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AN EVALUATION OF THE FRESHMAN TESTING PROGRAM OF SOUTHEASTERN STATE COLLEGE OF OKLAHOMA

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AN EVALUATION OF THE FRESHMAN TESTING PROGRAM

OF SOUTHEASTERN STATE COLLEGE OF OKLAHOMA

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AN EVALUATION OF THE FRESHMAN TESTING PROGRAM OF SOUTHEASTERN STATE COLLEGE OF OKLAHOMA

CHAPTER I

INTRODUCTION

Southeastern State College is a coeducational college located in Durant, Oklahoma, and is one of six institutions maintained by the State of Oklahoma for the primary purpose of training teachers. The enrollment for the academic year 1956-57 was approximately 1,550, a slightly higher total than the average for the last several years.

Each freshman student at Southeastern State College is required to attend a "Freshman Week" program, the purpose of which is to orient the student to college and to obtain data about the student that will aid various college personnel to counsel or advise with the student more effectively during his initial enrollment. The student is also required to enroll in a course entitled "Orientation" which meets one hour a week for the first twelve weeks of the semester and carries one semester hour credit. The objective of the course is the further orientation of the student to college life, the acquirement of additional data concerning the student, acquainting the student with his adviser, and so on.

During Freshman Week three tests--an aptitude test, an English achievement test, and a reading test--are administered to each student.

The tests used are selected forms of the Otis Self-Administering Tests of Mental Ability[1] and the Mechanics of Expression and Reading Comprehension tests of the Cooperative English Test Series. The results obtained from these tests are used for advising the freshman in selecting his first-semester course of study. In particular, the score on the achievement test in English determines whether the student will be enrolled in the standard freshman three semester hour English grammar course which meets three hours per week or a remedial course which meets five hours per week for the same credit.

As part of the Orientation course the freshman student takes an achievement test in mathematics, the California Mathematics Test; an interest test, the Kuder Preference Record; and a personality test, The Adjustment Inventory by Hugh M. Bell. The results of these tests are used in further academic advising and other counseling with the student. The tests are given during the Orientation course rather than during Freshman Week because it is deemed unwise to administer too many tests during this rather short pre-enrollment period. College officials in charge of this program are in agreement with research studies in which evidence suggests an extended period between tests gives greater assurance that students will be better instructed as to the value of the testing program, will be more relaxed, and can therefore exhibit their usual performance on the tests.[2]

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[1]The authors and publishers of all educational tests under consideration in this study and of the manuals explaining how to use and grade them are listed in the Bibliography.

[2]Donald E. Super, "Testing and Using Test Results in Counseling," Occupations, XXIX (1950), pp. 95-97.

Purpose of the Study

It is the purpose of this study to determine the predictive value of the results of the aptitude and achievement tests used in the freshman testing program of Southeastern State College and to elicit and evaluate information from members of the faculty concerning the use of those results and recommendations for the improvement of the program. The achievement of this purpose is accomplished by means of two separate but closely related investigations the results of which should yield sufficient information for a valid evaluation of the program.

The most important and detailed investigation is a statistical comparison of the scores made by a selected group of freshman students on the aptitude and achievement tests administered during Freshman Week and the Orientation course with the grade point averages of the same group for the freshman year. The procedures of this comparison and the number of cases for which the necessary computations are performed should be adequate to determine the value of the test results in predicting the academic success a student may be expected to attain. A final aim of this investigation is the formulation of a function which may be used to predict the academic sucess future students may expect to achieve at this college.

The collateral investigation is an attempt made by means of a questionnaire sent to members of the faculty of Southeastern State College to gather and assess the following information:

1. The extent of knowledge concerning the present freshman testing program among members of the faculty.

2. The number of faculty members who are aware of the location

and availability of test results.

3. The number of faculty members who actually use the test results.

4. Suggestions by members of the faculty for improving the freshman testing program.

It is hoped that the fulfillment of the purpose of this study will not only result in increased knowledge of the local validity of the tests used and a strengthening of the testing program of Southeastern State College, but that the culmination of this investigation will find utility beyond the immediate situation by proving an addition of value to the body of knowledge of these areas.

A representative selection from the literature of studies similar to the one being made is summarized in the following section, and generalized results of comparable studies as obtained by authorities in the measurements field are reported.

Review of Literature in the Field

In a study made at the George Peabody College for Teachers it was found that on a sample of 136 college freshmen the following correlations between scores on the Cooperative English Test and grade point ratios determined from college grades were: reading vocabulary, .25; reading speed, .42; reading level, .38; and mechanics of expression, .54.[1]

Using the Psychological Examination, high school marks, a locally prepared mathematics test, the Cooperative English Test, and the Coopera-

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[1]Scarvin B. Anderson, "Prediction and Practice Tests at the College Level," The Journal of Applied Psychology, XXXVII (1953), pp. 256-59.

tive Mathematics Test, Webb and McCall found a multiple correlation coefficient of .756 in their study at Emory University. Their investigation correlated the test scores and first year college grades.[1]

In 1946, in a study made at The University of Utah of 276 freshman students in the College of Engineering, it was found that the total score on the Cooperative English Test and the grade point ratio for the freshman year had a correlation of .524.[2]

About twenty years ago T. D. D. Quaid made a study on prediction in Oklahoma. A multiple correlation coefficient of .621 was found when scores on the Ohio State Psychological Examination, The American Council on Education Psychological Examination, high school average marks, and scores on the Purdue Placement Test in English were correlated with grade point ratios of first-semester college grades. Quaid used 140 college freshmen at Phillips University, Enid, Oklahoma, in his study. In this study the author found, however, the correlation between the first-semester marks and second-semester marks to be .784 with a probable error of .022.[3]

In predicting college success of veterans enrolled at The University of Oklahoma, Fisher found that a multiple correlation coefficient of

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[1]Sam C. Webb and John M. McCall, "Predictors of Freshman Grades in a Southern University," Educational and Psychological Measurement, XIII (1953), p. 662.

[2]George A. Pierson and Frank B. Jex, "Using the Cooperative General Achievement Tests to Predict Success in Engineering," Educational and Psychological Measurement, XI (1951), pp. 397-402.

[3]T. D. D. Quaid, "A Study in the Prediction of College Freshman Marks" (unpublished Ph.D. dissertation, The University of Oklahoma, 1937), p. 58.

.42 with a probable error of .04 existed between the first-semester grades and the scores on the Ohio State Psychological Examination and high school marks. The correlation between these tests and second-semester marks was determined to be .52 with a probable error of .04. However, the correlation between first- and second-semester marks was found to be .683 with a probable error of .02.[1]

Comparing the results of many investigators, David Segel found that ability tests, achievement tests, and high school marks reach correlations of .50-.55 with college marks; multiple coefficients of correlation reach .60-.70.[2]

One reason aptitude and achievement tests do not predict grades more accurately is that scores on these tests usually reflect maximum performance rather than the typical performance of an individual. Thus it seems probable that this unpredicted achievement is due largely to such factors as persistence, motivation, interest, personal adjustment, and study habits. Based on this assumption, the inclusion of interest and personality tests in a test battery to be used for predicting success in college seems justified.[3]

However, in writing for Review of Educational Research, Tiedeman and Wilson in a review of many studies concerning interest and personal-

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[1]William O. Fisher, "A Study of the Prediction of the Collegiate Success of Veterans at Oklahoma University" (unpublished Ed.M. thesis, The University of Oklahoma, 1948), pp. 15-18.

