqrt{7.77 - .11} = 2.8$

Deviation = 3 x 2.8 = 8.4

Mean = 58 + (3 x .33) = 59.0 Median = 56.5 + 4.3 = 60.8

$$r_{x_5y} = \frac{\frac{\Sigma x_5 y}{N} - (Mx_5)(My)}{(\sigma x_5)(\sigma y)} = \frac{\frac{182462}{64} - (59.0)(47.8)}{(8.4)(7.8)} = .47$$

$$\sigma_{x_5 y} = \sigma x_5 \sqrt{1 - r^2_{x_5 y}} = 8.4 \sqrt{1 - (.47)^2} = 8.4 \times .8832 = 7.42$$

$$\sigma r = \frac{1 - r^2}{\sqrt{N}} = \frac{1 - (.47)^2}{\sqrt{64}} = \frac{.78}{8} = .097$$

The General Educational Development Tests, Average Scores, and their Correlation with the Honor Point Averages

A mean of 57.8, a median of 58.0 and a standard deviation of 6.4 were found for the average scores achieved on the five tests in the battery. The coefficient of correlation between the average scores on the five tests and the honor point averages was found to be .72. The standard error of estimate computed 4.71 and the sampling error involved in the coefficient of correlation was found to be .060. Reference is made to Table VII, page 30, where all arithmetical computation is provided. The average scores on the five tests is represented by variable "x_6" and the honor point averages are represented by the variable "y" in all statistical computations.

From the above data it may be observed that, with an unlimited sample, the true coefficient of correlation lies between .57 and .87 at the five per cent level of confidence. Similarly, the two per cent confidence is .56 to .88 and the one per cent confidence level is .54 to .90.

Testing the significance of this correlation by means of the null hypothesis, it may be observed that the coefficient of .72, which was obtained in this case, is far greater than the "r" of .320 which is necessary to disprove the hypothesis at the one per cent level. From this observation it may be concluded that the average score achieved on the High School General Educational Tests is a reliable criteria for predicting college success under similar circumstances.

Table VII

Arithmetical Computations
High School General Educational Development Test Averages
Correlated with Honor Point Averages

Group	Frequency	Deviation	Fd	Fd^2
69-71	5	5	25	125
66-68	1	4	4	16
63-65	9	3	27	81
60-62	7	2	14	28
57-59	17	1	17	17
54-56	13	0	0	0
51-53	4	-1	-4	4
48-50	2	-2	-4	8
45-47	4	-3	-12	36
42-44	2	-4	-8	32
Total	64		59	347

$\frac{\Sigma Fd}{N} = .922 \qquad \left[\frac{\Sigma Fd}{N}\right]^2 = .846 \qquad \frac{\Sigma Fd^2}{N} = 5.422 \qquad \sqrt{5.42 - .85} = 2.14$

Standard Deviation = 3 x 2.14 = 6.4

Mean = 55 + (3 x .92) = 57.8 Median = 53.5 + 53.5 = 58.0

$$r_{x_6y} = \frac{\frac{\Sigma x_6 y}{N} - (Mx_6)(My)}{(\sigma x_6)(\sigma y)} = \frac{\frac{179126}{64} - (57.8)(47.8)}{(6.4)(7.8)} = .72$$

$$\sigma_{x_6 y} = \sigma_{x_6}\sqrt{1 - r^2_{x_6 y}} = 6.8\sqrt{1 - (.72)^2} = 6.8 \times .6928 = 4.71$$

$$\sigma_r = \frac{1 - r^2}{\sqrt{N}} = \frac{1 - (.72)^2}{\sqrt{64}} = \frac{.48}{8} = .060$$

The Ohio Psychological Test - Form 21 - and its Correlation with the Honor Point Averages

A mean of 47.6, a median of 45.7 and a standard deviation of 9.3 were found for the scores achieved on the Ohio Psychological Test. The coefficient of correlation between the scores on the Ohio Psychological Test and the honor point averages was found to be .71. The standard error of estimate was computed as 6.58 and the sampling error involved in the coefficient of correlation was found to be .062. Reference is made to Table VIII, page 32, where all arithmetical computations are provided. The scores on the Ohio Psychological Test are represented by the variable "x_7" and the honor point averages are represented by the variable "y" in all statistical computations.

From the above data it may be observed that, with an unlimited sample, the true coefficient of correlation would lie between .56 and .86 at the five per cent level of confidence. Similarly, the two per cent level of confidence is .54 to .88 and the one per cent level of confidence is .52 to .90.

