A STUDY OF THE RELATIONSHIP BETWEEN HIGH SCHOOL MARKS AND COLLEGE SUCCESS AS MEASURED BY COLLEGE MARKS AND ENTRANCE EXAMINATIONS

A THESIS

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CHAPTER I

INTRODUCTION

Since the fall of 1924, the Kansas State Teachers College of Emporia has administered to its freshmen a battery of entrance examinations. The tests included in the battery have varied from year to year; but, for the most part, they have covered the following fields: intelligence, English, vocabulary, reading, mathematics, and spelling. On the basis of the composite scores which the freshmen make, the students are divided into ten groups, known on the campus as deciles. The tests are intended to measure native capacity and previous preparation. The College has made an intensive study of the relation of the test scores to the students' success in college.[1] Although no student is ever denied admittance on the basis of his test record, the information regarding the chances which a student of a given level has of succeeding in college is made available to all freshmen. Aside from the extent to which high school achievement may be measured by the test battery, however, nothing has been done at the College to determine what influence

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[1] H. E. Schrammel and E. R. Wood, "Success and Failure of College Students." Studies in Education, No. 3 (Emporia: the Kansas State Teachers College, 1931).

secondary school achievement has on college success. It was in an attempt to discover some of the salient facts in this connection that the present study was begun. The investigation involves three general factors: the relation of high school marks to entrance examinations in college, the relation of high school marks to college marks, and the relation of college marks to entrance examinations.

The problem of predicting college success is not a new one. In fact, the related studies are almost innumerable. A summary of some of the most outstanding ones will serve to indicate the general trend of the results obtained in the field.

Segel,[2] by correlating entrance units, computed from the number of A's and B's made in high school, with the Thurstone Psychological Examination and the various sections of the Iowa Content Examination, found coefficients ranging from .064 for entrance units and mathematics, to .320 for entrance units and English test scores. For his regression equation, he substituted for the fractional coefficients values ranging from zero to three. The equation was then found to be

$$X_0 = 0X_1 + 3X_2 + 3X_3 + X_4 + X_5 + 0X_6$$

when X_0 represents scholarship in the junior college; X_1,

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[2] David Segel, "The Automatic Prediction of Scholastic Success by Using the Multiple Regression Technique with Electric Tabulating and Accounting Machines." Journal of Educational Psychology, 22:139-44, February, 1931.

A's and B's in high school; X_2, the Thurstone test score; and X_3, X_4, X_5, and X_6, the English, mathematics, science, and social science divisions, respectively, of the Iowa Content Examination.

Dr. Hawks,[3] at Johns Hopkins University, correlated college averages and high school marks by subjects. She found a relationship between the high school marks and scholarship during the first semester and the first year in college to average about .60. The coefficient between the high school average and college scholarship was found to be approximately .70. According to Dr. Hawks's study, there is no apparent choice, for prediction, between the various subjects, except that there is no evidence of any relationship between non-academic subjects and first-year college scholarship. The high school record for the entire four years is apparently slightly better for prediction than a record of the last three years of high school. Application of the regression coefficient was found to be very little more effective than the use of a single coefficient.

Garrett[4] obtained coefficients between high school

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[3] Lena James Hawks, "Certain Relationships Between Scholarship in High School and in College." Johns Hopkins University Studies in Education, No. 15 (Johns Hopkins Press, 1931.)

[4] H. L. Garrett, "Predicting College Success upon the Basis of Senior High School Records." Peabody Journal of Education, Vol. 11, No. 5 (March, 1934) pp. 193-207.

averages for the total four-year period and college work to be .722 for the freshman year, .788 for the first two years combined, and .745 for the four years combined. From Garrett's study, it would seem that the fourth-year high school grades alone are just as valuable an index of what the student may be expected to do in college as is the index for the entire four-year period, as the coefficient between the average for the senior year of high school and that for the four-year college period was .774; for the two-year college period, it was .777; and for the college freshman year, it was .726.

Goldthorpe[5] collected high school grades for 136 freshmen who came from three Chicago high schools and three suburban township high schools and who completed a full year's work in the liberal arts college of Northwestern University in 1920. College marks were tabulated according to quartile rank in the high school class. From these data, it was found that the chances are better than nine out of ten that a student who ranks in the highest quartile in high school will do work in the first year of college above a C average; and the chances that a student from the lowest quartile will attain a similar standard are one out of five. Rank in the high school class, when correlated with

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[1] J. Harold Goldthorpe, "Relative Rank in High School and in the First Two Years of the University." School and Society, 30:130-134, July 27, 1929.

rank in the first year at the University, yielded a coefficient of .618 ± .034. Results secured after the second year in the University showed that the student from the highest quartile has eight chances out of ten of being in the upper half of his college group. If a student ranks in the lowest quartile of his class in high school, there appears to be a marked tendency to remain in the lower half of his college class, the chances, according to Goldthorpe, being only one out of sixteen that he will rise above the median of his group. There was a marked tendency for all to slip downward.

On the basis of high school scholarship in academic subjects, intelligence rating as determined by the Terman test, and character ratings, Pierson and Nettels[6] studied the achievement of students who had completed one year of college work. All of the students studied were graduates of the Los Angeles high schools. The coefficients between high school grades and first-year college grades was .523 ± .07. The regression equation, in which G equals college scholarship; H, high school scholarship in academic subjects; I, intelligence; and C, character, was found to be

$$\overline{G} = .23I + .96H + .047C - 29.97$$

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[6] C. D. Pierson and C. H. Nettels, "Study of High School Seniors to Determine Who Shall Be Recommended to College." School and Society, 28:215-16, August 18, 1928.

The coefficient between high school grades and college marks, when intelligence and character rarings were held constant, was found to be .457 ± .08.

Thurber,[7] in a study of 295 1930 and 1931 graduates of Colgate University, found that at the end of the sophomore year, 36.3 per cent of the students were in the same quartile as in high school; 20 per cent advanced to a higher quartile; and 43.7 per cent fell to lower rankings. Seventy-nine and seven-tenths per cent were in the same quartile or within one quartile of that in which they ranked in high school; 80 per cent were in the same quartile or a lower one. The number of students who dropped to a lower quartile rank was twice as great as the number who advanced to a higher rank. Of the 301 students who were in college four years, 37.5 per cent were in the same quartile as in high school; 20.3 per cent advanced to a higher quartile; and 42.2 per cent fell to a lower one. Seventy-seven and four-tenths per cent were in the same quartile or within one quartile of that in which they ranked in high school. Seventy-nine and seven-tenths per cent were in the same or a lower quartile. The tendency to drop to a lower quartile rank was still twice as great as the tendency to advance to a higher one.

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[7] C. H. Thurber, "Is Scholarship Ranking Useful for Prediction?" School and Society, 37:327-9, March 11, 1933.