[2]David Segel, Prediction of Success in College, U. S. Office of Education Bulletin No. 15 (Washington: U. S. Government Printing Office, 1934), pp. 1-89.

[3]E. F. Lindquist (ed.), Educational Measurement (Washington: American Council on Education, 1951), pp. 86-115.

ity inventories made the statement, "Except when inventories were rekeyed especially for the purpose, personality- and interest-inventory scores added little to the efficiency of aptitude and achievement measures for prediction of educational success."[1] Only aptitude and achievement scores will be used in predicting college success from the test battery administered at Southeastern State College.

The reading of the results of studies similar to that herein undertaken yields a conception of the results one might expect to obtain in an investigation of the predictive value of tests. It will be of interest to the writer to compare his findings with those of other investigations and, if any meaningful disparities should be discovered, to search for possible reasons for them.

A detailed statement of the problem of this investigation and a declaration of its importance will be made in the following chapter. The sources and methods of securing the data will be described, and techniques used in analyzing the results will be presented.

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[1]David V. Tiedeman and Kenneth M. Wilson, "Development and Applications of Nonprojective Tests of Personality and Interest," Review of Educational Research, XXIII (1953), p. 56.

CHAPTER II

THE PROBLEM

The larger area within which the problem of this study is defined is the determination of the probable academic success a beginning student at Southeastern State College may be expected to achieve. The specific problem which is attacked comprises two separate but related investigations which may be outlined as follows:

Examination is made in the first phase of this investigation of the various criteria which are at the disposal of advisers during the first semester of each academic year. Among these are the raw and percentile scores on a college aptitude test and scores on achievement tests in English grammar, reading comprehension, and mathematics. These scores are examined with the intent of discovering relationships which may exist between each of them and between each test score and the grade point average of each first-semester freshman student involved in this study.

This phase of the study is accomplished by a series of operations the purposes of which are as follows:

1. To find relationships among the variables on which data are available.

2. On the basis of the relationships found, to choose those variables which appear to serve best the problem of predicting the freshman

grade point averages of students.

3. To determine the particular function of these variables which may be used to calculate these grade point averages.

With reference to the first purpose, information concerning the following specific questions is desired:

1. How well does each of the tests predict the freshman grade point averages of the students?

2. How well does each of the tests predict the results of each of the other tests?

With reference to the second and third purposes, it is hoped that answers to the following questions may be found:

1. Which variables serve collectively to yield the best prediction of the freshman grade point averages of the students?

2. What is the degree of accuracy of prediction as determined by these variables?

3. What function of these variables may best be used to yield the most accurately predicted freshman grade point average for the student?

In the second phase of the study a collateral investigation is made to determine the use made of the results of the freshman testing program by the faculty members of Southeastern State College in counseling with students. An attempt is made to elicit suggestions from members of the faculty concerning changes they believe would strengthen and improve the program.

Specific questions for which answers are desired from faculty members are as follows:

1. How many times each year do you use the results of the freshman tests?

2. How helpful to you are the results of the freshman tests?

3. Do you feel that you are adequately informed as to the location, availability, contents, and use of the test data?

4. Are you satisfied with the battery of tests which comprises the freshman testing program at the present time?

5. If you are not content with present program, what changes would you prefer to have made?

In this study the investigation of the predictive value of the tests is considered to be of paramount importance, for, as Cronbach writes, "an attempt to predict underlies every use of testing."[1] The predictive value of the tests is essentially the validity of the tests in the local situation, and there are no compensating factors to justify the use of tests if they do not yield valid results.

Importance of the Problem

As the freshman testing program is an established function of Southeastern State College, new and valid information concerning it should be of direct and practical value to this institution. The tests selected and used have high reliability coefficients, are logically valid, have large well-selected norm populations, and are widely used. They have also, in general, been empirically validated in various studies at other institutions. However, the tests need local empirical validation to be of most value to Southeastern State College. In considering the

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[1]Lee J. Cronbach, Essentials of Psychological Testing (New York: Harper and Brothers, 1949), p. 9.

question of local validity, Cronbach writes, "Not all tests claimed to measure aptitude in a given area have been tested for empirical validity, and no one knows how well any test will work in a particular situation until he tries it out."[1]

At this writing, there is some indication that this study may prove of value to the State of Oklahoma, for recent inflated enrollments at some state institutions of higher education are compelling school officials to consider tentative plans for limiting the size of the student body. Dr. George L. Cross, president of The University of Oklahoma, has stated that if, in the future, such limitations need be made, some type of testing program should be used as an aid in the selective admission of students.[2]

This problem of selective admission is not unique to the State of Oklahoma, and college admissions officials are turning more and more to objective tests and other quantitative data for aid in solving the problem.[3] Chauncey and Frederick write, "It is desirable to assess these various factors [motivation, personal adjustment, study methods, and aptitude] independently in order to have a more adequate basis than school record alone for admission to college and for individual guidance of the student after he has been admitted."[4]

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[1] Ibid.

[2] Mike Blatz, "2500 Limit for O.U.'s Next Freshman Class," The Daily Oklahoman (Oklahoma City), March 20, 1955, p. 1.

[3] Henry Chauncey and Norman Frederick, "The Functions of Measurement in Educational Placement," Educational Measurement, ed. E. F. Lindquist (Washington: American Council on Education, 1951), p. 86.

[4] Ibid., p. 89.

It is hoped that this study may be of some benefit to education in general, especially from the additional information obtained on the tests under consideration in the problem. Oscar K. Buros makes the statement, "Appraisals and reappraisals of old tests are needed almost as badly as evaluations of new tests."[1]

Sources of Data

The principal sources of data are test results obtained from the office of the director of testing of Southeastern State College, course grades from the office of the registrar, information from publications located principally in the libraries of The University of Oklahoma and Southeastern State College, and data from a questionnaire (See Appendix V).

Raw scores for the various tests administered during Freshman Week and during the Orientation course are on file in the office of the director of testing. Scores for each freshman student who took the tests during the first semester of the academic years 1952-53 and 1953-54 and scores for a random sample of fifty freshman students who took the tests during the first semester of the academic year 1956-57 were obtained for use in this investigation.

Grades attained by these individuals in the college courses taken during their freshman year were obtained from the office of the registrar of Southeastern State College in order that grade point averages could be calculated.