Testing the significance of this correlation by means of the null hypothesis, it may be observed that the coefficient of .71, which was obtained in this case, is far greater than the "r" of .320 necessary to disprove the hypothesis at the one per cent level of significance. From this observation it may be concluded that the Ohio Psychological Test is a reliable instrument for predicting college success when used under similar circumstances.

Table VIII

Arithmetical Computations
Ohio Psychological Test, Form 21
Correlated with Honor Point Averages

Group	Frequency	Deviation	Fd	Fd^2
70-72	1	9	9	81
67-69	1	8	8	64
64-66	3	7	21	147
61-63	2	6	12	72
58-60	4	5	20	100
55-57	2	4	8	32
52-54	5	3	15	45
49-51	7	2	14	28
46-48	8	1	8	8
43-45	13	0	0	0
40-42	13	-1	-13	13
37-39	1	-2	-2	4
34-36	0	-3	0	0
31-33	1	-4	-4	16
28-30	1	-5	-5	25
25-27	1	-6	-6	36
22-24	1	-7	-7	49
Total	64		78	720

$\frac{\Sigma Fd}{N} = 1.2 \quad \left[\frac{\Sigma Fd}{N}\right]^2 = 1.44 \quad \frac{\Sigma Fd^2}{N} = 11.25 \quad \sqrt{11.25 - 9.81} = 3.1$

Standard Deviation = 3 x 3.1 = 9.3

Mean = 44 + (3 x 1.2) = 47.6 Median = 42.5 + 3.2 = 45.7

$$r_{x_7y} = \frac{\frac{\Sigma x_7 y}{N} - (Mx_7)(My)}{(\sigma x_7)(\sigma y)} = \frac{\frac{148916}{64} - (47.6)(47.8)}{(9.3)(7.8)} = .71$$

$$\sigma x_7 y = \sigma x_7 \sqrt{1 - r^2 x_7 y} = 9.3 \sqrt{1 - (.71)^2} = 9.3 \times .7071 = 6.58$$

$$\sigma r = \frac{1 - r^2}{\sqrt{N}} = \frac{1 - (.71)^2}{\sqrt{64}} = \frac{.50}{8} = .062$$

Table IX

Summary of Statistical Computations

Test	Correlation Coefficient	5 Per Cent Level of Confidence	1 Per Cent Level of Confidence	Standard Error of Estimate
G.E.D. #1	.58 ± .082	.38 - .78	.34 - .82	5.59
G.E.D. #2	.68 ± .067	.52 - .84	.48 - .88	5.15
G.E.D. #3	.70 ± .064	.55 - .85	.52 - .88	5.36
G.E.D. #4	.69 ± .065	.53 - .85	.51 - .87	6.06
G.E.D. #5	.47 ± .097	.23 - .71	.18 - .76	7.42
G.E.D. Av.	.72 ± .060	.57 - .87	.54 - .90	4.71
Ohio Psyc.	.71 ± .062	.56 - .86	.52 - .90	6.58

The Null Hypothesis

The null hypothesis was used to test the significance of the "r" obtained in each correlation by using a table[1] designed to show the coefficient of correlation necessary to establish a significance greater than chance, for any given "N", at the 5 per cent and at the 1 per cent levels. Since the "N" is 64 for each of the problems summarized above, the table was entered with 62 (N-2) degrees of freedom and, by means of linear interpolation, it was determined that an "r" of .246 would be necessary to disprove the null hypothesis at the 5 per cent level of significance. Similarly, it was determined that an "r" of .320 would be necessary to offer the same assurance at the 1 per cent level of significance.

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[1] Garrett, Henry E., Statistics in Psychology and Education, New York: Longmans, Green and Company, p.299, Table 49

CHAPTER IV

Summary and Conclusions

The prediction of scholastic success has commanded the attention of psychologists and educators for several years, with much research being done on the subject. Recently the problem of determining the probability of scholastic success has been concerned with the returning veteran. Since many of these men have not completed the usual four years of high school preparatory work and have had their scholastic progress interrupted by military service, the criteria customarily used for predictive purposes are either lacking or insufficient from the standpoint of reliable norms. All cases dealt with in this study concern the efforts of men who have completed less than twelve years of formal education and for whom the usually reliable high school rank is lacking as a result of their not having graduated from high school. Further, the scores they might achieve on an acceptable college aptitude test would tend to lack significance, since the norms used would almost invariably be based upon a population which had completed a full preparatory program and which had entered college as soon as this preparatory work had been completed. While speculations have been made concerning the motivation and maturation peculiar to veterans and the relation of these to scholastic success, little has been done to follow the progress of these men in their college work or to attempt to establish a relationship between this progress and predictive techniques.

