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High School Grades and College Aptitude Tests as Indices to College Achievement and Contination at Utah State Agricultural College

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HIGH SCHOOL GRADES AND COLLEGE APTITUDE TESTS AS INDICES TO COLLEGE ACHIEVEMENT AND CONTINUATION AT UTAH STATE AGRICULTURAL COLLEGE

by

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INTRODUCTION

For many years colleges have been concerned about entrance requirements and procedures for admitting students. In fact, to deal with such matters was one purpose of the famous N.E.A. Committee of Ten which reported in 1893. A few years later the Committee on College Entrance Requirements met and considered the problem directly. Transcripts of credits from high school including specified subjects, the passing of the generally recognized College Entrance Board Examination, and the passing of entrance examinations set up by the individual colleges all have been used as evidence for admission to college. Such examinations are also used as indicators of the students possible subsequent success in college. For a long time in most colleges unless a student could pass a rigid examination there was no chance of his obtaining a college education. Only after his gaining entrance to college was any attempt made at guiding the student.

As the land-grant colleges, provided for in 1862, became a significant part of higher education in America new conceptions were necessary in regard to entrance examinations. Since most land-grant colleges had very diversified curricula, more and varied types of students were attracted to them. Often times a student desired a college education, but wasn't sure just what field to major in. When it became apparent to the colleges that such a student may easily get into an undesirable

area of study for him and then discontinue, procedures were undertaken to guide him more intelligently.

During the last half century most colleges have attempted to use scientific measurements to determine the general academic ability, intelligence, achievement, and interests of the students. With this information guidance is much more effective. It can be used before the student is too deeply involved in a course of study that may lead to his failure or dropping out of college, instead of transferring to a more suitable field of study.

It is acknowledged that there are a great many factors that contribute to college failures or drop-outs. It is also admitted that a great number of students have personal problems that cannot be measured, statistically speaking. However certain kinds of evidence, such as a persons poor aptitude in certain fields, his intelligence quotient, and his interests can be measured, also his high school record can be obtained and carefully analyzed. All these matters should be considered for the betterment of all parties concerned.

There is great variation among the predictive measures used by the various colleges. Also there is much variation among the values of the predictive measures. There is also a great variation among the uses in which these predictive measures are employed by the school. These variations range from the use of no tests at all to the use of a series of tests or batteries of tests. The value of their prediction ranges from -.29 to a positive .85. The use of

the prediction ranges from no use to refusal to admit in school. (2) Due to these great variations it is generally unsuccessful for any school to accept the findings of another and apply it to themselves. To be most helpful a study should use the specific students of a designated school and the predictive measures that that particular school employs.

It is the purpose of the present study to evaluate selected predictive measures available for use at the Utah State Agricultural College.

PROBLEM

It is accepted that the most valid prediction of any student's success at a vocation is for him to try it. Whether he fails or is successful he does know where he stands. There are a couple of faults even with such a sure method. One of them is that this trial-and-error procedure is both expensive and time consuming. Another is if the student fails he may consider himself a failure at everything and may possibly become more maladjusted than before.

If society bears the brunt of the expense, as in a state college or university, it is not fair either to society or to the individual to train a student in a vocation where his performance will be at a low level. This is especially so when his abilities could be diverted into vocations in which he would be much more proficient.

It is necessary for the well-being of society to deal in probabilities for groups. In doing this an individual occasionally may be misdirected; however the total group may be well directed and society as a whole will thus gain. In situations where there is a positive predictive value gained from the measures used in guiding the individual, the chances of misdirecting him are lessened in accordance with the value of the measure as a predictive device.

Values of predictions are generally used in selecting individuals most likely to profit from instruction, sectioning them into classes according to the class

progression rate, and helping to explain failures to the individuals. (3)

As indicated previously the purpose of this study at the outset was to evaluate selected predictive measures available for use at the Utah State Agricultural College. Four such measures were used in the study.

The problem was specifically worded therefore:

TO DETERMINE THE VALUE OF HIGH SCHOOL GRADE POINT AVERAGES, AND SCORES MADE ON U.S.A.F.I. ENGLISH AND NATURAL SCIENCE TESTS, AND U.S.A.C. MATHEMATICS TEST IN PREDICTING ACHIEVEMENT AND CONTINUATION AT THE UTAH STATE AGRICULTURAL COLLEGE.

If there are significant values from U.S.A.C.'s predictive measures perhaps these measures can be used in some manner that more students will remain in college until desirable goals are attained. If there is no predictive value gained from the measures perhaps steps can and should be taken to employ methods that do produce positive factors.

Definition and Clarification

In this study high school grade point averages will be referred to as high school grades. The averages were obtained from the student's high school record. The same procedure was used that the college uses in obtaining the college grade points. This procedure allows 3 grade points for each credit of 'A', 2 for each credit of 'B', 1 for each credit of 'C', zero for each credit of 'D'. A deduction of one grade point was made for each credit of failure. (4)

Since only a limited number of 'D' credits are allowed for college graduation, college achievement will be defined as the ability to achieve a college grade point average of 1.00 which is the equal of a 'C'.

College continuation will be considered the number of quarters that the student completed or remained at U.S.A.C.

College aptitude tests are the examinations administered to new students entering U.S.A.C. for the first time. In 1946 these tests were of three different types: (1) United States Armed Forces Institute Test of General Educational Development (High School Level) Correctness and Effectiveness of Expression, (2) United States Armed Forces Institute Test of Interpretation of Reading Materials in the Natural Sciences, and (3) The Utah State Agricultural College Mathematics Test.

For the sake of brevity, henceforth these tests will be called or spoken of as (1) English, (2) Science, and (3) Mathematics.

The American Council on Education in 1945 published an "Examiner's Manual for the U.S.A.F.I. Tests". They described the English test as follows:

> This test consists principally of a series of passages of connected prose which were originally well written but which for test purposes have been systematically corrupted by including many of the most common and serious faults and infelicities found in the writing of high school and college students. Each passage is printed in a narrow column on the left-hand side of the test page, with certain words, phrases and sentences, and marks of punctuation underlined and numbered. On the right-hand side of the page several ways of writing each numbered portion are presented. For each numbered

portion the student must decide which of the suggested ways of writing is the best, thus the passage is restored to something like its original form.