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[1]The Nineteen Forty Mental Measurements Yearbook, ed. Oscar K. Buros (Highland Park, N. J.: The Mental Measurements Yearbook, 1941), p. 11.

A questionnaire was submitted to members of the faculty and administrative staff of Southeastern State College, and the results are used to determine how much use is being made of the test data and information in students' cumulative records, their opinion of the testing program, and their suggestions for improving the program.

Analysis of the Data

The fundamental step in analyzing the data is to correlate scores on each of the tests with the criterion and with every other test score, using only aptitude and achievement test scores. From the results so obtained certain tests will be selected in order that a multiple correlation coefficient may be calculated. A multiple regression equation will also be written so that a student's grade point average can be predicted from his raw test scores.

This regression equation will be based on the combined enrollment of freshmen during the first semesters of the academic years 1952-53 and 1953-54 (hereafter referred to as the combined classes). The equation will then be used to predict the grade point averages of a random sample of the first-semester 1956-57 freshman class. It is a purpose of this study to determine a regression equation that can be used to predict success for future students.

All questionnaire information will be analyzed to determine how much use the faculty is making of test scores, its judgment of the present testing program, and the most frequently occurring suggestions for modifying the program.

Test Data

The tests used in the freshman testing program of Southeastern State College have been selected by the director of the program and intuitively seem valuable for the counseling and advising activities of this institution.

To test general college aptitude the Otis Self-Administering Tests of Mental Ability, Higher Examination: Form D is used. Hereafter this test will be referred to as the Otis test (abbreviated OT), and the scores on this test will be designated X_1 scores. According to the Manual of Directions and Key, the reliability of this test is high. This manual gives the coefficient of reliability as .921, which was determined by using two forms of the same test.[1]

Before 1952 both the Otis test and the American Council on Education Psychological Examination were administered, but it was found that the correlation between these tests was so high that it was not considered necessary to administer both of these tests.

The Cooperative English Test, published by the Educational Testing Service, contains three tests, two of which are used in this testing program. One test used is the Mechanics of Expression (abbreviated ME); the scores on this test will be designated X_2 scores. The other test used is the Reading Comprehension (abbreviated RE), which yields scores on speed of reading, vocabulary, level of reading, and a combined or total reading score. This total reading score is designated X_4 and is the only reading score used in this study. Reliability of these tests has

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[1]Arthur S. Otis, Manual of Directions and Key, Otis Self-Administering Tests of Mental Ability (rev.; New York: World Book Company, 1928), p. 12.

been reported as "adequate."[1]

To test mathematics achievement the California Mathematics Test, Advanced Form AA (abbreviated MA) is used. The total raw score on this test will be designated X_3. The manual for this test reports that it has a reliability of .93.[2] This test may be used for diagnostic purposes; for this reason, each student's answer sheet for this test is made a part of his cumulative record.

The Kuder Preference Record, Vocational, Form CH, is used to measure interest in these areas: outdoor, mechanical, computational, scientific, persuasive, artistic, literary, musical, social service, and clerical. A profile of scores made by each student in each of the areas is made a part of the student's cumulative record. According to the Examiner Manual published for this test, reliabilities of the various areas range from .84 to .93. Correlation between area scores are in general very low.[3] The inventory is adequate in reliability and the low correlation coefficients indicate that there is little overlapping among interest areas.

A limitation of this test is the question of possible faking of answers, for, as Orrin H. Cross states, "it...appears that a subject

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[1]The Third Mental Measurements Yearbook, ed. Oscar K. Buros (New Brunswick, N. J.: Rutgers University Press, 1949), pp. 118-22.

[2]Ernest W. Tiegs and Willis W. Clark, Manual, California Mathematics Test: Advanced Forms AA, BB, CC (Los Angeles: California Test Bureau, 1950), p. 4.

[3]G. Frederic Kuder, Examiner Manual for the Kuder Preference Record: Vocational, Form C (rev.; Chicago: Science Research Associates, 1950), p. 20.

suitably motivated may successfully fake the Kuder Preference Record."[1] However, this does not impress the writer as a significant factor in the program at Southeastern State College; there is no compelling reason for the faking of answers as there might be in an employment situation. Furthermore, the administration of the test during the Orientation course furnishes an opportunity for the person giving the test to establish rapport with the students. Concerning this point Cronbach writes, "In adjustment inventories the subject frequently conceals his attitudes and feelings. The person is usually pleased with and proud of his interests, however."[2]

The test battery also includes a personality test and for the last several years The Adjustment Inventory by Hugh M. Bell has been used. This test gives an insight into how a student feels about his health, home life, social contacts, and emotional patterns in his life.

The manual for this test indicates the reliability of the areas tested as: home adjustment, .89; health and adjustment, .80; social adjustment, .89; and emotional adjustment, .85. The total score reliability is .93. These coefficients were determined by using the odd-even items and applying the Spearman-Brown prophecy formula on scores made by 258 college freshmen and juniors.[3]

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[1]Orrin H. Cross, "A Study of Faking on the Kuder Preference Record," Educational and Psychological Measurement, X (1950), p. 277.

[2]Cronbach, p. 353.

[3]Hugh M. Bell, Manual for the Adjustment Inventory, Student Form (Stanford, California: Stanford University Press, n.d.), p. 3.

The scores on the personality test and the interest test are not used in the predictive study, but they are part of the test battery referred to in the questionnaire.

The Criterion

Since prediction of success in college work is the major aim of any testing program, a criterion for success must be established. For this evaluation, success is defined as the student's grade point average for his freshman year. At Southeastern State College the grade point designation is: A, 4 grade points; B, 3 grade points; C, 2 grade points; D, 1 grade point; F, 0 grade point. In this study each student's grade point average is calculated to the nearest hundredth of a grade point.

It is well known that the lack of reliability of teachers' marks is a complicating factor in finding valid correlation coefficients.[1] However, in this study no technique to normalize teachers' grades will be used.

Correlations of Tests and Grade Point Averages

After scores on tests and grade point averages have been accumulated, correlations between each test and the criterion and correlations between the tests will be calculated. The Pearson product-moment method will be used to calculate these coefficients of correlation.[2] The correlations will be calculated for the 1952-53 class, the 1953-54 class, and for the combined classes. Means and standard deviations for test scores

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[1] Lindquist, p. 727.

[2] Henry E. Garrett, Statistics in Psychology and Education 4th ed. (New York: Longmans, Green and Company, 1953), pp. 122-51.

and grade point averages will be determined for each of the years stated as well as for the combined classes.[1] These statistics will be calculated for each class as well as for the combined classes to check for accuracy and to determine whether the classes seem to vary from one another. Also means and standard deviations will be figured for the 1956-57 freshman class sample to determine whether this class varies from the combined classes.

