

ation-  
ns of  
ation  
t-year  
nsyl-  
stud-

Pear-  
period  
Apti-

higher  
above

ement

son to  
sable,  
n con-

need  
Apti-

ber 1

## PREDICTIVE VALUE OF CERTAIN MEASURES FOR SUCCESS IN MAJOR SUBJECTS

JULIA O'SULLIVAN

THE major aim of this study is to secure objective and reliable data that will enable educational counselors to assist students of Hunter College to select their majors with greater wisdom. It is the purpose of this study to analyze, evaluate and compare pre-admission data, such as the Regents average in the major field, a placement-test score in the major subject and a psychological-examination score to determine which of these factors individually or collectively is the best index of success in the major field in college. In addition to the pre-admission data which are mentioned above, the prognostic value of the first-semester grade in the major subject was studied.

There is an acute need for this type of information because many students select a major unwisely and later seek to change it. The application for a change of major is often the result of maladjustment to the first choice of major. Thus, if educational counselors possessed reliable information as to the indices of success in a given major, they could advise students with greater certainty.

This information would benefit the student educationally and psychologically, since the correct choice of major at the beginning of her college career would prevent the loss of time, the discouragement and emotional stress that may accompany failure in an unsuitable major. This information would also be valuable to the administration since it would tend to reduce changes of major and failures in major courses.

PROCEDURE. The subjects of this investigation were 452 freshmen who were admitted to Hunter College in February 1934, and 654 freshmen who were admitted to Hunter College in September 1933. They were enrolled in the following majors: biology, chemis-

Vol  
90

XIV  
15-195

try, French, history, mathematics, and pre-medical.<sup>1</sup> The records of these students on all the variables included for study were secured from the office of the Registrar and from the office of the Bureau of Educational Guidance.

The following is a list of the variables which were employed:

1. Psychological-Test Score. Since intelligence undoubtedly is a factor which conditions success in college majors, the relationship between intellectual ability, as measured by the American Council Psychological Examination (1933 edition), and success in the majors was studied. The raw scores were used in this investigation.

2. Regents Average in Major Subject. Since it is logical to assume that previous preparation and success in a given subject are related to future success in that subject, the relationship between a student's previous record in a given subject, measured by the Regents average in the major subject, and success in that subject in college was investigated. The Regents average that was employed consisted of an arithmetic average of all Regents marks in the high-school subject that was identical with or allied to the subject that was chosen as a college major.

3. Placement-Test Score. Another measure of previous preparation that was studied to determine its prognostic value was a placement-test score. The following placement tests of the Cooperative Test Series which were related to the majors chosen were administered:

Major	Placement Test
Biology	Co-operative <i>General Science</i> Test Experimental Edition, Form D 1, 1934
Chemistry	Co-operative <i>General Science</i> Test Experimental Edition, Form D 1, 1934
French	Co-operative <i>French Grammar</i> Test Experimental Edition, Form 8, 1933 Co-operative <i>French Reading</i> Test Experimental Edition, Form 6, 1934

<sup>1</sup> Since the number of students enrolled in the chemistry and pre-medical groups was so small they were combined. For both of these groups the major field is chemistry.

TABLE I  
ZERO ORDER CORRELATION COEFFICIENTS BETWEEN VARIOUS PREDICTIVE MEASURES AND FIRST AND SECOND SEMESTER GRADES\*

PREDICTIVE MEASURE	FIRST SEMESTER GRADE				SECOND SEMESTER GRADE					
	FRENCH N=121	MATHE- MATICS N=78	CHEMISTRY N=63	BIOLOGY N=92	HISTORY N=98	FRENCH N=78	MATHE- MATICS N=61	CHEMISTRY N=43	BIOLOGY N=43	HISTORY N=81
First Semester Grade in Major										
Regents Average	.478 ± .047	.775 ± .051	.529 ± .061	.197 ± .068	.335 ± .060	.495 ± .058	.628 ± .072	.610 ± .067	.465 ± .063	.380 ± .064
Placement Test Score	.639 ± .036	.367 ± .066	.210 ± .081	.130 ± .069	.193 ± .066	.247 ± .072	.287 ± .079	.437 ± .083	.323 ± .072	.272 ± .069
A.C.E.†	.228 ± .078	.293 ± .070	.315 ± .077	.088 ± .070	-.043 ± .068	.279 ± .070	.212 ± .083	.268 ± .094	.144 ± .078	.349 ± .064

\* The correlations reported in this table are for the class of February 1934. All of the variables enumerated above were not available for both classes. However, where the same variables were available for both classes the correlation coefficients were quite similar.

† A.C.E. denotes American Council Psychological Examination raw score.

	Co-operative <i>French Vocabulary Test</i> Experimental Edition, Form 6, 1933
<i>History</i>	Co-operative <i>General Culture Test</i> Part I, 1933
<i>Mathematics</i>	Co-operative <i>General Mathematics</i> Test for College Students, 1933.

4. First-Semester Grade in Major Subject. In addition to investigating the prognostic value of previous preparation in a given subject in high school, the value of the first-semester college grade in the major subject was studied to ascertain its relationship to success in the second-semester major course.

5. Criterion of Success. The criterion of success that was used in this investigation was academic success in the major as measured by college grades in the major subject for the first and second semesters transmuted into a weighted index number.