By correlating high school grades with college marks for the first two semesters, Clark[8] found a coefficient of .455 ± .03 to .05. Clark also computed the relationship between college scholarship and rank in high school. The ranks were expressed in .2 sigma intervals on the assumption that grades of high school classes fall under a normal curve. The mean coefficient for high school rank thus determined and college marks was .510.

In an attempt to predict college success from entrance examinations, Dr. August Dvorak and Mr. Rufus Salyer of the University of Washington made multiple correlations of several groups of high school grades and relative standings in the Iowa Placement Tests in mathematics and physics with the average grade points earned for the year by engineering students.[9] The results were then checked by being applied to the grades made by the engineering students who entered at the beginning of the autumn quarter of 1931. The coefficient between predicted grades and the average of the first quarter grades was .678 ± .029; between the predicted grades and the average of the first and second-quarter grades,

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[8] E. L. Clark, "High School Average Versus High School Class Rank as a Means of Predicting College Success." School and Society, 34:765-6, December 5, 1931.

[9] E. R. Wilcox, "A Study of the Performance of Freshmen Engineering Students in the Light of Prediction Based upon Their High School and Placement Test Records." Journal of Engineering Education, 25:214-218, November, 1934.

the coefficient was .660 ± .031; and between the predicted grades and the average of the first, second, and third-quarter grades, .591 ± .041. The authors found, however, that college averages for the first quarter and those for the second and third quarters, when correlated, yielded coefficients of .662 ± .031 and .700 ± .030, respectively. The average of the predicted grades and the first-quarter college averages yielded still higher coefficients: .705 ± .031, when correlated against the average of the second and third-quarter grades, and .814 ± .021, when correlated against the average of the first, second, and third-quarter grades. The last coefficient, however, should naturally be expected to be unusually high, since the first-quarter college grades made up a part of both sets of averages used in the computation.

Schrammel and Wood[10] found that there is a decided relationship between college students' scores on entrance examinations and their success in college. A student who ranks in the first decile on the entrance examinations has only about 45 chances out of 100 of making an average grade during his freshman year of C (average) or better, while the chances are approximately 70 out of 100 that a tenth-decile student will make an average grade of B (good) or better. A tenth-decile student has no chance, accord-

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[10] H. E. Schrammel and E. R. Wood, op. cit., p. 58.

ing to the data collected, of making an average grade of F (failure), and only 1.6 chances in 100 of making an average of D (poor). On the other hand, a first-decile freshman has no chance of making an average grade of A (superior) and only 2.4 chances in 100 of making an average grade of B. Each successive decile, from one to ten, has a greater chance of making a high average grade; and, in reverse order, each successive decile from ten to one has a greater chance of making a low average grade. The coefficient between decile rank on the entire battery of tests and honor points for the first two years of college was found to be .53 ± .02; between scores on the Army Alpha Intelligence Examination and honor points for the two-year period, the coefficient was .51 ± .02.

Finch and Nemzek[11] secured, for 118 graduates of the University of Minnesota High School, (1) marks earned during the freshman year in the College of Science, Literature, and the Arts of the University of Minnesota; (2) honor point averages, based upon high school marks earned at the University of Minnesota High School; (3) University of Minnesota College Aptitude Test percentile ranks, obtained approximately the same time the students entered the

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[11] F. H. Finch and C. L. Nemzek, "Prediction of College Achievement from Data Collected During the Secondary School Period." The Journal of Applied Psychology 18:454-60, June, 1934.

University; and (4) intelligence quotients obtained at the time the students entered the University High School. The correlation coefficient for the 118 graduates, all of whom had attended the high school for three or more years, was .77 ± .03 between college averages and high school averages. For the 90 students who had attended the high school for four years, the coefficient was .79 ± .04. By the application of a predictive formula, the writers found that high school honor point averages are 36 per cent and 39 per cent, for the two groups, respectively, better than pure guess. Prediction based upon IQ's was found to be only 12 per cent better than pure guess, while the college aptitude test percentile rank yielded predictions only 9 per cent and 8 per cent superior to guess. The multiple coefficients based upon the four variables were found to be .784 for the 118 cases and .797 for the 90 cases.

Odell,[12] in an intensive study between marks in certain high school subjects and marks in related subjects in college, found coefficients ranging between .10, between electrical engineering in college and mathematics in high school (a correlation which Odell says is not reliable because of the small number of cases) and .61 between Orientation in college and history in high school. The coefficients

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[12] Charles W. Odell, "Predicting the Scholastic Success of College Students." University of Illinois Bulletin, Vol. XXVIII, No. 5 (Urbana: the University of Illinois, September 30, 1930.)

for college subjects and total high school averages range between .05 (again not reliable) and .71 for the same subjects, respectively, as those listed above. The smallest of the coefficients which Odell considers to be statistically reliable was .17, and it was for physical education. The majority of the coefficients were between .30 and .50. The coefficient between the college freshman average in all subjects and the total high school average Odell found to be .54.

Jordan[13] found a coefficient of only .31 between high school averages and first-quarter marks at the State Normal School, Ellensburg, Washington. The coefficients between the first-quarter college marks and test scores ranged between .47 and .61, with a coefficient of .79 between the prediction index, which is a composite of weighted test scores, and college marks. The relationship which Jordan found between high school marks and college marks is lower than most of the coefficients found by other experimenters. Perhaps the fact that the sampling of college work was so meager is responsible, at least in part, for the size of the coefficient.

Between the composite ratings on the Iowa High School

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[13] John S. Jordan, "A Study of the College Aptitude and Ability of High-school Seniors." Research in Higher Education, No. 12 (United States Department of the Interior, 1931) pp. 50-66.

Survey Tests and first-semester grade point averages of the freshmen who entered the University of Iowa from 1923 to 1927 Gerberich obtained a coefficient of .52 ± .03.[14]

All of these studies seem to indicate that, while it should not be stated definitely that any given student's standing in college can be predicted absolutely, there is a marked tendency for college students to maintain the same relative standing which they held in high school; and there is a distinct relationship between achievement on entrance examinations--and intelligence tests in particular--and college success.

The problem of the relationship between college success and success in high school is a broad and somewhat complex one. The present study makes no attempt to cover the entire field. It does attempt, however, to answer, at least in part, for the students of the Kansas State Teachers College of Emporia, the following questions:

1. What relationship exists between high school marks and scores received on entrance examinations?

2. What, if any, are the sex differences in average grades in high school and rank on entrance test scores in college?

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[14] Joseph Raymond Gerberich, "A Personnel Study of 10,000 Iowa High School Seniors." University of Iowa Studies: Studies in Education, Vol. V, No. 3 (Iowa City, Iowa: the University of Iowa, April 15, 1930) p. 93.

3. What relationship exists between high school marks and college marks?

4. Is the relationship between high school marks and college marks relatively constant for the four years of college? If not, how great are the differences, and for what period is the relationship closest?