Multiple Correlation

There are several techniques for choosing the tests yielding the best predictive index. Mary Agnes Gordon made a comparison study of the Cowles-Crout, Wherry-Doolittle, and Horst-Smith methods. Her report is summarized in this statement, "In this study the Wherry-Doolittle appears to have a slight advantage over the Cowles-Crout in selecting the most valid composite, whereas the latter technique has the advantage in greater computational ease."[2] The Wherry-Doolittle method is used in this study to select the tests to be used in calculating the coefficient of multiple correlation (designated R) that best predicts college success.[3] This coefficient will be determined for the combined classes only.

Multiple Regression Equation

In the process of combining the test scores into the most effective composite score, the beta weights (designated β_1, β_2, β_3, ...,

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[1] Ibid., pp. 28-29, 50-57.

[2] Mary Agnes Gordon, "Empirical Comparison of Three Multiple Correlation Techniques," Educational and Psychological Measurement, XIV (1954), pp. 133-37.

[3] Garrett, pp. 404-22.

β_n) are computed.[1] These weights are constant multipliers which are applied to separate test standard scores to obtain the best prediction of the criterion and are called regression weights. The multiple regression equation uses these weights in connection with the several test standard scores (designated Z_1, Z_2, Z_3, ..., Z_n) attained by an individual to obtain his standard predictive index (designated $\bar{Z}_c$) of college success. Therefore, the equation will have the form:

$$\bar{Z}_c = \beta_1 Z_1 + \beta_2 Z_2 + \ldots + \beta_n Z_n . \qquad (1)$$

After the beta weights are determined, the corresponding score weights (designated b_i) are calculated so the more useful equation

$$\bar{X}_c = b_1 X_1 + b_2 X_2 + \ldots + b_n X_n + K \qquad (2)$$

can be written.[2] In this equation the designation $\bar{X}_c$ is the estimated grade point average the student will receive if he has made scores of X_1, X_2, X_3, ..., X_n on the tests.

Questionnaire

Information was desired concerning the extent of the use of test results of the present freshman testing program, so questionnaire forms directed to members of the faculty and administrative staff were distributed. This method of obtaining the "use" information was selected be-

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[1]Robert L. Thorndike, Personnel Selection (New York: John Wiley and Sons, 1949), pp. 185-93.

[2]Dorothy C. Adkins et al., Construction and Analysis of Achievement Tests (Washington: U. S. Government Printing Office, 1947), pp. 119-23.

cause no record is maintained in the office of the director of testing. Such a record would be virtually impossible to maintain, as all test information is supplied immediately to the adviser of each student for inclusion in his individual file.

Information concerning any changes which the faculty or staff may consider desirable in the testing program was also desired, and questions concerning such recommended changes were included in the questionnaire.

A survey of student opinion of the program is not made in this study although such an evaluation would seem to be of value.

CHAPTER III

COLLECTING THE TEST DATA

Sources of test and criterion data and the methods of procurement will be described in this chapter. An explanation will be made of the rejection of certain cases, and each category of cases so omitted will be described. Information concerning the choice of grade point averages for the complete freshman year, of the cases to be investigated, as the criterion for success will be given.

Test Data

As an aid in collecting the data an individual data sheet was prepared for each student (See Appendix I). Alphabetized lists of all students who took one or more of the freshman tests during the first semester of the academic years 1952-53, 1953-54, and 1956-57 were secured from the director of testing. The students were assigned a class number with the first student on the list designated Number 1, the second Number 2, and so on. This was done for each list.

Raw scores on the Otis, Mechanics of Expression, California Mathematics, and Reading Comprehension tests were also secured from the office of the director of testing. These scores were secured from lists maintained in this office when available; in other cases, results listed in

the cumulative record folders were used. In the cases in which the scores were secured from lists a check for accuracy was made by comparing them with the scores entered in the students' cumulative record folders. The national or standard percentile scores (designated S) were entered on the students' individual data sheets for each of these tests, and, when available, the local percentile scores (designated L) were also recorded. This was done as an added check for accuracy.

The age and sex of each student and the name of the high school which he attended just prior to entering Southeastern State College are items of information also maintained in the individual cumulative record folders. A notation of this information was made on each student's individual data sheet, and the age and sex of each student were recorded with other raw data (See Appendixes II, III, and IV). However, this information was not used in this study.

Criterion Data

The decision to use the academic work for the complete freshman year in computing a student's grade point average as the criterion of success was made for two main reasons. The first is that the results for the complete test battery are not available for the freshman's initial registration but can be used in advising for the spring semester. The second reason is that academic grades made by the freshman, other than failing grades, during the fall semester are not available for use in advising the student for the spring semester, and for this reason results of the complete test battery could probably be effectively used as an aid in the academic advising of the second-semester freshmen.

Official college transcripts were used to determine the number of semester hours for each college letter grade attained by each freshman student involved in this study. The total number of hours so obtained was checked by adding the semester hours credit on the transcript. The products, sums, and quotient on each individual data sheet were double checked for accuracy of grade point average.

Every course each student took while classified as a freshman was used. In general, this comprised the fall- and spring-semester grades for the student's freshman year. However, in some cases the student began his work in the summer preceding his enrollment in the Orientation course in the fall. These summer courses were added to the student's fall- and spring-semester work, and the grade point average was calculated from the total. In some cases the student did not return to school after the first semester, and course grades were available for one semester's work only for use in calculating the grade point average. In every case used the student completed the work for the fall semester. Thus every student used in the study completed from fourteen to forty-two semester hours of work in which the student attained grades of A, B, C, D, or F. In cases in which a student officially withdrew from a course the course was not counted. The majority of students completed from twenty-nine to thirty-three semester hours of college work during the period allowed for inclusion in this study.

Selection of Cases

During the academic year 1952-53, of the 260 first-semester freshman students who took at least one test of the battery, 235 were used in this study. The remaining twenty-five students were not used for the

following reasons: eighteen withdrew from college during the first semester and thus had no grade point average, three left college without an official withdrawal and for this reason received a grade of F in each course, and four students never enrolled. Of the eighteen students who withdrew, six did not complete the test battery and would not have been included in the study for this reason.

Tests given during the "Freshman Week" are administered before the student officially enrolls. For this reason it is possible for a person to take some of the tests and never enroll in this college.

Each of the 260 first-semester freshman students of the academic year 1952-53 was assigned a number, called the class number, and each of the students whose test scores and grade point averages are used in the predictive evaluation in this study was also assigned a case number (See Appendix II for the following data on each student in the 1952-53 first-semester freshman class: class number; age; sex; raw scores on the Otis, Mechanics of Expression, California Mathematics, and Reading Comprehension tests; grade point average for the freshman year; and case number).

For the first-semester freshmen for the academic year 1953-54, of 299 students who took at least one test of the battery, the test scores and grade point averages of 276 students were used in this study. Of the twenty-three students whose data were not used, twelve withdrew during the first semester, four left school without withdrawing officially, three did not enroll, two were advanced students who enrolled for the Orientation course, and two who completed the semester's work did not have a complete test battery (See Appendix III for data on these students).