This larger context permits the inclusion of errors in choice of words, order of sentences, connecting links between sentences, irrelevant and unnecessary details, parallel structure, sequences of tenses, inconsistency, style, good taste, and literary tact which could not be based on isolated sentences, and permits also the inclusion of any type of error which might otherwise be tested in independent sentences, such as errors in punctuation, capitalization, agreement of pronoun and of antecedent, use of adverb for adjective, and agreement of noun and subject.

The Science test was described by the "Examiner's Manual" as follows:

> The type of test used in the social studies, the natural sciences, and the humanities is that in which the student is required to interpret and evaluate a number of reading selections representative of those he will have to read and study in subsequent school work. This type of test is particularly appropriate in these areas in light of the considerations discussed in the preceding paragraphs. In the first place, through this type of test the student can be held both directly and indirectly responsible for a wide background of fundamental knowledge. One's ability to interpret a printed discussion of any special subject obviously depends primarily upon how much he already knows and has thought about the subject involved and about the broad field from which it is taken. This is particularly true if the discussion was written for readers who are presumably already well informed in the general area involved, which is the type of selection used in the general tests. One cannot possibly fully comprehend an advanced discussion about social studies which are used in the discussion, or without knowing the essential features and interrelationships of the social, political, and economic institutions and practices mentioned, or without being able to supply some specific examples of the general references made and to amplify the analogies used, etc. The more of this background the student possesses the greater is the likelihood that he will answer correctly the questions calling for a direct interpretation of the passage read. This type of test can thus require that an integrated body of knowledge be brought to bear on particular problems, without placing any undue premium upon the peculiar form or organization in which the student's ideas have been acquired, or without penalizing him unduly for inability to supply any particular fact or set of facts where another will serve the same general purpose.

While thus well suited to the task of determining the extent of the student's background of substantial knowledge in the field tested, this type of test has been selected for use in this battery primarily because of its effectiveness in measuring certain generalized intellectual skills and abilities needed by the student for success in his later school work. These include such abiltities as those needed to detect errors and inconsistencies in logic, to develop and apply generalizations, to determine the adequacy of evidence, to draw inferences from data, to note implicit assumptions and to 'dig out' meanings not explicitly stated, to form value judgements, to recognize as such an appeal to the emotions rather than to the intellect, to recognize and resist the tricks of the propagandist, to detect bias, and many other abilities involved in critical thinking in general.

A description of the Mathematics test given by its author, Dr. Arden Frandsen follows: (6), (3).

The mathematics test is comprised of 56 problems sampling the basic and most frequently used phases of arithmetic and elementary algebra. The selection of problems was guided by the hypothesis that performance on the common mathematical problems within the experience of every person who has completed high school would measure mathematical abilities independent to some degree of training. To free further the functions measured from specific memory, rules for many of the processes were supplied. The problems included addition, subtraction, multiplication, and division of integers, fractions, decimals, and denominate numbers; the variations on percentage problems; ratio and proportion; solving for one unknown in simple literal linear equations; substitutions in formulae; computing areas of simple geometric figures; determining position of decimal place; conversions of fractions to percentages; and dealing with signed numbers.

REVIEW OF LITERATURE

A great many studies have been made at various colleges to determine the value of their predictive measures. A number of them will be summarized to show similarities and differences to which this study may be compared.

Bert Sappenfield (7) at Montana State University reported a correlation of .62. This was between the average grade made by 282 students in their four years of high school, and the average grades made by these same students in their first year of college.

His conclusion was that the more nearly homogeneous the group was the higher the prediction value in regard to college performance. The students with the higher high school grades performed more closely with the scores made on their aptitude tests. Thus, they were a more predictable group.

Francis Smith (8) at Fresno State College conducted a study using specific subject examinations and high school record. These were used to predict college success.

The conclusions were that high school records were as useful in estimating college success as Reading or English percentiles. High school records and examinations begin to lose their value for prediction after a year lapse. It is safer to depend on several factors in estimating college success than on one. Too many things can happen during a single test to depend solely upon it for one's predictions.

Berdie and Sutter (9) at the University of Minnesota reported that the General Educational Development Test predicted success equally as well as rank in high school class.

Leonard Haas (10) at Eau Claire State conducted two four year studies. He used high school rank and college entrance examination as his predictors.

One study showed a correlation between high school rank and college grades as .63. The other correlation between the same two factors was .57. The writer stated rank in high school was the best predictive factor.

Garrett (1) made an extensive review of the many studies made on predicting college success. He states:

> Among all the factors contributing to prediction of scholastic success in college, the student's average grade in high school continues to show the highest correlation with later college scholarship average. This seems to hold true whether the reports be of individual investigation or summaries of several like studies.
>
> The tendency is all the more convincing when the coefficients of correlation continue high in spite of variation in the weightings used to reduce high school grades to comparable averages, the size of the group studied, kinds of marking systems used, the length of college course considered as a criterion, and other factors which make it difficult to reduce the material to comparable data.
>
> The present summary of 32 coefficients of correlation range from .29 to .83 and have a median of ,56.

On the use of aptitude tests as a measure of college prediction, Garrett found coefficients of correlation ranging from -.04 to .65 with a median of .41.

Garrett (1) also reported on a study by Tribilcock of the success of 651 high school graduates. He found that 72% of the lower third high school grade averages made 'C' or better averages in college.

Tribilcock made the conclusions that: the colleges are right in expecting the poorest work from the lowest high school rank. Colleges that have admission standards above passing grades are excluding many that could do satisfactory work. Colleges that take students regardless of their rank are doing a real educational service. They open the door of opportunity to many students so they can obtain college degrees.

In this area a study was made in 1947 by Pierson (11) at the University of Utah. He was dealing specifically with engineering students. His investigation was made to discover: (1) the combination of marks earned in high school and the first year of college that makes possible the most efficient prediction of scholastic success in engineering curricula; (2) some indication of the reliability and validity of scholastic achievement in engineering as a criterion of success in the profession; (3) the differences between the marks earned by engineering school graduates and drop-outs.