5. Is there any marked difference between the sexes in relative rank in high school and in college? If so, what is the difference?

CHAPTER II

METHOD OF PROCEDURE

Since one of the principal factors to be considered in this study was rank on entrance examinations, the selection of subjects was necessarily limited to students who had entered college since the inauguration of the freshman testing program. It was desired also to secure additional information concerning the students who had been included in a previous study at the Kansas State Teachers College of Emporia.[1] For these reasons, the students selected were from the groups that entered in the fall of 1924 and after. The inclusion of all of the freshmen who had taken entrance examinations, however, would have involved so many subjects that the working out of the study would have been an endless task. Some arbitrary method of selection, therefore, was necessary. In general, the students selected were those who had entered the College some time during the period of September, 1924, to September, 1932, and who had continued for at least two consecutive years. Students who entered in January were not included. Students who transferred work in excess of eight semester hours taken before their

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[1] H. E. Schrammel and E. R. Wood, "Success and Failure of College Students." Studies in Education, No. 3 (Emporia: the Kansas State Teachers College, 1931.)

first two years at Emporia were excluded, as were those who had completed more than sixteen hours of work at Emporia, through summer school or correspondence, before taking the entrance examinations. In addition, it was necessary to eliminate some of the students on the basis of their high school transcripts. Since the transcripts came from different schools using different methods of marking, it was necessary to use some method of equating the high school work. This equating was done partly through a translation of marks and partly through elimination of subjects. As 75 per cent seemed to be the prevailing minimum passing mark, all transcripts using percentage grades with a minimum passing mark higher or lower than 75 per cent were excluded. Many of the transcripts did not indicate at what point work was considered to be failing or passing. Such transcripts were used provided that they did not allow credit for any grades below 75 per cent and that they did not withhold credit for any grades above 74 per cent. When five letter marks were used, the grades were recorded irrespective of the percentage used as passing. It is recognized, of course, that a great many transcripts which were not comparable to the standards set up were probably included. It is believed, however, that the number of cases is sufficiently large that the differences would balance approximately. In a few cases, the high school grading systems used less than

five markings. In such cases, the transcripts were not used. A few others were eliminated because they were in terms of marks which could not be interpreted with any assurance of accuracy.

By the method of selection employed, the following numbers of subjects were secured from the various deciles:

Deciles	Boys	Girls	Total
I	20	61	81
II	27	54	81
III	39	71	110
IV	27	80	107
V	35	82	117
VI	31	87	118
VII	35	86	121
VIII	36	106	142
IX	36	117	153
X	52	122	174
Total	338	866	1204

It can be recognized readily from the tabulation above that although the method of securing subjects was entirely arbitrary, the group studied can scarcely be termed "unselected" if "unselected" is taken to mean an approximation to the normal distribution curve. The reason is, of course, that mortality among the lower deciles is greater than it is among the higher deciles.

The selectiveness of the group should not, however, invalidate the results, since there is a fair sampling from each decile group.

In the recording of the marks from the transcripts all high school subjects which carried full credit and in which classes met the regular number of periods a week were included except chorus, glee club, band, orchestra, and private music lessons. In a few cases, required subjects which did not carry full credit were included. Typewriting and hygiene were the principal ones of these. For the college averages, all subjects were included except preparatory English, which carries no credit, and physical education practice, freshman lectures, and use of the library, which are required but which do not give credit applicable on the 120 hours required for graduation.

The following tabulation indicates the method employed to equate the high school transcripts. The letters A, B, C, D, and F have been used to represent the letter marks. Any other system of letters was, of course, interpreted in the same manner, as were marks given in terms of numbers, such as 1, 2, 3, 4, and 5. An A + was considered equivalent to a per cent mark of 99 or 100; an A was considered equal to a per cent mark of 97 or 98; and so forth. In the computation of the high school average, an A+ was weighted by being multiplied by .67; an A was mulitplied

by 1.00; an A-, by 1.33; and so forth. The weighted grades were added and the total divided by the number of credits to secure the average grade or grade index.

Letter mark	Per cent value	Point value
A+	99 - 100	.67
A	97 - 98	1.00
A-	96	1.33
B+	94 - 95	1.67
B	90 - 93	2.00
B-	88 - 89	2.33
C+	86 - 87	2.67
C	83 - 85	3.00
C-	80 - 82	3.33
D+	78 - 79	3.67
D	77	4.00
D-	75 - 76	4.33
F	below 75	5.00

There was no way of making a definite check on the failures, but some of the transcripts seemed to indicate that there is a possibility that failures were not recorded in all cases, since the student received no credit for unsatisfactory work. Such omissions, if they did occur, should not influence the results greatly because the method of plotting correlations emphasizes relative grade indices, and the students who made failing marks in some subjects

were probably near the bottom of the distribution in most of their work. Nevertheless, the chances that the results may have been affected is sufficiently large to warrant taking the possible omission of failures into account in the interpretation of the findings.

Since the college transcripts were all from one institution, the computations were somewhat simpler than those for the high school work. A, B, C, D, and F college marks are used. An A was given the value of 1; a B, of 2; a C, of 3; a D, of 4; and an F, of 5 in the computation of the grade index. The weighted grades were added and the total divided by the total number of hours to secure the average. For interpreting the indices and for plotting the correlations, the same grouping as that listed in the tabulation on page eighteen was used, except that it was necessary to add an F+, which was assigned a point value of 4.67. A+ was considered to include all averages from .67 to .99, inclusive; A included all from 1.00 to 1.32, inclusive; and so forth.

The general method used in the statistical computations included the correlation of grade indices for the high school period and for various combinations of the college period with each other and with decile rank on the entrance examinations, and the working out of partial correlation coefficients and of a regression equation involving college marks for the first and second years combined, high

school marks, and entrance test ranks. The specific methods employed will be taken up in the successive chapters.

The report of the findings is divided into three general sections which are included in three separate chapters: the relation of high school marks to entrance examination scores, the relation of high school marks to college marks for various periods of time, and the prediction of college success from high school marks and entrance examinations.

CHAPTER III

THE RELATION OF HIGH SCHOOL MARKS TO PERFORMANCE ON COLLEGE ENTRANCE EXAMINATIONS

In the Introduction, a statement was made regarding the sectioning of the Teachers College freshmen into deciles computed on the basis of entrance examinations. The purpose of this chapter is to show the relationship between these decile ranks and the grades which the students made while in high school.

Although the subjects covered in the batteries have varied from time to time, this study considers for individual test correlations only the six fields covered by the examinations which are used at the College at the present time: namely, intelligence, English, vocabulary, reading, mathematics, and spelling. Since several different tests were used in a given field over the period of years considered, the decile rank on the individual examinations was used as a method of equating the scores. In Table I are listed the zero-order coefficients obtained by correlating the average grade in high school with the decile rank on the various tests. The number of cases for the different tests varies, as test scores were not available for all students in all subjects.