For the first-semester freshman class for the academic year 1956-57 a random sample of fifty students was selected from the 382 students who took one or more of the tests.

Using the technique explained by Yates[1] and the table of random numbers found in Statistical Tables for Biological, Agricultural and Medical Research[2] sixty class numbers were chosen because some cases would probably be lost by withdrawals, failure to enroll in college, incomplete test battery, and so on. The first fifty students selected by the class numbers who had a complete test battery and a grade point average were assigned case numbers and constitute this sample (Appendix IV lists the case number, the random sample selection number, the class number, raw test scores, estimated grade point average, actual grade point average, and the difference in grade point averages for each student in the study; the random sample selection Numbers 57-60 inclusive were not used because they were not needed and do not appear in the data in the Appendix). Of the first fifty-six sample numbers selected, six were not included in the final study because two students never enrolled, two students left college without an official withdrawal, one did not have a complete test battery, and one withdrew from college.

In the 1956-57 sample the fifty cases used represent 89.3 per cent of the original sample of fifty-six. This compares well with the 90.4

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[1]Frank Yates, Sampling Methods for Censuses and Surveys (2d ed.; London: Charles Griffin and Company, Ltd., 1953), pp. 21-22.

[2]Ronald A. Fisher and Frank Yates, Statistical Tables for Biological, Agricultural and Medical Research (2d ed.; London: Oliver and Boyd, Ltd., 1943), pp. 91 and 93.

per cent of cases used of the 1952-53 class and the 92.3 per cent of cases used of the 1953-1954 class.

CHAPTER IV

PROCESSING THE TEST DATA

The procedures used in assembling and processing the data will be explained in this chapter. The reasons for techniques used will be presented and the checks for accuracy will be described. Tables prepared to exhibit the results of the processing of the data will be included.

Preparing the Data

In order to evaluate the quality of the test scores in predicting college success and in order to discover the relationships among those scores necessary to the formulation of an equation which may predict a student's freshman grade point average, a great number of statistical calculations must be made.

Because of the number of cases and the number of scores for each case it was decided that the International Business Machine (hereafter abbreviated IBM) Company's machines located in the College of Business Administration at The University of Oklahoma, Norman, Oklahoma, should be used. Arrangements for the use of these machines were made and the data processed by these machines are the basis for this report.

The raw data sent to the bureau included the class number; age; sex; grade point average (hereafter designated X_c); case number; and raw scores on the Otis Self-Administering Tests of Mental Ability (X_1), the

Mechanics of Expression test of the Cooperative English Test (X_2), the California Mathematics Test (X_3), and the Reading Comprehension test of the Cooperative English Test (X_4) for each student in the first-semester freshman classes for the academic years 1952-53 (See Appendix II) and 1953-54 (See Appendix III) selected for inclusion in this investigation. These data were sent to the bureau where they were punched on the IBM cards, and the information resulting was printed from them by use of the IBM accounting machine. The printed material was then proofread against the original data as a check for accuracy.

Tables 1 and 2 were prepared to exhibit the results of the calculations which the bureau was requested to make. Further calculations were performed manually and the results are shown in Tables 3 and 4.

The following information was supplied by the bureau for each set of data: the sums of the raw test scores and grade point averages (ΣX_1, ΣX_2, ΣX_3, ΣX_4, and ΣX_c); the sums of the squares of the raw test scores and grade point averages (ΣX_1^2, ΣX_2^2, ΣX_3^2, ΣX_4^2, ΣX_c^2); the sums of the products of each raw test score and each corresponding raw test score (ΣX_1X_2, ΣX_1X_3, ΣX_1X_4, ΣX_2X_3, ΣX_2X_4, ΣX_3X_4); and the sums of the products of each raw test score and corresponding grade point average (ΣX_1X_c, ΣX_2X_c, ΣX_3X_c, ΣX_4X_c).

In general, the information supplied can be summarized as: ΣX_i and ΣX_iX_j; i, j = 1, 2, 3, 4, c; where the summation is on the 235 cases for the academic year 1952-53 for the first set of data and on the 276 cases for the 1953-54 academic year for the second set of data and not on i or j.

TABLE 1.--Summary of data on test scores and grade point averages for 235 first-semester 1952-53 freshmen

Information	Test Scores and Grade Point Averages				
	OT X_1	ME X_2	MA X_3	RE X_4	GP X_c
$*\Sigma X_i$	9,986	11,412	20,665	11,417	526.00
ΣX_i^2	448,747	576,118	1,938,429	573,175	1,298.3242
$**\Sigma X_1X_i$		500,082	914,872	500,069	23,277.12
ΣX_2X_i			1,029,463	566,090	26,548.24
ΣX_3X_i				1,025,961	47,835.17
ΣX_4X_c					26,380.50

$*\Sigma X_i$ is the sum of the 235 X_i scores; for example, the entry in the X_1 column (9,986) is the sum of the 235 raw scores on the Otis test, and so on.

$**\Sigma X_1X_i$ is the sum of the 235 products of each X_1 raw score with the corresponding X_i value; for example, the entry in the X_2 column (500,082) is ΣX_1X_2, or the sum of the products of each Otis raw score with the corresponding score on the Mechanics of Expression test.

This information was desired as a means to calculating statistical values which are used in determining the predictive value of the tests. In particular, these values are substituted directly into formulas yielding means, standard deviations, and coefficients of correlation, as will be explained in the remainder of this chapter.

Of 260 first-semester freshman students enrolled during the academic year 1952-53, case numbers were assigned to the 235 students who met the requirements for inclusion in this study. Table 1 shows the sums

TABLE 2.--Summary of data on test scores and grade point averages for 276 first-semester 1953-54 freshmen

Information	Test Scores and Grade Point Averages				
	OT X_1	ME X_2	MA X_3	RE X_4	GP X_c
*ΣX_i	11,116	12,846	23,819	13,306	639.36
ΣX_i^2	481,130	624,130	2,205,235	668,480	1,616.5756
**$\Sigma X_1 X_i$		537,698	1,005,398	559,959	26,876.86
$\Sigma X_2 X_i$			1,145,765	637,264	30,838.62
$\Sigma X_3 X_i$				1,181,581	57,353.56
$\Sigma X_4 X_c$					31,799.81

*ΣX_i is the sum of the 276 X_i scores; for example, the entry in the X_1 column (11,116) is the sum of the 276 raw scores on the Otis test, and so on.

**$\Sigma X_1 X_i$ is the sum of the 276 products of each X_1 raw score with the corresponding X_i value; for example, the entry in the X_2 column (537,698) is $\Sigma X_1 X_2$, or the sum of the products of each Otis raw score with the corresponding score on the Mechanics of Expression test.

of the test scores and of the grade point averages, the sums of the squares of the test scores and of the grade point averages, and the sums of the products of corresponding test scores and grade point averages for this population.