A summary of Pierson's findings and recommendations revealed: (1) engineering school graduates were high school students of superior achievement; (2) general scholarship in engineering could be predicted as efficiently from high school grades as from high school

marks in specific courses; (3) high school marks in English were as predictive as high school marks in Mathematics or Science; (4) the multiple correlation was .52; (5) a study of the drop-outs revealed that 75% possessed the ability to succeed academically. There is a large amount of overlapping between drop-outs and successes; 9% of the graduates had high school averages below the average grade of the drop-outs; 20% of the drop-outs had high school averages equal to the average graduate; (6) high school grade ratios will gain in value if supported by some other predictive measure; (7) the need for guidance and counseling during the last year of high school and the first year of college is urgent; (8) the best single predictor of success in engineering courses was high school grades.

Another study that may be considered in this area was made by McClanahan and Morgan (12) at Colorado A & M. Here again the investigations were dealing with engineering students. They were using standard tests and high school rank as predictive measures for first year grades.

In their conclusions they stated that the poorest predictor was high school rank. They did not state what any of the coefficients of correlation were.

This above study was the only one that was found in which high school grades or rank was the poorest predictor. The variance in the two above studies seem to emphasize the point that specific studies should be made at each institution.

Moore (13) compiled a ten year study of the prediction of college scholarship. These predictions were made by high school grades, rank, and percentiles. He found correlations ranging from .13 to .87.

Three studies were found in which the same tests were used that are still being used by U.S.A.C.

One of these was made at Yale by Crawford and Burnham. (16) They used the U.S.A.F.I. Tests of Correctness and Effectiveness of Expression, and Reading Materials in the Natural Sciences. These are the same two measures as our English and Science. They used those two measures as predictives for freshman first term grades.

They found the English test correlated the term grade average at .51. The Science test correlated .36.

It will be interesting to compare the above study with the findings of this thesis, because two factors will be common to both. A high percent of the students in each study are veterans, and the same tests are used as predictive measures.

Employing the Mathematics test that the U.S.A.C. uses Frandsen and Hadley (3) reported on a group of naval trainees. They found a median correlation of .73 with the various mathematical classes that the trainees took.

Egbert (6) in 1948 correlated the three tests given by U.S.A.C. with two course of freshman mathematics.

He found that in predicting mathematical success the Mathematics test was the best. It was followed very closely by the Science test, and English was sonewhat lower. They were all significant at the one percent level.

Durflinger (14) reported on a 'summary of findings' that high school grades are used more often than any other criterion, on which prediction is based. Also that the correlations based on high school grades are more variable than any other predictive measure. He suggests that the reason for this is the variance in the meaning of the marks used for grading. He found the average correlation based on high school grades was .55. He also reported on a study by Segel, who found that the average correlation gained from achievement tests was .54. Thus they were almost the same.

Requa (15) at Idaho Southern Branch reported on high school rank determining college success. She found that in general high rank in high school led to high rank in college. However there were cases in which high ranking students failed to achieve a 'C' average in college. There were no cases of low quarter students achieving more than a 'C' average. She found the most unpredictable group was in the second quartile.

Durflinger (14) found that multiple coefficients of correlation very seldom went above .80 regardless of the variables that were used. That among twelve different studies on multiple correlations, an intelligence test, an achievement test, and high school grades usually obtained the highest correlation. The median correlation was between .60-.70.

Garrett (1) found three cases in which high school marks and English aptitude tests, used with an intelligence test correlated .80 to .81. He also stated that usually the

correlation was increased substantially by correlating the high school grades with some other factors. However this increase was not near as noticeable when correlating the second or third factor with the correlation already obtained from high school grades and perhaps another variable. Garrett also stated that adding a third variable added very little to the correlation, and adding a fourth was of no value.

A consensus of the studies reviewed above seems to show the following:

1. Average high school marks are the best single predictor of subsequent college achievement.

2. Practically all measures of student abilities, mental or academic are of some value in predicting college grades.

3. High school marks should be used in conjunction with some other factors or tests.

4. General or specific achievement tests occasionally have given as high a correlation as high school marks.

5. Due to many factors there is a variance of correlation found among the various predictive measures.

6. Those multiple correlations which are reported in the literature, are usually higher than single ones.

PROCEDURE

The psychology department of U.S.A.C. maintains a record of all the students who take the college aptitude tests. In the fall of 1946 there were approximately 1800 students who took the three tests. These records are maintained in alphabetical order. From these the records of every sixth student was selected until 300 were obtained.

There were four items taken from these records, the students name and the scores he had made on the three tests. The only reason the name was taken was so additional information could be obtained from the Registrar's office.

From the Registrar's office the following information was obtained:

1. The high schools attended.
2. Number of high school credits.
3. Number of college credits.
4. High school marks.
5. College grade points.
6. Department or school in which the student last enrolled.
7. Number of quarters completed.

The high school marks had to be converted to grade points. This was done in the same way college grade points are figured, that is, 3 points for an 'A', 2 for a 'B', 1 for a 'C', none for a 'D', and a minus 1 for failures. The only effort made to make a homogeneous group of these students in any respect was at this point. To figure grade points it was necessary for

the students to have come from a high school which marked similar to the college. In cases where the student was not from such a school, his record was scratched from the list and the record of the student immediately following him was selected.

All the information was gathered on individual cards made up in the following way:

Name--

High School--

Aptitude Scores

English _____ Science _____ Mathematics_____

High School Credits	Grade Points	Average
_____	_____	_____
College Credits	Grade Points	Average
_____	_____	_____

Quarters Completed

_____

Major

_____

In order to protect the identity of the individuals, as soon as the information was obtained the names were cut off and discarded.

The two sets of grade point averages for each student were figured on a calculator to minimize errors.

From these cards correlation scatter diagrams were constructed for each of the following pairs of variables.

1. College Grade Point Average and High School Grade Point Average.
2. College Grade Point Average and U.S.A.C Mathematics Test.
3. College Grade Point Average and U.S.A.F.I. English Test.
4. College Grade Point Average and U.S.A.F.I. Science Test.
5. College Grade Point Average and Quarters Completed.
6. Quarters Completed and U.S.A.F.I. English Test.
7. Quarters Completed and U.S.A.F.I. Science Test.
8. Quarters Completed and U.S.A.C. Mathematics Test.
9. Quarters Completed and High School Grade Point Average.

Using the diagrams, the product-moment correlation coefficient was determined on each.

In determining the difference between local and non-local students; local students were considered as all students from Utah, Idaho, western Wyoming, and eastern Nevada.

Each student was assigned to his respective school. If he were listed in a department such as; horticulture, chemistry, economics, etc, his school was determined from the school catalogue, and he was assigned to it. No attempt was made to determine whether a student transferred from one school to another during his enrollment.