TABLE I

CORRELATION COEFFICIENTS BETWEEN HIGH SCHOOL AVERAGES AND DECILE RANK ON ENTRANCE EXAMINATIONS

Test	Test score vs. high school average		Number of cases
	r	P. E.	
Intelligence	.51	.01	1202
English	.50	.01	1159
Vocabulary	.39	.02	1204
Reading	.31	.02	882
Mathematics	.39	.02	596
Spelling	.33	.02	1204

Read table thus: for the 1202 students for whom intelligence test scores were available, the coefficient between decile rank on the intelligence test and average high school marks was .51 with a probable error of .01.

The highest coefficient obtained, .51 ± .01, was between the high school average and the intelligence test score. The English test, when correlated against the high school average, yielded a coefficient almost as high, .50 ± .01. For both vocabulary and mathematics, the coefficients were .39 ± .02; for reading, the coefficient was .31 ± .02; and for spelling, it was .33 ± .02.

In addition to the computation of the coefficients between high school grade indices and decile ranks on the individual tests, correlations were made between the high school average and the composite decile rank, by years and for the nine years combined. These data are presented in Table II. The coefficients for the various years range from .31 ± .03, for 1924, to .57 ± .04, for 1929. With the exception of the 1924 and 1925 groups, there is comparatively little variation in the coefficients obtained for the different years. There are several possible explanations for the 1924 and 1925 groups being lower than the other years. For the earlier years the testing program was relatively new, and it is possible that its administration was not so well developed as in later years. It may be also that the character of the student body has changed since 1924; or perhaps the system of grading in the high schools has changed. The method of treating the scores may also have had something to do with the differences;

TABLE II

CORRELATION COEFFICIENTS BETWEEN HIGH SCHOOL AVERAGES AND COMPOSITE DECILE RANK: BY YEARS AND FOR THE TOTAL GROUP, 1924 TO 1932, INCLUSIVE

Year	Decile rank vs. high school average		Number of cases
	r	P. E.	
1924	.31	.03	113
1925	.37	.05	120
1926	.50	.04	160
1927	.56	.04	151
1928	.52	.04	134
1929	.57	.04	110
1930	.51	.04	146
1931	.47	.04	137
1932	.49	.04	129
1924-1932, inclusive:			
Boys	.48	.03	338
Girls	.50	.02	866
Total	.49	.01	1204

Read table thus: for the 113 students who entered college in the fall of 1924, the coefficient between average grades in high school and the composite scores on the battery of entrance tests was .31 ± .03.

however, since no system of weighting was used during the first three years of the testing program, and since only one test, literature, was weighted in 1927, it seems unlikely that the method of combining the scores could account for the differences in the correlation coefficients. Furthermore, since the rise is rather abrupt between 1925 and 1926, there seems to be little justification for the differences on the basis of administrative technique, character of the student body, or changes in grading systems. Although it is impossible to determine the actual causes for the differences, it is perhaps logical to assume that the inclusion of tests in several somewhat specific fields--American history and geography in 1924 and civics in 1925--may have reduced the validity of the test battery as a measure of the scholastic ability of the student. The number of cases for any year is too small, however, to justify any sweeping conclusions of this nature.

When all nine years were considered together, the coefficient between achievement on the tests and high school indices was found to be .48 ± .03 for the boys, .50 ± .02 for the girls, and .49 ± .01 for boys and girls together. The differences between the sexes are too small to be significant.

In summary, it may be stated that:

1. There is a significant relationship between marks

earned in high school and scores made on college entrance examinations.

2. There is a greater relationship between high school marks and intelligence test scores than between marks for the secondary school period and scores on any of the other tests.

3. The correlation coefficient between high school marks and English test scores is almost as high as the coefficient between the grade indices and the scores on the intelligence tests.

4. There seems to be little difference, for indicating previous preparation, between weighted and unweighted scores, although the data are not sufficiently definite to warrant any positive conclusion in this connection.

5. Apparently test batteries which are made up from the more general fields, such as intelligence, English, vocabulary, reading, mathematics, and spelling, are more valuable for indicating previous preparation than are those which include more specific subjects, such as history, geography, and civics. Again, the differences are not very distinctly marked and the number of cases is too small to justify any definite conclusions.

6. The differences between the sexes in their ability to maintain, on entrance examinations, the same level of achievement which they attained in high

school are not great enough to be significant.

In the interpretation of the data presented in this chapter, the reader should remember that this investigation includes only those students who remained in college for at least two consecutive years. The fact that there is a marked tendency for the poorer students to drop out after the first semester[1] indicates that the group considered here is somewhat selective; and the results may not be the same as those that would be obtained were all the college freshmen included.

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[1] H. E. Schrammel and E. R. Wood, "Success and Failure of College Students." Studies in Education, No. 3 (Emporia: the Kansas State Teachers College, 1931.)

CHAPTER IV

THE RELATIONSHIP BETWEEN SCHOLASTIC ACHIEVEMENT IN HIGH SCHOOL AND IN COLLEGE

In the preceding chapter were presented data regarding the relationship between high school achievement and rank on college entrance examinations. The purpose of the present chapter is to show to what extent students make the same relative grades in high school that they make in college.

The data were collected and the average grades for the various periods computed according to the method outlined in Chapter II. The high school averages were then correlated against the college averages for the first, second, third, and fourth years; for the first two years combined; and for the four years combined. Since many of the students had attended summer school or had taken work by correspondence or by examination, some difficulties arose in connection with the division of the courses into years. It was considered advisable to omit the summers, correspondence, and work taken by examination in the computation of averages by years and for the first two years combined and to include them in the four-year totals only. According to the method employed, the first and second years consist of work taken during the two consecutive years

immediately following entrance at the college. For the junior and senior years, semesters taken during the regular school year were matched in chronological order regardless of whether they were taken during the same school year. The coefficients which were obtained from the various correlations are presented in Table III. The last set of data in this table, listed as "Four-year equivalent (112 hours or more)," includes the work taken during the regular school year, summer school work, correspondence, and work taken by examination. The data were computed from the grades of all those who had enrolled for a total of 112 hours or more. The number of hours was set at 112 rather than 120, the number of credit hours required for graduation, for two reasons: in the first place, it seemed desirable to set a minimum somewhat below the 120 hours because strict adherence to the 120-hour requirement would have eliminated many students whose ability over the period of years was probably rather well indicated by the average of the work which they had completed. In the second place, 112 hours seemed to be a logical limit, since, in the selection of the students, eight hours' transferred work was allowed.

The coefficient between high school grades and college marks for the four years or the equivalent thereof was the highest among the six periods considered, .66 ± .02.