In 1953-54, 276 first-semester freshmen of the 299 enrolled met the requirements for inclusion in this study. Information concerning these cases corresponding to that presented in Table 1 for the previous year is shown in Table 2.

TABLE 3.--Summary of data on test scores and grade point averages for 511 first-semester 1952-53 and 1953-54 freshmen

Information	Test Scores and Grade Point Averages				
	OT X_1	ME X_2	MA X_3	RE X_4	GP X_c
$*\Sigma X_i$	21,102	24,258	44,484	24,723	1,165.36
ΣX_i^2	929,877	1,200,248	4,143,664	1,241,655	2,914.8998
$**\Sigma X_1 X_i$		1,037,780	1,920,270	1,060,028	50,153.98
$\Sigma X_2 X_i$			2,175,228	1,203,354	57,386.86
$\Sigma X_3 X_i$				2,207,542	105,188.73
$\Sigma X_4 X_c$					58,180.31

$*\Sigma X_i$ is the sum of the 511 X_i scores; for example, the entry in the X_1 column (21,102) is the sum of the 511 raw scores on the Otis test, and so on.

$**\Sigma X_1 X_i$ is the sum of the 511 products of each X_1 raw score with the corresponding X_i value; for example, the entry in the X_2 column (1,037,780) is $\Sigma X_1 X_2$, or the sum of the products of each Otis raw score with the corresponding score on the Mechanics of Expression test.

Of the total number of 559 first-semester freshman students enrolled at Southeastern State College during this two-year period (1952-53, 1953-54), 511 met all the requirements for inclusion in this investigation and comprise the cases making up the combined classes as heretofore defined. Table 3 exhibits the information concerning this population corresponding to that presented in Table 1 for the earlier year.

Table 4 shows the sums of the test scores and of the grade point averages (ΣX_i) and the sums of the squares of the test scores and of the

TABLE 4.--Summary of data on test scores and grade point averages for 50 first-semester 1956-57 freshmen

Information	Test Scores and Grade Point Averages			
	ME X_2	RE X_4	MA X_3	GP X_c
$*\Sigma X_i$	2,313	2,453	4,069	112.14
ΣX_i^2	111,839	123,645	355,704	274.7002

$*\Sigma X_i$ is the sum of the 50 X_i scores; for example, the entry in the X_4 column (2,453) is the sum of the Reading Comprehension scores.

grade point averages (ΣX_i^2) for a random sample of fifty first-semester freshman students of the total number of 382 enrolled during the academic year 1956-57. Information on the Otis test is not included in Table 4 as the information is not needed in examining the regression equation (See Equation 13). Coefficients of correlation are not calculated on this sample so sums of products of corresponding test scores ($\Sigma X_i X_j$; i, j = 2, 3, 4, c; $i \neq j$) are not needed and are not included in the table.

Means and Standard Deviations

The means and standard deviations are calculated for the first-semester freshman classes for each of the academic years 1952-53 and 1953-54 as well as for the combined classes for the purposes of: (1) checking for accuracy of calculations;[1] (2) examining these classes for significant differences between one another and between each of the

[1]Garrett, pp. 31 and 57.

classes and the combined classes, with regard to these statistics; and (3) aiding in the calculation of other statistical quantities.

For the 1956-57 class sample the means and standard deviations for the raw test scores and grade point averages are calculated to compare these statistics with corresponding statistics for the combined 1952-53, 1953-54 classes.

The mean (designated M),[1] standard deviation (designated σ),[2] standard error of the mean (designated σ_M),[3] and standard error of the standard deviation (designated σ_σ)[4] are calculated for each set of test scores and grade point averages for the first-semester freshman classes for the academic years 1952-53 and 1953-54 and the combined classes. These statistics are also calculated for the random sample of fifty first-semester freshmen for the academic year 1956-57. The results of these calculations are shown in Tables 5, 6, 7, and 8.

On comparing the statistics in Tables 5 and 6 it may be noticed that on every test the mean for the 1952-53 class is higher than the mean for the corresponding test for the 1953-54 class, and that the standard deviation for each test for the 1952-53 class is less than the corresponding standard deviation for the 1953-54 class. The indication, therefore, is that the 1952-53 class may have been superior to and more homogeneous than the 1953-54 class. However, the grade point average mean

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[1] Ibid., pp. 28-29.

[2] Ibid., pp. 54-56.

[3] Ibid., pp. 182-84.

[4] Ibid., pp. 194-95.

TABLE 5.--Means and standard deviations for variables on 235 first-semester 1952-53 freshmen

Information	Test Scores and Grade Point Averages				
	OT X_1	ME X_2	MA X_3	RE X_4	GP X_c
Mean (M)	42.49	48.56	87.94	48.58	2.238
Standard Error of M (σ_M)	.665	.630	1.481	.579	.0468
Standard Deviation (σ)	10.19	9.66	22.71	8.87	.717
Standard Error of σ (σ_σ)	.472	.447	1.052	.411	.0332

TABLE 6.--Means and standard deviations for variables on 276 first-semester 1953-54 freshmen

Information	Test Scores and Grade Point Averages				
	OT X_1	ME X_2	MA X_3	RE X_4	GP X_c
Mean (M)	40.28	46.54	86.30	48.21	2.316
Standard Error of M (σ_M)	.662	.587	1.401	.595	.0422
Standard Deviation (σ)	11.00	9.75	23.28	9.89	.701
Standard Error of σ (σ_σ)	.470	.417	.995	.423	.0300

for the 1952-53 class is less than the mean for the 1953-54 class. These statistics are examined for significant differences to determine the probability that these variations might occur by chance, and the findings will be stated later in this chapter.

TABLE 7.--Means and standard deviations for variables on 511 first-semester 1952-53 and 1953-54 freshmen

Information	Test Scores and Grade Point Averages				
	OT X_1	ME X_2	MA X_3	RE X_4	GP X_c
Mean (M)	41.30	47.47	87.05	48.38	2.280
Standard Error of M (σ_M)	.473	.432	1.019	.418	.0314
Standard Deviation (σ)	10.70	9.76	23.04	9.44	.710
Standard Error of σ (σ_σ)	.336	.306	.724	.296	.0223

TABLE 8.--Means and standard deviations for variables on 50 first-semester 1956-57 freshmen

Information	Test Scores and Grade Point Averages			
	ME X_2	MA X_3	RE X_4	GP X_c
Mean (M)	46.26	81.38	49.06	2.243
Standard Error of M (σ_M)	1.39	3.13	1.15	.0963
Standard Deviation (σ)	9.84	22.17	8.12	.681
Standard Error of σ (σ_σ)	.987	2.22	.816	.0684

The means and standard deviations for the combined 1952-53, 1953-54 classes as shown in Table 7 are calculated directly from the raw data as summarized in Table 3. These values are checked for accuracy by finding the combined means and standard deviations by using the corresponding

values for the individual classes as shown in Tables 5 and 6.