ANALYSIS OF THE SAMPLING

A study of the records of the 300 students chosen showed the following:

1. Seventy-seven of the selected students were females. This was 26% of the total group. Of these 77 female students 26 were enrolled in the School of Home Economics.

2. The areas from which the students came ranged from coast to coast. However, 241 of them, or 80%, came from the defined local area. The remaining 59 students, or 20%, came from outside that area and are considered non-local students.

3. It was not determined whether the group in this study was predominantly veterans. However since the majority of college students in 1946 were veterans, it is believed that the same would hold true for this group.

4. The percent of the 300 students by the quarters they completed are as follows:

TABLE I

NUMBER AND PERCENT OF STUDENTS COMPLETING ONLY THE NUMBER OF QUARTERS INDICATED

Quarters Completed	% of Students	Number of Students
12	38%	114
11	2%	6
10	1%	4
9	3%	9
8	3%	10
7	3%	10
6	11%	32
5	4%	12
4	3%	8
3	15%	45
2	6%	19
1	8%	23
0	3%	8

From the preceding list it is seen that a large percent of the students leave after completing one or two years. It is hoped that they transferred to some other college rather than discontinue their education.

5. When the data were gathered the students were found to be enrolled (or to have been enrolled at the time they discontinued college) in the seven schools as listed below in TABLE II. As the study developed it was recognized that significant information could have been obtained if each student's registration each quarter had been checked to see whether or not he had changed from one school to another; however since the study was not concerned with this as a major concern it was decided to use only the school classification as finally listed on the student's records in the Registrar's office.

TABLE II

Classification of Students According to the School in Which They Were Finally Enrolled

School	Number of Students	Percent of Total
Agriculture	46	15%
Arts and Sciences	64	21%
Commerce	46	15%
Education	34	12%
Engineering and Tech.	60	20%
Forestry, Wildlife, Range	27	9%
Home Economics	23	8%

A further analysis of the data in the preceding two tables will be presented in additional tables for clarity.

TABLE III shows the comparison between local and non-local students in regard to the number of quarters they completed at U.S.A.C. It is seen that 48% of the non-local students remained for 12 quarters, whereas only 36% of the local students did. The two groups had almost the same number of drop-outs at the end of the first year, 32% local and 31% non-local. At the end of the second year, 42% of the non-local students had left; 49% of the local students had done likewise. Due to the high percent completing 12 quarters, the median number of quarters completed by the non-local students is 11.25 compared with 6.96 for the local students.

TABLE IV shows the comparison between high school grade point averages of the local and non-local students. Eighteen percent of the local students had a high school grade average of less than 'C' or 1.00. Forty-two percent of the non-local had the same average. Forty-one percent of the local students were above 1.00 grade point and below 2.00 grade point. Thirty-nine percent of the non-local students were equally situated. Forty-one percent of the local students were above 2.00 grade points, whereas only 19% of the non-local students were above that mark.

The mean for the local students was 1.66; for the non-local students it was 1.20. The median grade point was 1.64 for the local, and 1.13 for the non-local students.

TABLE III

CLASSIFICATION OF LOCAL AND NON-LOCAL STUDENTS ACCORDING TO SPECIFIC NUMBER OF QUARTERS THEY COMPLETED BEFORE DISCONTINUANCE

Quarters Completed	No. of Local Students	%	No. of Non-Local Students	%
12	86	36	28	48
11	4	02	2	03
10	4	02	0	00
9	7	03	2	03
8	9	04	1	02
7	9	04	1	02
6	27	11	5	08
5	12	05	0	00
4	6	02	2	03
3	33	14	12	21
2	19	08	0	00
1	19	08	4	07
0	6	02	2	03
Total	241	100	59	100

Local Students	Non-Local Students
Mean---7.12	Mean---7.95
Median-6.96	Median-11.25

TABLE IV

COLLEGE GRADE POINT COMPARISON OF LOCAL AND NON-LOCAL STUDENTS

Grade Point Ratio	No. of Local Students	%	No. of Non-Local Students	%
2.75-2.99	8	03	0	00
2.50-2.74	13	05	5	08
2.25-2.49	16	07	1	02
2.00-2.24	28	12	8	14
1.75-1.99	42	18	10	17
1.50-1.74	37	16	5	08
1.25-1.49	36	15	12	21
1.00-1.24	23	10	6	10
.75- .99	13	05	6	10
.50- .74	6	02	3	05
.25- .49	6	02	0	00
.00- .24	13	05	3	05
Total	241	100	59	100

Local Students	Non-Local Students
Mean---1.62	Mean---1.54
Median-1.56	Median-1.43

TABLE V shows the comparison between college grade point averages of the local students and the non-local students. Fourteen percent of the local students were below 1.00 grade point, whereas 20% of the non-local students were below the same point. Fifty-nine percent of the local students were above 1.00 and below 2.00 grade points. Fifty-six percent of the non-local students were at the same level. Sixteen percent of the local students were above 2.00. Twenty-four percent of the non-local students were above 2.00. A larger percentage of the non-local students make superior grades than do local students. However a larger percentage of them also make poorer grades than do the local students. The mean grade for the local students was 1.62. The mean grade for the non-local students was 1.54.

TABLE VI shows the number of quarters completed by the students according to the school in which they were enrolled in at the completion of their schooling at U.S.A.C. The school of Arts and Sciences had the most students with 64. Home Economics had the smallest enrollment at the end of quarters completed with 23. Education had the largest percent to complete 12 quarters, 59% did so. It would appear that students who enroll in or transfer to the school of Education tend to stay in school longer than do students in other schools. Home Economics had the smallest percent to complete 12 quarters, only 26% did so. The school of Forestry, Wildlife and Range had the highest percentage of casualties the first year. This school

lost 52% of its enrollment. They also had only 33% complete 12 quarters. Commerce also had a high casualty rate for the first year, 46%. Education was the lowest in regard to first year drop-outs with only 9% doing so. Engineering and Technology had 40% complete the course and 27% drop-out at the end of the first year. Arts and Sciences had 31% completion and 34% drop-outs. Agriculture had 41% completion and only 19% drop-outs. Arts and Sciences, Commerce, Forestry, and Home Economics lose more students the first year than they have graduate out of the same class. It should be remembered in the case of the above percentages that they are based not on the original enrollment in the schools, but on the enrollment as previously indicated.