TABLE III

COEFFICIENTS BETWEEN HIGH SCHOOL AVERAGE GRADES AND AVERAGE GRADES FOR VARIOUS PERIODS IN COLLEGE

College period	r	P. E.	Number of cases
First year	.63	.01	1204
Second year	.60	.01	1204
Third year	.61	.02	498
Fourth year	.52	.03	284
First and second years combined	.65	.01	1204
Four-year equivalent (112 hours or more)	.66	.02	341

Read table thus: The correlation coefficient between the average high school grades and the average grade for the first year in college was .63 ± .01 for the 1204 students who remained in college at least two consecutive years.

The totals for the first two years yielded a coefficient nearly as high, .65 ± .01. Among the single years considered, the freshman grades correlated most highly with college grades, r being .63 ± .01. The lowest coefficient secured, that between the secondary school average and the average for the fourth year in college, was .52 ± .03. A possible explanation for the fact that this coefficient is lower may be that the practice teaching work and certain other education requirements tend to bring the student's average down below the standards which he usually maintains. This explanation cannot be made with any assurance of its accuracy, however, since a great many required courses are included in the freshman year, and many of the students who attended for two years had practice teaching requirements to fulfill for a life certificate. Perhaps a more accurate conclusion would be that the upper classmen carry on a more diversified program, participating in more extracurricular activities and assuming more responsibility for leadership in various organizations. Both of these explanations are applicable to the students whose senior averages in college are lower than their high school averages. There is also the possibility that the fact that much of the work of the senior year is in the field of the students' fields of greatest interest may tend to bring his average up to a higher level than it was in

high school. Undoubtedly there were forces working both ways; but it is, of course, impossible to say just what these forces were.

The significance of these coefficients for prediction is more readily seen from the coefficient of alienation, which, for the freshman year, is .7742. In other words, for the first year's work in college, predictions based upon the grade distributions for the high school period would be approximately 23 per cent more accurate than pure guess. For the first two years combined, the coefficient of alienation is .7571; and for the four years combined, it is .7485. For these two periods, the predictions based upon high school marks would, therefore, be approximately 25 per cent and 24 per cent, respectively, more accurate than pure guess. While the alienation coefficients are too large to insure a high degree of accuracy in prediction, for purposes of educational and vocational guidance, if the error of estimate can be reduced 25 per cent, surely such a reduction would be desirable.

For certain representative periods the data were computed separately for boys and girls in order to determine whether there are any sex differences in the predictive value of high school records. The periods selected were the first year, the first and second years

TABLE IV

COEFFICIENTS BETWEEN HIGH SCHOOL AVERAGE GRADES AND AVERAGE GRADES FOR CERTAIN REPRESENTATIVE PERIODS OF COLLEGE WORK, BY SEX

College period	Sex	r	P. E.	Number of cases
First year	M	.64	.02	338
	F	.61	.01	866
First and second years combined	M	.64	.04	338
	F	.65	.01	866
Four-year equivalent (112 hours or more)	M	.60	.04	122
	F	.67	.02	218

Read table thus: the correlation coefficient between high school averages and the average grade for the first year in college was .64 ± .02 for the boys and .61 ± .01 for the girls.

combined, and the four years or equivalent thereof. The results are presented in Table IV. For the first two years and for the four-year equivalent, the coefficients are lower for the boys than for the girls; for the first year, the difference is in favor of the boys. Except for the four-year period, however, the differences are almost negligible; and even for the four years the difference is not great enough to be highly significant. It is impossible to say just what caused the difference for the four-year period. It is probable, however, that the percentage of boys who, as they advance in college, assume responsibilities other than their school work is greater than the percentage of girls assuming such responsibilities.

If coefficients of alienation are computed for the data of Table IV, it will be seen that for the freshman year and for the first two years combined, predictions would be approximately equal in accuracy for the sexes; and for the four-year period such predictions would be approximately 6 per cent more accurate for the girls than for the boys.

From the data presented in this chapter, the following conclusions may be made.

1. There is a significant relationship between marks earned in high school and college marks received for the various periods of time considered.

2. The relationship between high school grades and college grades for the four years combined, or the equivalent thereof, is more marked than is that for the other years or combinations of years.

3. There is less relationship between secondary school marks and college marks for the senior year than for the other years or combinations of years.

4. Predictions based upon the distributions of high school and college marks would be approximately 25 per cent more accurate than pure guess.

5. So far as relationship between the grades made in high school and those earned in college is concerned, there is little difference between boys and girls, the differences being greatest for the four years combined.

6. For the freshman year and for the first two years combined, predictions based on high school grades would be approximately equal in accuracy for the boys and girls. For the entire college period, predictions would be approximately 6 per cent more accurate for the girls than for the boys.

CHAPTER V

THE VALUE OF HIGH SCHOOL MARKS AND ENTRANCE EXAMINATIONS FOR PREDICTING COLLEGE SUCCESS

In Chapters III and IV were presented the data regarding the relationship of high school marks to rank on entrance examinations and to scholastic success in college. The problem now arises as to the relative value of the various criteria for predicting college success. In order to secure the zero-order r's between test scores and school marks, decile ranks on the various entrance examinations were correlated against the high school averages and against the college averages for the first and second years combined. Intercorrelations between the various tests were also computed. These data are listed in Table V.

From this table it will be seen that the highest coefficient between college averages and test scores is for English, .54 ± .01; the r's for intelligence and vocabulary, when correlated against college marks, are almost as high, .52 ± .01 and .50 ± .01, respectively. The lowest coefficients between school marks and test scores are in reading, .38 ± .02 for college averages and .31 ± .02 for high school averages. The intercorre-

TABLE V. ZERO-ORDER CORRELATION COEFFICIENTS BETWEEN HIGH SCHOOL MARKS, COLLEGE MARKS FOR THE FIRST TWO YEARS, AND ENTRANCE TEST SCORES

	High school average	Intelligence	English	Vocabulary	Reading	Mathematics	Spelling
College average for first and second years	.65 ± .01	.52 ± .01	.54 ± .01	.50 ± .01	.38 ± .02	.44 ± .02	.45 ± .02
High school average		.51 ± .01	.50 ± .01	.39 ± .02	.31 ± .02	.39 ± .02	.46 ± .02
Intelligence			.60 ± .01	.68 ± .01	.52 ± .02	.53 ± .02	.48 ± .02
English				.53 ± .01	.43 ± .02	.41 ± .02	.52 ± .01
Vocabulary					.54 ± .02	.27 ± .03	.49 ± .01
Reading						.32 ± .02	.35 ± .02
Mathematics							.40 ± .02

Read table thus: the coefficient between the college average for the first two years and the high school averages is .65 ± .01; between the college averages and scores on intelligence tests, the *r* is .52 ± .01.

lations between test ranks range from .27 ± .03, for vocabulary and mathematics, to .68 ± .01, for intelligence and vocabulary. In general, the r's for reading and mathematics are lower than those for the other tests.