The recognized statistical methods which are used in prognosis studies were employed. They are coefficients of correlation (simple, partial, and multiple) and regression equations. The simple or zero order correlation coefficient measures the relationship between the grades received in the major and each of the prognostic measures. The multiple correlation coefficient expresses the relationship between the grades received in the major and two or more of the prognostic measures. The rectilinear regression equation is used to predict or forecast the probable grades students would receive in the major.

FINDINGS. In Table I are listed the zero order coefficients of correlation between the various predictive measures which were used, and first and second semester grades in the major.

An analysis of the data in Table I reveals the following points which are the most significant findings of the study.

1. For all majors except the French major, the Regents average in the major subject or in the allied subject was the best single index of success in the first-semester major course. For the French, mathematics, and chemistry majors the correlational relationship was substantial; for the history and biology majors the correlational relationship was slight.

2. For all majors except the French and history majors the Regents average in the major subject was the second best index of success in the second-semester major course, but in no instance was the relationship substantial enough for predictive purposes.

3. The only placement test that correlated to a substantial degree with work in the major course was the Cooperative French Test which correlated with the first-semester French grade to the extent of  $r.639$ , and it was only slightly inferior to the first-semester French grade for predicting success in the second-semester French course.

4. For the other majors the placement-test score correlated with the first- and second-semester grades to too slight an extent to be of value for prediction.

5. For all majors except the chemistry major, the American Council Psychological Examination total score was the least valuable index for predicting success in the first-semester major course. For the chemistry major it was slightly superior to the placement-test score. The coefficients of correlation between the first-semester grade in the major subject and the American Council Psychological Examination were too low for purposes of prediction.

6. Similarly, for all majors except the history major, the American Council Psychological Examination total score was the least valuable index of success in the second-semester major course. In no case was the correlation high enough to be significant.

7. The American Council Psychological Examination correlated more closely with success in the more general subjects, such as history and chemistry, than with subjects which have a more specialized subject matter, such as mathematics and French.

8. The first-semester grade in the major subject was consistently the best index of success in the second-semester major course.

9. Success in the French major was consistently the easiest to predict. The correlation coefficients secured for the French major were the highest.

Next in order of predictability followed the chemistry and mathematics majors with the chemistry major easier to predict by a very slight amount. The majors in which it was most difficult to

predict success were the biology and history majors. It was slightly more difficult to predict success for the history major.

After an analysis of the zero order correlations the following question naturally presents itself: Would a combination of these variables yield predictive data of a higher order than that secured by the zero order correlations? If so, which combination would provide the best basis for prediction? The data in Table II, which compares the highest zero order coefficients of correlation with the highest multiple coefficients of correlation, provide an answer to this question.

A study of Table II reveals that a combination of the predictive measures employed did not yield significantly higher correlations, except in the case of the history major, where the addition of the American Council Psychological Examination total score to the first-semester major grade for predicting the second-semester grade increased the correlation to a marked extent. Thus,  $r_{21} = .380$  was changed to  $R_{2-15} = .557$  when the psychological test score was combined with the first-semester grade for predicting the second-semester grade. In all other instances the increase in the size of the correlation coefficients that resulted when the multiple correlation technique was employed was so insignificant that it did not justify the labor involved in the calculations of the multiple correlation coefficients.

The results of this study verify the conclusion of other investigators, namely, that past performance is the best index of success. This study revealed that in most instances the best index of success in the major for the first semester was the Regents average, which was a record of past achievement. Furthermore, the best index of success in the major for the second semester was the first semester-grade in the major subjects which was a record of past achievement.

Furthermore, this study justifies with objective and experimental data the present system of major election guidance at Hunter College. The measures of academic achievement which the counselors have empirically found to be of value in guiding students in the election of majors correspond to the measures which this study

TABLE II  
HIGHEST ZERO ORDER AND HIGHEST MULTIPLE COEFFICIENTS OF CORRELATION FOR VARIOUS PREDICTIVE MEASURES AND FIRST AND SECOND SEMESTER GRADES\*

MAJOR	FIRST SEMESTER	SECOND SEMESTER
French	(N=121) $r_{13} = .639 - .036$ $R_{1-345} = .668 - .034$	(N=78) $r_{21} = .495 - .058$ $R_{2-1345} = .558 - .053$
Mathematics	(N=78) $r_{14} = .575 - .051$ $R_{1-345} = .615 - .047$	(N=61) $r_{21} = .628 - .052$ $R_{2-1345} = .647 - .050$
Chemistry	(N=63) $r_{14} = .529 - .061$ $R_{1-345} = .542 - .060$	(N=43) $r_{21} = .610 - .067$ $R_{2-1345} = .654 - .059$
Biology†	(N=92) $r_{14} = .197 - .068$	(N=71) $r_{21} = .465 - .063$ $R_{2-1345} = .539 - .077$
History	(N=98) $r_{14} = .335 - .060$ $R_{1-345} = .375 - .059$	(N=81) $r_{21} = .380 - .064$ $R_{2-1354} = .564 - .050$

- \* Variable 1—First semester grade  
Variable 2—Second semester grade  
Variable 3—Placement test score  
Variable 4—Regents Average  
Variable 5—American Council Psychological Examination total score

† Since the zero order correlations were so low and unreliable for this major the multiple correlation coefficients were not computed.

found to be most indicative of success in the major field. They are Regents grades in the major subject and the first-semester college grade in the major subject.<sup>2</sup>

—Volume 13, Number 1

<sup>2</sup> In addition to the measures mentioned above the counselors use all other available data. The analysis of the student's record is supplemented by a personal conference with the student through which additional information is secured.