TABLE VII shows the comparison of the high school grade point average of the students as classified in each of the seven schools. Home Economics leads the schools with a high school grade point mean of 2.09. Arts and Sciences has a mean of 1.64. Agriculture follows with 1.54. Close behind them is Engineering and Technology with 1.53. Then fairly close together is Education with 1.49 and Commerce with 1.45. The lowest mean of all the schools is Forestry, Wildlife and Range. Their high school grade point mean is 1.09. As will be later seen this school also has the lowest college grade point mean. It seems this school either attracts the weaker students, or has a more difficult course of study than the others.

TABLE VI

CLASSIFICATION OF SCHOOL ENROLLMENTS ACCORDING TO THE NUMBER OF STUDENTS COMPLETING ONLY THE NUMBER OF QUARTERS INDICATED, 0-12

Quarters Completed	Engineering Technology	Arts and Science	Education	Agriculture	Commerce	Forestry Wildlife Range	Home Economics
12	24	20	20	19	16	9	6
11	2	0	0	3	0	1	0
10	0	0	0	3	1	0	0
9	1	2	2	1	1	2	0
8	2	5	2	0	1	0	0
7	1	1	3	3	1	0	1
6	9	7	2	5	3	1	5
5	3	6	0	2	0	0	1
4	1	1	2	0	2	0	2
3	7	16	0	2	8	8	4
2	3	2	1	3	6	1	3
1	6	3	2	3	6	2	1
0	1	1	0	2	1	3	0
Total	60	64	34	46	46	27	23
Mean	7.47	6.78	9.39	7.95	5.52	6.30	6.18
Percent Completing 12 Quarters	40%	31%	59%	41%	37%	33%	26%
Percent Dropping First Year	27%	34%	9%	19%	46%	52%	35%

TABLE VII

HIGH SCHOOL GRADE POINT AVERAGE OF INDIVIDUALS BY SCHOOLS

Grade Point Ratio	Agriculture	Arts and Science	Commerce	Education	Engineering Technology	Forestry Wildlife Range	Home Economics
2.99 2.75	2	6	1	2	3	0	3
2.74 2.50	5	8	1	2	1	1	6
2.49 2.25	3	2	3	4	5	0	2
2.24 2.00	8	11	8	4	9	2	5
1.99 1.75	4	6	4	3	9	1	3
1.74 1.50	5	4	4	5	7	2	1
1.49 1.25	3	4	6	0	5	5	1
1.24 1.00	7	8	7	10	7	2	0
.99 .75	2	5	7	2	4	6	0
.74 .50	1	2	2	1	4	3	0
.49 .25	3	2	1	1	2	3	0
.24 .00	3	6	2	0	3	2	2
Total	46	64	46	34	60	27	23
Mean	1.54	1.64	1.45	1.49	1.53	1.09	2.09

TABLE VIII compares the college grade point average of the students in each of the seven schools. Home Economics and Education have the highest mean with 1.78. Agriculture has a grade point mean of 1.66. Arts and Sciences, and Engineering and Technology are close together with 1.58 and 1.57 each. Commerce has a mean of 1.45, the same mean as their high school grades. The school of Forestry, Wildlife and Range have the lowest college grade point mean of all the schools. It is 1.27. They also had the lowest position of the high school grade point means.

TABLE VIII

COLLEGE GRADE POINT AVERAGE OF INDIVIDUALS ACCORDING TO SCHOOL

Grade point ratio	Agriculture	Arts and Science	Commerce	Education	Engineering Technology	Forestry Wildlife Range	Home Economics
2.75-2.99	1	3	2	0	1	0	1
2.50-2.74	4	1	3	4	2	1	3
2.25-2.49	4	7	1	2	3	0	0
2.00-2.24	6	6	6	4	9	4	1
1.75-1.99	9	9	3	9	12	1	9
1.50-1.74	2	11	7	6	7	4	5
1.25-1.49	7	8	8	6	13	5	1
1.00-1.24	9	5	3	0	7	4	1
.75- .99	2	5	5	2	3	2	0
.50- .74	0	3	3	0	1	2	0
.25- .49	0	1	1	1	0	0	3
.00- .24	2	4	4	0	2	4	0
Total	46	64	46	34	60	27	23
Mean	1.66	1.58	1.45	1.78	1.57	1.27	1.78

THE PREDICTION OF COLLEGE ACHIEVEMENT

The following pages will be devoted to the scatter diagrams and coefficients of correlation with which this study dealt.

At the bottom of each page will be the information as to what the correlation was found to be, what the mean and sigma of each distribution, and whether the correlation is significant or not.

Since each of the scatter diagrams is self explanatory no explanation of them will be given until later.

TABLES IX to XII dealing with the prediction of college achievement will be considered first.

TABLE IX--College grade point ratios and U.S.A.F.I. Natural Science Test.

TABLE X --College grade point ratios and U.S.A.F.I. English Test.

TABLE XI--College grade point ratios and U.S.A.C. Mathematics Test.

TABLE XII-College grade point ratios and high school grade point ratios.

TABLE IX

CORRELATION BETWEEN COLLEGE GRADE POINT RATIOS AND USAFI TEST IN NATURAL SCIENCE

USAFI Test Natural Science	College Grade Points .00 .24	.25 .49	.50 .74	.75 .99	1.00 1.24	1.25 1.49	1.50 1.74	1.75 1.99	2.00 2.24	2.25 2.49	2.50 2.74	2.75 2.99	Total
75-77													
72-74							1	2	2	2	1	1	9
69-71							1	1	2		1		5
66-68	2			2	2		3	4	5	4	4	1	27
63-65				1	1			1			3	1	7
60-62					2	1		3	8	2	2	2	20
57-59	2	1	1	4	6	15	8	13	9	5	4	1	69
54-56	4		2	1		5	7	7	4	3			33
51-53	1	1	1	3	6	11	10	9	3		2	2	49
48-50			1	1	6	3	7	4	1	1	1		25
45-47	3			4	3	2	1	1					14
42-44	2		2	1		5	2	2	1				15
39-41	1	1		1	2	1		4					10
36-38	1	1	2	1	1	5	2	1	1				15
33-35		2											2
Total	16	6	9	19	29	48	42	52	36	17	18	8	300