For the purpose of ascertaining how much weight should be attached to high school marks and to the various entrance examinations if the marks and scores are to be taken as criteria of college success, a regression equation was worked out. The partial r's, together with the standard deviations, are given in the succeeding pages. The subscripts are to be interpreted as follows:

1 college averages for the first two years
2 high school averages
3 decile rank on the intelligence test
4 decile rank on the English test
5 decile rank on the vocabulary test
6 decile rank on the reading test
7 decile rank on the mathematics test
8 decile rank on the spelling test

In the first column under the sixth-order correlations are tabulated the net r's between college averages and the other criteria. It will be seen that between college averages and high school marks the net coefficient is .46, which, in view of the number of other factors involved, must be considered significantly high.

First-order Correlations

$r_{12.3} = .52$	$r_{15.6} = .38$	$r_{23.1} = .26$	$r_{26.5} = .13$
$r_{12.4} = .52$	$r_{15.7} = .44$	$r_{23.4} = .30$	$r_{26.7} = .21$
$r_{12.5} = .57$	$r_{15.8} = .36$	$r_{23.5} = .36$	$r_{26.8} = .18$
$r_{12.6} = .61$	$r_{16.2} = .25$	$r_{23.6} = .43$	$r_{27.1} = .15$
$r_{12.7} = .58$	$r_{16.3} = .15$	$r_{23.7} = .39$	$r_{27.3} = .16$
$r_{12.8} = .56$	$r_{16.4} = .19$	$r_{23.8} = .37$	$r_{27.4} = .23$
$r_{13.2} = .29$	$r_{16.5} = .15$	$r_{24.1} = .23$	$r_{27.5} = .32$
$r_{13.4} = .29$	$r_{16.7} = .28$	$r_{24.3} = .28$	$r_{27.6} = .32$
$r_{13.5} = .28$	$r_{16.8} = .27$	$r_{24.5} = .38$	$r_{27.8} = .25$
$r_{13.6} = .41$	$r_{17.2} = .27$	$r_{24.6} = .43$	$r_{28.1} = .25$
$r_{13.7} = .38$	$r_{17.3} = .23$	$r_{24.7} = .40$	$r_{28.3} = .28$
$r_{13.8} = .39$	$r_{17.4} = .28$	$r_{24.8} = .34$	$r_{28.4} = .27$
$r_{14.2} = .33$	$r_{17.5} = .37$	$r_{25.1} = .10$	$r_{28.5} = .33$
$r_{14.3} = .33$	$r_{17.6} = .36$	$r_{25.3} = .07$	$r_{28.6} = .39$
$r_{14.5} = .37$	$r_{17.8} = .32$	$r_{25.4} = .17$	$r_{28.7} = .36$
$r_{14.6} = .45$	$r_{18.2} = .22$	$r_{25.6} = .28$	$r_{34.1} = .44$
$r_{14.7} = .44$	$r_{18.3} = .27$	$r_{25.7} = .32$	$r_{34.2} = .46$
$r_{14.8} = .40$	$r_{18.4} = .24$	$r_{25.8} = .21$	$r_{34.5} = .39$
$r_{15.2} = .35$	$r_{18.5} = .27$	$r_{26.1} = .09$	$r_{34.6} = .49$
$r_{15.3} = .23$	$r_{18.6} = .37$	$r_{26.3} = .06$	$r_{34.7} = .49$
$r_{15.4} = .30$	$r_{18.7} = .33$	$r_{26.4} = .12$	$r_{34.8} = .47$

First-order Correlations (continued)

$r_{35.1} = .57$
$r_{35.2} = .61$
$r_{35.4} = .53$
$r_{35.6} = .56$
$r_{35.7} = .66$
$r_{35.8} = .58$
$r_{36.1} = .41$
$r_{36.2} = .44$
$r_{36.4} = .36$
$r_{36.5} = .25$
$r_{36.7} = .44$
$r_{36.8} = .43$
$r_{37.1} = .39$
$r_{37.2} = .42$
$r_{37.4} = .39$
$r_{37.5} = .49$
$r_{37.6} = .45$
$r_{37.8} = .42$
$r_{38.1} = .32$
$r_{38.2} = .32$
$r_{38.4} = .25$
$r_{38.5} = .23$
$r_{38.6} = .37$
$r_{38.7} = .34$
$r_{45.1} = .36$
$r_{45.2} = .42$
$r_{45.3} = .21$
$r_{45.6} = .39$
$r_{45.7} = .48$
$r_{45.8} = .37$
$r_{46.1} = .29$
$r_{46.2} = .33$
$r_{46.3} = .17$
$r_{46.5} = .20$
$r_{46.7} = .35$
$r_{46.8} = .31$
$r_{47.1} = .23$
$r_{47.2} = .27$
$r_{47.3} = .14$
$r_{47.5} = .33$
$r_{47.6} = .32$
$r_{47.8} = .26$
$r_{48.1} = .37$
$r_{48.2} = .38$
$r_{48.3} = .33$
$r_{48.5} = .35$
$r_{48.6} = .44$
$r_{48.7} = .43$
$r_{56.1} = .44$
$r_{56.2} = .48$
$r_{56.3} = .30$
$r_{56.4} = .41$
$r_{56.7} = .50$
$r_{56.8} = .45$
$r_{57.1} = .06$
$r_{57.2} = .14$
$r_{57.3} = -.15$
$r_{57.4} = .07$
$r_{57.6} = .12$
$r_{57.8} = .09$
$r_{58.1} = .30$
$r_{58.2} = .38$
$r_{58.3} = .25$
$r_{58.4} = .30$
$r_{58.6} = .38$
$r_{58.7} = .43$
$r_{67.1} = .18$
$r_{67.2} = .23$
$r_{67.3} = .06$
$r_{67.4} = .17$
$r_{67.5} = .21$
$r_{67.8} = .21$
$r_{68.1} = .22$
$r_{68.2} = .25$
$r_{68.3} = .13$
$r_{68.4} = .16$
$r_{68.5} = .12$
$r_{68.7} = .26$
$r_{78.1} = .25$
$r_{78.2} = .27$
$r_{78.3} = .20$
$r_{78.4} = .24$
$r_{78.5} = .32$
$r_{78.6} = .32$