Now that the majority of the men who acquired military service have returned to civilian life, it becomes very desirable to be able to predict

their probability of college success in order to help them efficiently with their plans for vocational training and in order to utilize our over-taxed educational facilities to the utmost. To date, the primary purpose that has been made of the High School Level General Educational Development Tests is in qualifying for a High School Equivalence Certificate in order to qualify for employment opportunities which might not otherwise be available. It would be erroneous to think of these tests solely in terms of college admission although that is the only aspect with which this study is concerned. As stated in Chapter I, the purpose of this study was to determine to what extent the scores achieved on the High School Level General Educational Development Tests correlated with honor point averages in the University of Minnesota Science, Literature and Arts College; to compare this correlation with that of the Ohio Psychological Test, Form 21, which is generally accepted as a reliable college aptitude test; and to determine, if possible, what effect the number of years of preparatory background, age and marital status had on college success.

Prediction of College Success

A study of the statistical computations (Table IX) indicates that the three General Educational Development Tests dealing with the interpretation of reading materials in social science, natural science, and literature, all correlate well, and about equally well with the honor point averages achieved by the sixty-four veterans whose cases were examined. General Educational Development Test Number 1, "Effectiveness of Expression", which is perhaps more like the usual college aptitude test than the other four from the standpoint of abilities measured, did not correlate as well with college success as did the tests on the interpretation of reading materials. However, the coefficient obtained appears statistically significant and indicates that, under similar circumstances, this test may be considered to be a valid instrument for predicting college success.

The scores achieved on General Educational Development Test Number 5, "General Mathematical Ability", correlated least well with the honor point averages. Inasmuch as the college grades used represent achievement in a science, literature and arts college where facility in mathematics is a minor pre-requisite, the lack of a more significant relationship is understandable. It is likely that the correlation between the scores on Test Number 1 and achievement in a scientific or an engineering curriculum would be significantly higher.

The relationship between the average score on the five General Educational Development Tests and the honor point averages was found to be more

pronounced than that of any individual test score. The "r" of .72 ± .060 obtained in this correlation indicates that the average test score may be used with considerable confidence in predicting college success under similar circumstances. It represents an "r" .54 - .90 at the one per cent level of confidence and is far greater, even at this point, than the .320 necessary to disprove the null hypothesis and establish a significance greater than chance at the one per cent level.

The coefficient of correlation of .71 ± .062, which was obtained by comparing the test scores achieved on the Ohio Psychological Test with the honor point averages, indicates that this instrument continues to maintain a comparatively high degree of reliability when used under circumstances similar to those in this study. This coefficient agrees well with the "r" of .68 which was obtained on the basis of 1030 cases of honor point ratios of college freshmen for a full college year of thirty-six weeks at the Ohio State University.[1] It is also very much in agreement with the coefficient of .72 discussed in the preceding paragraph.

The relationships between test scores and honor point averages obtained in this study agree well with the results of a survey recently made at the University of Wisconsin.[2] In that survey, the composite General Educational Development Test scores proved to be a better predictor of college success

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1 The Ohio State Psychological Test, Manual of Directions, 1941, 4 pages

2 Milligan, E.E., Lins, Joseph L. and Little, Kenneth, "The Success of Non-High-School Graduates in Degree Programs at the University of Wisconsin", School and Society, LXVII, January 10, 1948, p. 27-29

than a well-established college aptitude test. The American Council Psychological Examination was used in this instance.

The results of a study of the relationship between College Level General Educational Development Test scores and first term averages in the University of Minnesota, General College[1], indicate relationships which are also in very close agreement with those of the present study. Callis and Wrenn concluded that the best single predictor of scholastic success in the College G.E.D. battery is the social science test, that the total score on the battery is a better predictor than any single test in the battery, and that the G.E.D. score shows promise of being one of the best single predictors of scholastic success when compared with the measures thus far studied and reported at the University of Minnesota.