$Mean_x$ = 1.59 $Sigma_x$ = .65 r_{xy} = .41

$Mean_y$ = 54.62 $Sigma_y$ = 8.97 Significant at 1% level

TABLE X

CORRELATION BETWEEN COLLEGE GRADE POINT RATIOS AND USAFI ENGLISH TEST

USAFI English Test	College Grade Points .00 .24	.25 .49	.50 .74	.75 .99	1.00 1.24	1.25 1.49	1.50 1.74	1.75 1.99	2.00 2.24	2.25 2.49	2.50 2.74	2.75 2.99	Tot.
75-77													
72-74									1				1
69-71								1			1		2
68-68									1	1		1	3
63-65						2	2	1	2	2	2	1	12
60-62				2		1	1	8	1	3	4	3	23
57-59	1				1	3	5	1	3	4	1		19
54-56	3			1	1	2	3	7	3		4	1	25
51-53	1			1	4	9	4	11	7	3	1	1	42
48-50		1	1	3	6	8	9	8	7		2	1	51
45-47	3		3	1	4	6	7	5	5	2	1		37
42-44	3	1	1	1	2	7	6	5	3	1			30
39-41	2	1	2	4	7	7	3	3	1		1		31
36-38	3	1	1		3	3	2	2	1	1	1		18
33-35		2	1	1	1				1				6
Total	16	6	9	19	29	48	42	52	36	17	18	8	300

$Mean_x$ = 1.59 $Sigma_x$ = .65 r_{xy} = .37

$Mean_y$ = 49.48 $Sigma_y$ = 7.95 Significant at 1% level

TABLE XI

CORRELATION BETWEEN COLLEGE GRADE POINT RATIOS AND U.S.A.C. MATHEMATICS TEST

U.S.A.C. Math. Test	College Grade Points .00 .24	.25 .49	.50 .74	.75 .99	1.00 1.24	1.25 1.49	1.50 1.74	1.75 1.99	2.00 2.24	2.25 2.49	2.50 2.74	2.75 2.99	Tot.
55-59								1					1
50-54					1		1	1	3	1			7
45-49						1	1	4		1	2	1	10
40-44	1				1	2	2	1	4	2	2		15
35-39	1				3	3	2	3	2		3	2	19
30-34			1		2	4	3	3	4	7	2		26
25-29	2			5		5	6	10	6	2	4	1	41
20-24	5		2	2	6	11	10	7	6	2	4	3	58
15-19	2	1	3	8	7	9	9	10	2	1	1		53
10-14	3	2	1	3	6	8	5	10	6	1			47
5- 9	1		2	1	2	2	3	2	3			1	17
0- 4	1	3			1	3							8
Total	16	6	9	19	29	48	42	52	36	17	18	8	300

$Mean_x$ = 1.59 $Sigma_x$ = .65 r_{xy} = .42

$Mean_y$ = 23.40 $Sigma_y$ = 9.10 Significant at 1% level

TABLE XII

CORRELATION BETWEEN COLLEGE GRADE POINT RATIOS AND HIGH SCHOOL GRADE POINTS

H.S. Grade Points	College Grade Points .00 .24	.25 .49	.50 .74	.75 .99	1.00 1.24	1.25 1.49	1.50 1.74	1.75 1.99	2.00 2.24	2.25 2.49	2.50 2.74	2.75 2.99	Total
2.99 2.75	1					2	2	2		5	2	3	17
2.74 2.50	1					1	3	4	5	2	5	3	24
2.49 2.25						2	4	8	2	1	2		19
2.24 2.00	2		1	1	3	7	8	10	10	2	3		47
1.99 1.75	1		1	2	2	6	3	8	5	1	1		30
1.74 1.50		1		1	2	7	6	5	2	1	2	1	28
1.49 1.25	1	1		4	5	4	3	3	3				24
1.24 1.00	2		2	4	6	6	6	7	4	2	2	1	42
.99 .75	3	1	3	5	6	3	3	2					26
.74 .50	3		1		2	1	3	1		2			13
.49 .25	2	1		2	1	4		2					12
.24 .00		2	1		2	5	1		5	1	1		18
Total	16	6	9	19	29	48	42	52	36	17	18	8	300

$Mean_x$ = 1.59 $Sigma_x$ = .65 r_{xy} = .40

$Mean_y$ = 1.59 $Sigma_y$ = .76 Significant at 1% level

The outstanding conclusions to be drawn from the data in TABLES IX to XII are the similarities of the correlations. Science and college grade points were found to correlate .41; Mathematics and grade points, .42; English and grade points .37, and high school grade points and college grade points .40.

Since as other studies quoted earlier indicated that high school grade points are usually the best indicator of college success, some of the detailed information in TABLE XII might well be emphasized. Two students whose average grade points in high school were 2.50 and above, fell below .25 in college. Eighteen students with high school averages of 1.00 and below made 2.00 or above in college.

Apparently the wide diversity of opportunity in the U.S.A.C., or some other factors not considered in this study, seem to make it possible for students with all levels of high school marks to be successful. It will be noted again, for example, that the range of students in the interval of 2.50-2.74 in college grades represents the full range of high school grades from .00-2.99.

One multiple correlation was tried using Mathematics, Science and college grades. This resulted in a multiple correlation of only .44, just two points above the highest correlation obtained from the highest zero order correlation involved.

The correlations dealing with the prediction of continuation in college are shown in TABLES XIII to XVII.

TABLE XIII

CORRELATION BETWEEN THE QUARTERS COMPLETED AND USAFI ENGLISH TEST

USAFI English Test	Quarters Completed													
	0	1	2	3	4	5	6	7	8	9	10	11	12	Tot.
75-77														
72-74													1	1
69-71								1					1	2
66-68			1							1			1	3
63-65				2	1		1		1				7	12
60-62		1	1	6	1	2	4						8	23
57-59		1	1	5	1	1	2			1		1	6	19
54-56	2	3	1	2		1	2	1	1	2			10	25
51-53	1	2	2	5	1	1	5			1			24	42
48-50		4	5	10	1	1	6	3	3	1	1	2	14	51
45-47	1	3	3	2	2	1	4	1	2	2	1		15	37
42-44	1	4		5		2	3	2				2	11	30
39-41		4	2	4	1	2	3		3	1		1	10	31
36-38	3		2	3		1	2				1		6	18
33-35		1	1	1				2			1			6
Total	8	23	19	45	8	12	32	10	10	9	4	6	114	300