Second-order Correlations

$r_{12.34} = .47$	$r_{27.13} = .05$	$r_{47.12} = .20$	$r_{58.23} = .25$
$r_{13.24} = .16$	$r_{27.34} = .13$	$r_{47.13} = .07$	$r_{58.24} = .26$
$r_{14.23} = .23$	$r_{28.13} = .18$	$r_{47.23} = .10$	$r_{58.34} = .20$
$r_{15.24} = .25$	$r_{28.34} = .21$	$r_{48.12} = .33$	$r_{67.12} = .17$
$r_{15.34} = .17$	$r_{34.12} = .41$	$r_{48.13} = .27$	$r_{67.13} = .02$
$r_{16.23} = .14$	$r_{35.12} = .57$	$r_{48.23} = .28$	$r_{67.23} = .06$
$r_{16.24} = .16$	$r_{35.24} = .52$	$r_{56.12} = .43$	$r_{67.24} = .16$
$r_{16.34} = .10$	$r_{36.12} = .40$	$r_{56.13} = .28$	$r_{67.34} = .04$
$r_{17.23} = .17$	$r_{36.24} = .34$	$r_{56.23} = .30$	$r_{68.12} = .20$
$r_{17.24} = .20$	$r_{37.12} = .37$	$r_{56.24} = .40$	$r_{68.13} = .10$
$r_{17.34} = .20$	$r_{37.24} = .35$	$r_{56.34} = .27$	$r_{68.23} = .13$
$r_{18.23} = .14$	$r_{38.12} = .27$	$r_{57.12} = .05$	$r_{68.24} = .14$
$r_{18.24} = .11$	$r_{38.24} = .18$	$r_{57.13} = -.21$	$r_{68.34} = .08$
$r_{18.34} = .18$	$r_{45.12} = .35$	$r_{57.23} = -.16$	$r_{78.12} = .22$
$r_{24.13} = .13$	$r_{45.13} = .15$	$r_{57.24} = .03$	$r_{78.13} = .14$
$r_{25.13} = -.06$	$r_{45.23} = .20$	$r_{57.34} = -.19$	$r_{78.23} = .16$
$r_{25.34} = .01$	$r_{46.12} = .28$	$r_{58.12} = .29$	$r_{78.24} = .19$
$r_{26.13} = -.02$	$r_{46.13} = .13$	$r_{58.13} = .15$	$r_{78.34} = .16$
$r_{26.34} = .01$	$r_{46.23} = .16$		

Third-order Correlations

$r_{12.345} = .48$
$r_{13.245} = .04$
$r_{14.235} = .19$
$r_{15.234} = .19$
$r_{16.234} = .11$
$r_{16.235} = .08$
$r_{16.245} = .07$
$r_{16.345} = .06$
$r_{17.234} = .15$
$r_{17.235} = .22$
$r_{17.245} = .20$
$r_{17.345} = .24$
$r_{18.234} = .08$
$r_{18.235} = .09$
$r_{18.245} = .05$
$r_{18.345} = .15$
$r_{25.134} = -.08$
$r_{26.134} = -.04$
$r_{26.345} = .01$
$r_{27.134} = .04$
$r_{27.345} = .13$
$r_{28.134} = .15$
$r_{28.345} = .21$
$r_{35.124} = .50$
$r_{36.124} = .33$
$r_{36.245} = .17$
$r_{37.124} = .32$
$r_{37.245} = .39$
$r_{38.124} = .16$
$r_{38.245} = .05$
$r_{45.123} = .16$
$r_{46.123} = .14$
$r_{46.235} = .11$
$r_{47.123} = .06$
$r_{47.235} = .14$
$r_{48.123} = .25$
$r_{48.235} = .24$
$r_{56.123} = .27$
$r_{56.124} = .37$
$r_{56.134} = .27$
$r_{56.234} = .28$
$r_{57.123} = -.21$
$r_{57.124} = -.02$
$r_{57.134} = -.22$
$r_{57.234} = -.18$
$r_{58.123} = .17$
$r_{58.124} = .20$
$r_{58.134} = .12$
$r_{58.234} = .21$
$r_{67.123} = .03$
$r_{67.124} = .12$
$r_{67.134} = .01$
$r_{67.234} = .04$
$r_{67.235} = .11$
$r_{67.245} = .16$
$r_{67.345} = .01$
$r_{68.123} = .10$
$r_{68.124} = .12$
$r_{68.134} = .07$
$r_{68.234} = .09$
$r_{68.235} = .06$
$r_{68.245} = .04$
$r_{68.345} = .03$
$r_{78.123} = .13$
$r_{78.124} = .17$
$r_{78.134} = .13$
$r_{78.234} = .14$
$r_{78.235} = .21$
$r_{78.245} = .19$
$r_{78.345} = .21$

Fourth-order Correlations

$r_{12.3456} = .48$
$r_{13.2456} = .03$
$r_{14.2356} = .18$
$r_{15.2346} = .17$
$r_{16.2345} = .06$
$r_{17.2345} = .19$
$r_{17.2346} = .15$
$r_{17.2356} = .21$
$r_{17.2456} = .19$
$r_{17.3456} = .24$
$r_{18.2345} = .04$
$r_{18.2346} = .07$
$r_{18.2356} = .09$
$r_{18.2456} = .05$
$r_{18.3456} = .15$
$r_{26.1345} = -.02$
$r_{27.1345} = .08$
$r_{27.3456} = .13$
$r_{28.1345} = .16$
$r_{28.3456} = .21$
$r_{36.1345} = .18$
$r_{37.1245} = .38$
$r_{37.2456} = .37$
$r_{38.1245} = .07$
$r_{38.2456} = .04$
$r_{46.1235} = .10$
$r_{47.1235} = .10$
$r_{47.2356} = .13$
$r_{48.1235} = .23$
$r_{48.2356} = .24$
$r_{56.1234} = .25$
$r_{57.1234} = -.22$
$r_{57.2346} = -.20$
$r_{58.1234} = .14$
$r_{58.2346} = .19$
$r_{67.1234} = -.02$
$r_{67.1235} = -.03$
$r_{67.1245} = .12$
$r_{67.1345} = .07$
$r_{67.2345} = .10$
$r_{68.1234} = .07$
$r_{68.1235} = .06$
$r_{68.1245} = .05$
$r_{68.1345} = .04$
$r_{68.2345} = .03$
$r_{78.1234} = .12$
$r_{78.1235} = .17$
$r_{78.1245} = .18$
$r_{78.1346} = .16$
$r_{78.2345} = .18$
$r_{78.2346} = .14$
$r_{78.2356} = .21$
$r_{78.2456} = .19$
$r_{78.3456} = .21$

Fifth-order Correlations

$r_{12.34567} = .47$
$r_{13.24567} = -.04$
$r_{14.23567} = .16$
$r_{15.23467} = .21$
$r_{16.23457} = .04$
$r_{17.23456} = .13$
$r_{18.23456} = .04$
$r_{18.23457} = .01$
$r_{18.23467} = .05$
$r_{18.23567} = .05$
$r_{18.24567} = .01$
$r_{18.34567} = .10$
$r_{27.13456} = .02$
$r_{28.13456} = .16$
$r_{28.34567} = .19$
$r_{37.12456} = .37$
$r_{38.12456} = .06$
$r_{38.24567} = -.03$
$r_{47.12356} = .10$
$r_{48.12356} = .23$
$r_{48.23567} = .22$
$r_{57.12346} = .23$
$r_{58.12346} = .13$
$r_{58.23467} = .17$
$r_{67.12345} = .08$
$r_{68.12345} = .04$
$r_{68.23457} = .01$
$r_{78.12345} = .16$
$r_{78.12346} = .12$
$r_{78.12456} = .18$
$r_{78.13456} = .16$
$r_{78.12356} = .17$
$r_{78.23456} = .18$