The average score achieved on the General Educational Development Tests has been established as the best single predictor of college success of the instruments examined in this study. Table X, on page 39, has been prepared to facilitate a comparison of the average scores achieved by the sixty-four veterans at the University of Minnesota, and the thirty-one veterans at the three state colleges, with scholastic success on a "pass-fail" basis. A "C" average, or an honor point average of +1.0, was used as the lower limit of the "pass group in each case.

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1 Callis, Robert, and Wrenn, C., Gilbert, "General Educational Development Tests as Predictors of Scholastic Success", Educational and Psychological Measurements, VII, (1940) p. 261-270

Table X

Pass-Fail Analysis on Basis of Average General Educational Development Scores

University of Minnesota			State Colleges		
Group	Pass Frequency	Fail Frequency	Group	Pass Frequency	Fail Frequency
70-74	3	0	70-74	0	0
65-69	3	0	65-69	2	2
60-64	12	4	60-64	9	2
55-59	10	18	55-59	8	5
50-54	0	8	50-54	1	0
45-49	0	4	45-49	0	2
40-44	0	2	40-44	0	0
Total	28	36		20	11

From the above tabulation, the following conclusions may be tentatively arrived at:

1. An average General Educational Development score of 55, or more, must be achieved in order that the prospective student may have about an even chance to do satisfactory work on a liberal arts college level. Only one student below the 55-59 interval was found to be doing satisfactory work.
2. Prospective students whose average General Educational Development score falls in the 60-64 interval have almost a 4 to 1 chance of doing successful work in a liberal arts college.

3. Prospective students whose average General Educational Development score falls in the 55-59 or 60-64 interval have a higher probability of success at one of the state colleges than at the University of Minnesota.

The above conclusions are, of course, highly tentative, since they are based on a small sampling and need further study and verification on larger and different populations before they can be accepted with a sufficiently high degree of confidence.

Effect of Age on College Success

It seems quite customary, in most counseling situations, to consider the age of the counselee as an important factor in determining his degree of maturity and sense of responsibility. Generally, an older individual will have a higher level of interest maturity and a more pronounced sense of purpose. Table XI, on the following page, has been prepared to facilitate the analysis of this factor. Since it has been established that an average General Educational Development Test score of 55 or better is necessary in order that the prospective student may have a reasonable chance for college success, the only cases to be examined will be those whose average score fall in the 55-59 interval or above.

Table XI

Pass-Fail Analysis on the Basis of Student Ages

University of Minnesota			State Colleges		
Age Group	Pass Frequency	Fail Frequency	Age Group	Pass Frequency	Fail Frequency
Over 20	18	7	Over 20	9	6
20 or Less	12	13	20 or Less	10	3

From this tabulation, it may be concluded that if an older individual has any advantage from the standpoint of greater academic promise, this advantage is more pronounced in a larger institution where the problem of orientation is more complex and where the amount of individual attention might be less. In the case of the smaller state colleges, the advantage appears to belong to the younger student. Again the conclusions must be regarded as highly tentative in view of the small sampling and the relatively small portion of the students' college careers available at this time.

Significance of the Number of Years of School Completed

Table XII, on the following page, has been prepared to facilitate a study of the significance of the number of years of preparatory training completed prior to college matriculation. It seems reasonable to suppose that a more extensive preparatory background will tend to be of value in a liberal arts college curriculum.

Table XII

Pass-Fail Analysis on the Basis of School Years Completed

University of Minnesota			State Colleges		
Years Completed	Pass Frequency	Fail Frequency	Years Completed	Pass Frequency	Fail Frequency
11-11½	18	19	11-11½	16	6
8-10½	10	17	8-10½	4	5

From this tabulation, it may be concluded that, for the cases examined in this study, the number of years of school completed has a positive relationship with liberal arts college success. Further, it may be concluded that the probability of success increases as the number of years of preparatory school increases. In considering only those students whose General Educational Development Test score average fell in the 55-59 interval or above, the following distribution was found as indicated in Table XIII.

Table XIII

University of Minnesota			State Colleges		
Years Completed	Pass Frequency	Fail Frequency	Years Completed	Pass Frequency	Fail Frequency
11-11½	18	14	11-11½	15	5
8-10½	10	10	8-10½	4	4

This distribution is very similar to the one in Table XII in that it also indicates that a greater amount of preparatory work completed prior to

college matriculation, insures a greater probability of success. This conclusion does not agree with the findings in a somewhat similar study conducted recently at the University of Wisconsin. As a result of this study, Milligan, Lins and Little concluded that "There is no apparent relationship between grade-point averages and the number of high-school units completed".[1] This discrepancy could well have resulted from the fact that the populations examined were somewhat different; a difference in course enrollments; and the limited sample available for the study at hand, which makes the conclusions expressed above highly tentative.