$Mean_x$ = 7.28 $Sigma_x$ = 4.07 r_{xy} = .10

$Mean_y$ = 49.48 $Sigma_y$ = 7.95 Not Significant

TABLE XIV

CORRELATION BETWEEN THE QUARTERS COMPLETED
USAFI NATURAL SCIENCE TEST

USAFI Natural Science Test	Quarters Completed 0	1	2	3	4	5	6	7	8	9	10	11	12	Tot.
72-74										1			8	9
69-71									1	1			3	5
66-68	2	1	2	2		1	3	1		1			10	27
63-65			1	2			1	1			1		1	7
60-62					1	1	3		1	1			13	20
57-59	1	4	4	6	2	4	6	2	1	3	1	1	34	69
54-56	2	1	2	8		1	6		2	1			10	33
51-53		6	2	8	1		7		2		2	3	18	49
48-50		4	1	4	2	3	2		1				8	25
45-47	2	2		2		1		2	1			2	2	14
42-44		2	3	1	1	1	1	2					4	15
39-41	1	1	1	3			2	2						10
36-38		2	2	4	1		1		1	1			3	15
33-35		1	1											2
Total	8	23	19	45	8	12	32	10	10	9	4	6	114	300

$Mean_x$ = 7.28 $Sigma_x$ = 4.07 r_{xy} = .29

$Mean_y$ = 54.62 $Sigma_y$ = 8.97 Significant at 1% level

TABLE XV

CORRELATION BETWEEN QUARTERS COMPLETED AND U.S.A.C. MATHEMATICS TEST

U.S.A.C. Math. Test	Quarters Completed													Total
	0	1	2	3	4	5	6	7	8	9	10	11	12	
55-59													1	1
50-54				1		2				1			3	7
45-49				1						1			8	10
40-44	1			1			1						12	15
35-39	1		2	2		1	4		1			1	7	19
30-34		1	3	5		2	4			1			10	26
25-29	1	3	1	6	2		6	3	1	1		2	15	41
20-24	3	4	2	5	2	1	5	2	3	2	2	2	25	58
15-19		6	4	11	1	2	5	3	1	2	1		17	53
10-14	1	6	4	7		4	6	2	4		1		10	45
5- 9	1	2	2	2	2		1			1		1	5	17
0- 4		1	1	4	1								1	8
Total	8	23	19	45	8	12	32	10	10	9	4	6	114	300

$Mean_x$ = 7.28 $Sigma_x$ = 4.07 r_{xy} = .22

$Mean_y$ = 23.40 $Sigma_y$ = 9.10 Significant at 1% level

TABLE XVI

CORRELATION BETWEEN THE QUARTERS COMPLETED AND HIGH SCHOOL GRADE POINTS

H.S. Grade Points	Quarters Completed													
	0	1	2	3	4	5	6	7	8	9	10	11	12	Tot.
2.99 2.75	1	1	1	3			1			2			8	17
2.74 2.50		1		3	1	1	8			1		1	8	24
2.49 2.25		2	1	1	1		2	2		1	1		8	19
2.24 2.00	1	3	2	8	3	3	6	2	2				17	47
1.99 1.75	1	3	4	6		1	2		1		1	1	10	30
1.74 1.50		1	1	6	1	1	4	2	1	1			10	28
1.49 1.25	1	3	1	4		3	1		2		1	1	7	24
1.24 1.00	1	4	3	2			6	1	1			1	23	42
.99 .75	1	4	4	5	1	1		1		2	1		6	26
.74 .50	1	2	1	2		1						1	5	13
.49 .25	1			3			1	1					6	12
.24 .00			1	1	1	1	1	1	3	2		1	6	18
Total	8	23	19	45	8	12	32	10	10	9	4	6	114	300

$Mean_x$ = 7.28 $Sigma_x$ = 4.07 r_{xy} = .00

$Mean_y$ = 1.59 $Sigma_y$ = .76 Not Significant

TABLE XVII

CORRELATION BETWEEN COLLEGE GRADE POINT RATIOS AND QUARTERS COMPLETED

	COLLEGE GRADE POINT												
Qtrs. Comp.	.00 .24	.25 .49	.50 .74	.75 .99	1.00 1.24	1.25 1.49	1.50 1.74	1.75 1.99	2.00 2.24	2.25 2.49	2.50 2.74	2.75 2.99	Total
12	1			2	10	21	19	26	18	7	7	3	114
11				1	2	2					1		6
10				1	1			1			1		4
9				2			1		1	3	2		9
8			1	1	2	3	2		1				10
7		1		1	1	1	3	2			1		10
6				1	1	6	6	8	5		3	2	32
5	1				2	3		4	1	1			12
4			1			1		3	2		1		8
3	2	2	2	5	5	9	7	3	3	5	1	1	45
2		1	4	2	2	1	2	2	3			2	19
1	4	2	1	3	3	1	2	3	2	1	1		23
0	8												8
Total	16	6	9	19	29	48	42	52	36	17	18	8	300

$Mean_x$ = 1.59 $Sigma_x$ = .65 r_{xy} = .35

$Mean_y$ = 7.28 $Sigma_y$ = 4.07 Significant at 1% level

The data in TABLES XIII to XVII are concerned with the prediction of continuation in college. Frankly, these data are difficult to interpret. To begin with, the correlations are all low, one being exactly .00. The correlation between English scores and numbers of quarters completed was found to be .10; Science and quarters completed .29; Mathematics and quarters completed .22; high school grades and college quarters completed .00, and college grades and quarters completed .35.

Among the graduates, those listed as completing 12 quarters, every interval above the lowest on the entrance tests is represented, as well as intervals from the lowest to the highest on both high school grades and college grades.

SUMMARY OF FINDINGS

Review of Problem and Procedure

The problem of this study is to determine if there is any significant predictive value in regard to college achievement and continuation that can be based upon high school grade point averages, and the results of the college entrance examinations of students at U.S.A.C.

From the files of the psychology department, the records of 300 students who enrolled in the fall of 1946 were selected. The scores these students had made on the college aptitude tests were also obtained. Then from the files in the Registrar's office the following information was obtained; the name of the high school attended, number of high school credits, number of college credits, number of college grade points, number of quarters completed, and the major school. The high school grade points were also totaled. The average high school grade and the average college grade was figured for each student.