An examination of the data shown in Table 8 for the 1956-57 sample reveals the information that the class appears to have a higher mean on the Reading Comprehension test than either of the two earlier classes but lower means on the Mechanics of Expression and California Mathematics tests. Standard deviations, in general, seem to be smaller than corresponding standard deviations on either of the earlier classes; this is to be expected as the data for the 1956-57 class are based on a sample. However, the standard deviation for the Mechanics of Expression test is higher for the 1956-57 sample than for either of the two earlier classes. The only difference that appears to be of significance is the relatively small mean for the mathematics test on the sample.

The statistics on the 1956-57 sample are examined for the significance of the differences between these statistics and the values found for the combined classes. The results of this examination are presented in the following section.

Differences between Classes

Since one purpose in determining the means and standard deviations of test scores and grade point averages, as stated in the previous section, is to compare the classes for differences, and especially since there appears to be a possibility that the 1952-53 class was superior to and more homogeneous than the 1953-54 class, a statistical comparison of these quantities is made.

The differences between the standard deviations for the 1952-53 and the 1953-54 classes are examined to determine how significant these

differences appear to be. This examination is made by finding what Garrett defines as the critical ratio[1] for the differences between two standard deviations. Table 9 was prepared to exhibit this information.

TABLE 9.--Critical ratios of the differences between corresponding standard deviations for the 1952-53 and 1953-54 classes

Information	Test Scores and Grade Point Averages				
	OT X_1	ME X_2	MA X_3	RE X_4	GP X_c
Std. Dev. 1952-53 (σ_{2-3})	10.19	9.66	22.71	8.87	.717
Std. Dev. 1953-54 (σ_{3-4})	11.00	9.75	23.28	9.89	.701
Standard Error σ_{2-3}	.472	.447	1.05	.411	.0332
Standard Error σ_{3-4}	.470	.417	.995	.423	.0300
Std. Err. ($\sigma_{2-3} - \sigma_{3-4}$)	.666	.611	1.45	.588	.045
Critical Ratio	1.23	.15	.38	1.73	.36

The critical ratios of the differences between corresponding means[2] on the 1952-53 and 1953-54 classes are calculated and the information so obtained is shown in Table 10.

An examination of the critical ratios listed in Tables 9 and 10 discloses the information that the mean scores between the 1952-53 and 1953-54 classes on the Otis and Mechanics of Expression tests have critical ratios of 2.35 and 2.34 respectively and are thus significantly dif-

[1] Ibid., pp. 232-36.

[2] Ibid., pp. 213-22.

TABLE 10.--Critical ratios of the differences between corresponding means for the 1952-53 and 1953-54 classes

Information	Test Scores and Grade Point Averages				
	OT X_1	ME X_2	MA X_3	RE X_4	GP X_c
Mean 1952-53 (M_{2-3})	42.49	48.56	87.94	48.58	2.238
Mean 1953-54 (M_{3-4})	40.28	46.54	86.30	48.21	2.316
Std. Error of M_{2-3}	.665	.630	1.481	.579	.0468
Std. Error of M_{3-4}	.662	.587	1.401	.595	.0422
Std. Err. ($M_{2-3} - M_{3-4}$)	.940	.862	2.040	.829	.063
Critical Ratio	2.35	2.34	.80	.45	1.24

ferent at the 2 per cent level. Considering differences, Adkins writes, "Generally a ratio of 3 is taken as the standard or the critical ratio; and a ratio between 2 and 3, though not regarded as significant, is considered to be suggestive of a true difference."[1]

The differences between means for other tests and grade point averages and the differences of the standard deviations between all variables for these two classes indicate that there are no significant differences between the classes.

Since in every case the test scores have a higher mean and a smaller standard deviation for the 1952-53 class as compared with the 1953-54 class, and that in the case of the Otis and Mechanics of Expres-

[1]Adkins, pp. 132-33.

sion tests the differences between the means are such that a true difference between these statistics is suggested, it seems that it may be concluded that the 1952-53 class tended toward being superior to and more homogeneous than the 1953-54 class even though this tendency can not be labeled significant.

Individual Classes and the Combined Classes

Each of the individual classes (1952-53, 1953-54, 1956-57) are compared to the combined 1952-53, 1953-54 classes for differences between means and standard deviations for corresponding tests and for the grade point averages. This is done by comparing the values of means and standard deviations shown in Tables 5, 6, and 8 with the corresponding statistics shown in Table 7 in the same manner as these statistics are compared for significant differences between the 1952-53 and 1953-54 classes. It is found that in no case are the differences between corresponding means or standard deviations significant at even the 5 per cent level; therefore, no tables were prepared to exhibit this information. As these statistics for the 1956-57 sample do not vary significantly from the corresponding statistics for the combined classes it seems probable that a function can be written using the data on the combined classes to predict success for the individuals comprising the sample.

Correlations[1]

The cardinal purpose of this study, as previously stated, is the determination of the predictive value of the aptitude and achievement

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[1]Garrett, pp. 122-28.

tests which are included in the test battery in use at the present time at Southeastern State College. The fundamental step toward the accomplishment of this purpose is the correlation of scores on each test with the criterion--the students' grade point averages--and with the scores on every other test used.

Coefficients of correlation for the combined 1952-53, 1953-54 classes are the statistics used to calculate the best predictive index; however, coefficients of correlation are also determined for the individual 1952-53 and 1953-54 classes for the purpose of examining the corresponding coefficients for differences.

Pearson product moment coefficients of correlation[1] (r) between test scores and grade point averages are calculated from the raw data shown in Appendixes II and III and as summarized in Tables 1, 2, and 3; and--by use of the standard deviations shown in Tables 5, 6, and 7--for the academic years 1952-53, 1953-54, and for the combined classes. The coefficients of correlation resulting are shown in Tables 11, 12, and 13.

For the combined classes the standard errors of the coefficients of correlation[2] (σ_r) are calculated by the application of the classical formula by Yule:[3]

$$\sigma_r = \frac{1 - r^2}{\sqrt{N}} \quad . \tag{3}$$

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[1] Ibid., p. 142.

[2] Ibid., pp. 197-98.

[3] Udny G. Yule, An Introduction to the Theory of Statistics (2d ed.; London: Charles Griffin and Company, Ltd., 1912), p. 352.

TABLE 11.--Coefficients of correlation between statistics on 235 first-semester 1952-53 freshmen

Test Scores		Test Scores and Grade Point Averages			
		ME X_2	MA X_3	RE X_4	GP X_c
Otis	X_1	.655	.675	.702	.538
Mechanics of Expression	X_2		.503	.579	.617
Mathematics	X_3			.464	.413
Reading	X_4				.552

TABLE 12.--Coefficients of correlation between statistics on 276 first-semester 1953-54 freshmen

Test Scores		Test Scores and Grade Point Averages			
		ME X_2	MA X_3	RE X_4	GP X_c
Otis	X_1	.686	.652	.801	.529
Mechanics of Expression	X_2		.593	.675	.573
Mathematics	X_3			.523	.483
Reading	X_4				.510

These standard errors of r are shown in Table 13 as the bottom number in each cell; that is, the top number of the cell is the coefficient of correlation and the number under each r is σ_r.