Conclusions

The following conclusions seem to be warranted on the basis of this study and the comparison of it with other prediction studies:

1. The average General Educational Development Test score is a better predictor of scholastic success than any of the individual General Educational Development Tests for the sample used.
2. The three General Educational Development Tests on interpretation of reading materials in social science, natural science and literature, are better individual predictors of scholastic success than either the test of effectiveness of expression or general ability in mathematics.
3. The Ohio Psychological Test is a valid instrument for predicting scholastic success when used with individuals

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[1] E.E. Milligan, L. Joseph Lins and Kenneth Little, op. cit. p. 29

who have not completed the usual four years of high-school.

4. A minimum average General Educational Development Test score of 55 should be achieved by a prospective college student before he can be considered as having adequate aptitude for training in a liberal arts college curriculum.
5. Prospective college students whose average General Educational Development Test scores fall in the 55-59 interval have a somewhat higher probability of success at Hamline University, Macalester College or at the College of St. Thomas than they do at the University of Minnesota.
6. Maturity, from the standpoint of age, is a greater asset to the student who enters the University of Minnesota, than it is to the student who matriculates at one of the state colleges studied.
7. A greater amount of preparatory units completed adds to the probability of scholastic success.
8. Although the General Educational Development Tests were not designed as predictors of college success, they seem to serve this capacity quite well.

Again it must be remembered that these conclusions can only be considered as tentative. Further study and verification on larger and different populations must be made before they can be accepted with a high degree of confidence.

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APPENDIX A

APPENDIX A

DATA CONCERNING THE TESTS USED IN THIS STUDY

The High School General Educational Development Tests are constructed to measure as directly as possible the attainment of objectives of the whole program of general education, and must minimize as much as possible the more immediate and temporary content objectives of special school subjects. The norms were established for a sample of 35,432 public high school seniors in 1943 from a general high school curriculum. The 814 schools were so selected that their relative distribution by states, and by size of class enrollment within states, was approximately the same as for all 20,725 public high schools in the country. From several frequency distributions of raw scores, standard T-score norms are available for all sections of the country and for the total of the United States. The reliability of the tests is evident from equivalent scores on all forms as well as by standardization techniques. Validity is evidenced by construction techniques and item selection, conceived to satisfy the basic purpose of the test battery.[1]

Form 21 of the Ohio State University Psychological Test is the outgrowth of twenty earlier forms published between 1919 and 1938. This form now comprises three sub-tests (1) same-opposites, (2) word relationships or analogies and (3) reading comprehension. The present

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[1] American Council on Education, Examiners Manual, Tests of General Educational Development, High School Level, 1945, 15 pages.

test has the advantage of having inherited the statistical refinements of the preceding forms and of containing only such test items as have demonstrated their validity in the earlier forms. It is similar to the General Educational Development Tests in that it is of the work-limit type. A validity coefficient of .68 was found for this test, based upon 1030 cases of honor point ratios of college freshmen for a full college year of thirty-six weeks. The reliability coefficient of this test was established by administering two or more forms of the test to each student. This reliability coefficient is .93, based upon 300 cases.[1]

The University of Minnesota Testing Bureau, 1942, norms were used to establish the standard scores on the Ohio Psychological Test, Form 21, test results used in this study. These norms are based on the scores achieved by the students who wrote this test at the University of Minnesota Testing Bureau during the 1941-42 school year. The University of Minnesota Testing Bureau reported that this group of students was made up of about ninety per cent Science, Literature and Arts freshmen and that the remaining ten per cent was made up of General College Students and upper classmen who had occasion to use the Testing Bureau facilities during that year.

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[1] The Ohio State University Psychological Test, Manual of Directions, 1941, page 2.

APPENDIX B

FORM USED FOR THE RECORDING OF DATA

NAME _____ Honor Point Average ____

C _____

H.S.G.E.D.

PART _____ 1.

2.

DATE COMP. _____ 3.

4.

AGE _____ 5.

Total _____

EDUC. _____ Ohio Psy. Total

OBJECTIVE _____

M S _____

COLLEGE _____