Sixth-order Correlations

$r_{12.345678} = .46$

$r_{13.245678} = -.04$

$r_{14.235678} = .15$

$r_{15.234678} = .20$

$r_{16.234578} = .04$

$r_{17.234568} = .12$

$r_{18.234567} = .02$

$r_{28.134567} = .16$

$r_{38.124567} = .01$

$r_{48.123567} = .22$

$r_{58.123467} = .11$

$r_{68.123457} = .03$

$r_{78.123456} = .16$

Standard Deviations for the Various Distributions

$\sigma_1 = .60$

$\sigma_2 = .59$

$\sigma_3 = 2.82$

$\sigma_4 = 2.77$

$\sigma_5 = 2.83$

$\sigma_6 = 2.83$

$\sigma_7 = 2.72$

$\sigma_8 = 2.83$

Partial Standard Deviations

$\sigma_{1.2345678} = .42$

$\sigma_{2.1345678} = .42$

$\sigma_{3.1245678} = 1.68$

$\sigma_{4.1235678} = 1.97$

$\sigma_{5.1234678} = 1.85$

$\sigma_{6.1234578} = 2.28$

$\sigma_{7.1234568} = 2.15$

$\sigma_{8.1234567} = 2.23$

Among the test ranks, those for vocabulary correlate most highly with college marks; English is second; and mathematics is third.

The regression equation, computed from the partial r's and sigmas, was found to be

$$X_1 = .45X_2 - .01X_3 + .03X_4 + .04X_5 + .01X_6 + .02X_7 + .00X_8$$

According to this equation, the only factor which is of any great significance for predicting college success is high school averages. In view of the high zero-order coefficients between certain tests and college marks, and in view of the relationship which has been found to exist between performance on entrance examinations and the scholastic achievement of these same college students or of similar college groups,[1] such an interpretation is undoubtedly erroneous. The only possible explanation for the low coefficients for the test scores is that there is an overlapping of functions covered by the different examinations. For example, the intelligence test involves certain reading skills; mathematics ability; much vocabulary; and perhaps, indirectly, certain of the abilities covered in an English test. When all of these abilities are held constant, perhaps there is, in reality, very little left to intelli-

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[1] H. E. Schrammel and E. R. Wood, "Success and Failure of College Students." Studies in Education, No. 3 (Emporia: the Kansas State Teachers College, 1931) Chap. IV.

gence as it is measured by group tests. It is possible also that the selectiveness of the group may have had something to do with the manner in which the equation worked out. Undoubtedly there are many factors besides native capacity and previous preparation which influence college success. It may be that these factors operate more strongly in the case of students who remain in school for at least two consecutive years than in the case of those who drop out after one semester or one year. On the other hand, perhaps, since the zero-order correlations are so high between intelligence and the other variables and since the coefficient for intelligence in the regression equation is so low, it is logical to assume that the intelligence test is the best single test for predicting college success. No positive statement of this kind should be made, however, without further experimentation.

In conclusion it may be stated that:

1. There is a significant relationship between college marks and decile rank on the various entrance examinations, the r for English tests being the highest, .54 ± .01, and the coefficient for intelligence and for vocabulary being only slightly lower.

2. Intercorrelations among the various tests are all significantly high, since the r in every case is much

higher than four times the P. E.

3. In general, so far as test scores are concerned, intercorrelations involving reading and mathematics are lower than those for the other tests.

4. Of the seven criteria selected, apparently high school marks are the most valid for predicting college success. Among the test scores, intelligence, English, and vocabulary are probably most valuable, although none of these has a high coefficient in the regression equation.

5. Apparently, from the regression equation obtained, there is a great deal of overlapping in the functions of the various tests used.

CHAPTER VI

SUMMARY AND CONCLUSIONS

The purpose of this study was to determine, at least in part, the relationship of high school achievement to college marks, and the relative value of high school achievement and college entrance examinations for predicting scholastic success in college. Grade averages were computed for the high school period; for the first, second, third, and fourth years of college separately; for the first and second years of college combined; and for the four years of college combined. The statistical treatment of the data consisted in the computation of zero and partial r's and the regression equation involving; high school marks; college averages for the first and second years combined; and test scores in intelligence, English, vocabulary, reading, mathematics, and spelling, separately.

From the data presented, the following conclusions may be made.

1. There is a significant relationship between marks in high school and scores on college entrance examinations. Intelligence scores show the greatest relationship with high school marks, while the correlation coefficient between high high school averages and English scores is only slightly lower.

2. Although the data are too meager to warrant any sweeping conclusions regarding the weighting of tests, from the zero-order coefficients obtained between decile rank and high school marks, it seems probable that weighting has little influence on the value of composite scores for measuring previous preparation as long as the tests included in the battery are general in nature.

3. For the most part, the r between the composite decile rank and high school marks is approximately equal to that between intelligence or English test scores and high school marks.

4. There is a significant relationship between marks earned in high school and those earned in college. For the periods studied, the greatest relationship was found to exist between high school averages and the college average for the four years combined. For the single years studied, the coefficients between high school averages and college marks for the freshman year was the highest; the r between high school marks and marks for the senior year in college was the lowest.

5. There is little difference between the sexes, either in relationship between decile rank and high school marks or in relationship between high school marks and college marks. For the four-year period, however, predictions based on high school marks are approximately

6 per cent more accurate for girls than for boys.

6. Since there is apparently a great amount of duplication of material covered by the examinations, the regression equation seems inadequate for determining which tests are most valuable for predicting success. From the zero-order and first-order r's, however, the conclusion seems justified that intelligence and English are the most valuable, English being somewhat in the lead--probably because so much of the required work of at least the first year in college is in the English department.

7. Apparently, for purposes of prediction, the average grade earned in high school is highly reliable. The zero-order coefficient between high school and college marks was .65 ± .01, and the net correlation when performance on the six tests was held constant was .46.

8. In the coefficients between high school marks and college marks and in the relationship between test scores and school marks, as indicated by the zero-order coefficients, this study agrees rather well with other studies. The regression equation obtained does not agree with others in the field, probably because of the method of selecting the subjects, the number of factors considered, and the overlapping of functions tested.

The present study is very much limited in scope. It considers only those students who remained in college for

at least two consecutive years. It does not take into consideration any personality factors; it fails also to take into account any responsibilities, outside of school work, which many college students are forced to assume. No allowance is made for departmental differences in predicting success or for the factor of interest, which may be indicated, to a certain extent, by the major and minor departments. For the four-year period, grades were included for students who had been out of school for varying lengths of time after the first two years; but no attention was paid to the influence which the activities engaged in during the time that the students were out of school had on their later academic achievement. Further studies should, perhaps, take into account these other phases of the problem.

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