The students were segregated according to the location of their home and the college school of enrollment.

Comparisons were shown in tabular form of the achievement and the continuation in the various schools of the college. This was done by classifying the students' records into two groups, local and non-local.

Using the scores the students had made on the college aptitude tests and their high school marks coefficients of correlation were determined with college grade point ratios and with the number of quarters completed in college.

Findings

1. A total of 114 students, or 38%, completed 12 quarters. This is greater than reported in a study by Haas (10) at Eau Claire Teachers College. In his study only 26% completed 12 quarters. Also in his study at the end of two years 57% had dropped out. Here at U.S.A.C. only 51% had left at that time. The college at Eau Claire, being strictly a teachers college, probably has a larger percent of women students than U.S.A.C. Since they would not be veterans, and have to finance their own way, our larger percentage is understandable. Furthermore the difference in dates of the two studies could account for the difference.

2. The non-local students remain in college longer than do local students. This is probably logical enough, it stands to reason that if a student has to travel a long distance to school, and does so of his own accord, he is probably motivated more strongly than one who has a short distance to travel.

3. The high school marks of the local students were almost one half grade point higher than the non-local students.

4. The college grades of the local students was only .08 of a point above the non-local students. The superiority of the local students in achieving higher grades in college is almost nil. This leads one to suspect that there is a variance in high school marks, or else the same students should remain the same difference apart, other things being equal.

5. Of the seven schools in the college, the high school

graduates with the lowest average, enrolled in the school of Forestry, Wildlife and Range. In this school they achieved the lowest average college grade, and had the largest percent (52%) of drop-outs at the end of one year. What may possibly account for this, is that many students believe all a forest ranger does, is hunt and fish. After one year, or less, they find out otherwise and leave school.

The school of Home Economics received the superior high school graduates. They had a high school grade point average mean of 2.09. This may support the accepted belief that high school girls receive better marks than boys. However out of this apparently select group the smallest percent of any school, 26%, was graduated. Their college average also dropped .31. In defense of this school, perhaps it can be said that since they were all women, marriage could cut deeply in their ranks. Probably very few were veterans, thus financial matters could also cause drop-outs. A study should be made to bring to light the real and valid reasons for the lose of these superior high school graduates.

The school of Education graduated the highest percent (50%) and also lost the smallest percent of drop-outs (9%). Some of the members on the writer's examining committee have suggested the following reasons for the above. (A) The course of study leads to many personal interviews, thus guidance likely takes place. (B) Unless the student graduates and certifies, he can not obtain a job as is possible to do in other schools. (C) Education may draw many students that are juniors and seniors when they enter the school.

The school of Commerce also lost a large percentage (46%) the first year. Here again however, a large number of girls are enrolled. It is believed that a larger percent of girls drop out than do boys.

The method of calculating the percentages of enrollment and retention in the various schools may invalidate the above results.

Correlation Findings

1. The correlation between college grade points and high school marks was .40. This is below the national consensus of .56. This appears to average about the same as reported in a study by Pierson (11) at the University of Utah in claiming high school marks as the best predictor of college achievement; contrasted with McClanahan and Morgan (12), at Colorado A and M, reporting high school marks as the poorest predictor.

2. The correlation between college grade points and the U.S.A.F.I. Natural Science Test was .41. This was quite comparable with the study made at Yale (16). There, this same test correlated with freshman grades .36.

3. The correlation between college grade points and the U.S.A.C. Mathematics Test was .42. This correlation was far below the median correlation of .73 found by Frandsen and Hadley (3). However there was an unusual situation at college at that time. The students they were using were selected ones and strongly motivated. Furthermore their study was concerned with but one year or less of college, whereas the present study covers as much as four years. A recent study by Frandsen found the correlation to be .40.

4. The correlation between college grade points and the USAFI English test was .37. This was less than the correlation found at Yale (16), where the same test was used. They found a correlation of .51. This does compare favorably with Egbert (6) at U.S.A.C. He found English lower than Science or Mathematics in predictive value for total grade point ratios.

5. The correlation between quarters completed and the USAFI English test was .10. There was no significant value that could be gained from the English test in regard to how long an individual would remain in college.

6. The correlation between quarters completed and high school marks was .00. This seem to support Smith (8) and his study at Fresno State. He claimed high school records begin to loose their value for prediction after a lapse of a year. It is likely the majority of the students in this study, being veterans, were out of high school for several years, before coming to college. The lack of correlation also shows the presence of other factors in causing drop-outs.

7. The correlation between quarters completed and the USAFI Natural Science test was .29. This seems to imply that there is possibly a different motive behind the students that achieve higher scores on this test, than there is the ones that achieve high on the English test.

8. The correlation between quarters completed and the U.S.A.C. Mathematics test was .22. The above statement would also apply in this case. (Item 7)

9. Multiple correlations did not show any significant gains over the single tests or high school marks. This also supported Egbert (6) at U.S.A.C.

10. Of all the correlations compiled for this study only two of them were not significant at the 1% level. These two were quarters completed and high school grade marks, and quarters completed and the USAFI English test.

11. The correlation between college grade points and quarters completed was .33. This seems to imply with the general belief that the students that make the best grades remain in college the longest.

CONCLUSIONS AND IMPLICATIONS

1. The value of high school marks for use as a predictor is probably not as high as generally believed. However high school marks in many cases will likely predict college success no better than a single aptitude test. They will possibly be of more value in the case of local students than non-local.

2. This study supports the conception that high school records lose their predictive value after a lapse of a year.

3. Even though the predictive value of the college aptitude tests is low, they should still be used. They proved to be as valuable as other aptitude tests used at various colleges.

4. This study agrees with Pierson (11) that a large percent of the students who drop-out are capable of college success. Since that is true it would be very benefical to the college, the individual, and society to determine the causes of these drop-outs. This study also supports Pierson in believing the need for guidance is urgent during the last year of high school and the first year of college.

5. It is suggested that studies be made in the various schools of the college to determine more specifically why capable students drop-out.

6. This study suggests that it would be unwise to rely only upon the college aptitude tests and high school marks for the guidance of individual students entering the college.

On the other hand if the college should at any time decide to make its entrance policies more selective it will get more students who will likely succeed if it chooses them on the basis of their rank in any one or all of the entrance tests also their rank in average high school marks.

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