TABLE 13.--Coefficients of correlation between statistics on 511 first-semester 1952-53 and 1953-54 freshmen

Test Scores		Test Scores and Grade Point Averages			
		ME X_2	MA X_3	RE X_4	GP X_c
Otis	X_1	.675 *.024	.663 .025	.758 .019	.523 .032
Mechanics of Expression	X_2		.553 .031	.631 .027	.584 .029
Mathematics	X_3			.498 .033	.448 .035
Reading	X_4				.526 .032

*The bottom number in each cell is the standard error of the coefficient of correlation.

On examining Table 13, it appears that the coefficients of correlation for the combined classes with each of the individual classes and the standard errors of r agree with reasonable expectations for the results of these calculations. The coefficient of correlation between the Otis test scores (X_1) and the criterion (X_c) for the combined classes is .523, which is lower than the corresponding statistics for the 1952-53 class--which is .538--and for the 1953-54 class--which is .529. The fact that the means for Otis test scores for these two classes differ so much may account for this occurrence.

The coefficients of correlation between test scores for the 1953-54 class appear to be considerably higher than the corresponding coefficients for the 1952-53 class, except for the correlation between the Otis

and the California Mathematics test scores. In the next section the significance of these differences is considered.

Comparing Correlations

Because of the apparently large differences between corresponding coefficients of correlation for test scores between the 1952-53 and the 1953-54 classes, these statistics are examined for the significance of their differences. To discover whether the coefficients of correlation for the 1952-53 class vary significantly from the corresponding coefficients of correlation for the 1953-54 class it is necessary to convert each r into Fisher's z value.[1] The significance of the differences between these z values is then determined; that is, the differences between the z values is divided by the standard error of the difference between the two z's to obtain the critical ratio.[2] The results of these calculations are exhibited in Table 14.

An inspection of Table 14 indicates that the differences in corresponding coefficients of correlation are not significant at a high level, with the possible exception of the corresponding coefficients of correlation between the Otis and the Reading Comprehension tests for the two classes--where the difference is significant at about the 1 per cent level. Even in this case the critical ratio of 2.56 is well below the standard critical ratio of 3 that is usually used to determine a real difference between statistics.

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[1]R. A. Fisher, Statistical Methods for Research Workers (11th ed.; London: Oliver and Boyd, Ltd., 1950), pp. 211-247.

[2]Garrett, pp. 239-40.

TABLE 14.--Critical ratios of the differences between corresponding coefficients of correlation for the 1952-53 and 1953-54 classes

Test Scores	Test Scores and Grade Point Averages							
	ME X_2		MA X_3		RE X_4		GP X_c	
	r	z cr	r	z cr	r	z cr	r	z cr
OT X_1	*.655	(.79) .67	.675	(.83) .56	.702	(.87) 2.56	.538	(.60) .11
	.686	(.85)	.652	(.78)	.801	(1.10)	.529	(.51)
ME X_2			.503	(.55) 1.46	.579	(.66) 1.90	.617	(.73) .90
			.593	(.68)	.675	(.83)	.573	(.65)
MA X_3					.464	(.50) .90	.413	(.44) .90
					.523	(.58)	.483	(.52)
RE X_4							.552	(.62) .67
							.510	(.56)

*The first number in each cell is r for 1952-53 followed by the corresponding Fisher z value. The second number in each cell is r for 1953-54 followed by its z value. The third number in each cell is the critical ratio.

A partial explanation as to why the test scores for the 1953-54 class correlate better with one another than those of the 1952-53 class may be that the 1953-54 class is found to have been possibly more heterogeneous than the 1952-53 class. It is known that the more homogeneous a group is the less chance that a high correlation exists between variables for the group.

The differences between the coefficients of correlation for each of the 1952-53 and 1953-54 classes and the corresponding coefficients of correlation for the combined classes (See Table 13) were examined, and in no case were the critical ratios of any apparent consequence; therefore the results are not tabulated in this study.

Multiple Coefficient of Correlation

The coefficients of correlation between the individual tests and the grade point averages give an indication as to how well each test predicts success in college. In order to determine how well the battery of tests predicts the freshman grade point averages a multiple coefficient of correlation must be calculated.

The Wherry-Doolittle test selection method[1] is used to choose those tests which yield the best multiple correlation coefficient and to calculate this coefficient.

Successive operations performed in the calculation of the multiple correlation coefficient[2] (hereafter designated R) are outlined in order that the reader may follow the computation. Table 15 was prepared to exhibit the data necessary to commence the procedure.

The coefficients of correlation of the tests with the grade point averages (criterion) shown in Table 13 are shown, with signs reversed, as the V_1 row of Table 15.

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[1] W. H. Stead et al., Occupational Counseling Techniques (New York: American Book Company, 1940), pp. 245-52.

[2] Garrett, pp. 404-15.

TABLE 15.--First auxiliary table for the calculation of the coefficient of multiple correlation

	Tests			
	OT	ME	MA	RE
V_1	-.523	-.584	-.448	-.526
V_2	-.1288		-.1250	-.1575
V_3	-.04189		-.08605	
V_4	-.01473			

The numbers 1.0000 are entered under each test in the first (Z_1) row of Table 16.

TABLE 16.--Second auxiliary table for the calculation of the coefficient of multiple correlation

	Tests			
	OT	ME	MA	RE
Z_1	1.0000	1.0000	1.0000	1.0000
Z_2	.5444		.6942	.6018
Z_3	.3611		.6573	
Z_4	.2956			

The first test selected is the Mechanics of Expression test as it has the highest V_1^2 / Z_1 quotient (.3410). The Wherry shrinkage formula,

$$\bar{R}^2 = 1 - K^2 \left(\frac{N - 1}{N - m} \right) , \qquad (4)$$

is then used. The multiple correlation coefficient from which the chance error has been removed is designated $\bar{R}$.[1] Table 17 was prepared for recording this information and as an aid in calculating $\bar{R}$.

TABLE 17.--Calculation of the coefficient of multiple correlation

a	b	c	d	e	f	g	
m	V_m^2/Z_m	K^2	$\frac{N-1}{N-m}$ (N = 511)	$\bar{K}^2$	$\bar{R}^2$	$\bar{R}$	Test
0		1.0000					
1	.3410	.6589	1.0000	.6589	.3410	.5840	ME
2	.0412	.6177	1.0020	.6189	.3811	.6173	RE
3	.01126	.6065	1.0039	.6088	.3912	.6254	MA
4	.00073	.6057	1.0059	.6093	.3907	.6250	OT

Entered in Row 1 is the value of V_1^2 / Z_1 (.3410). This value is subtracted from 1.0000 (K^2 entry in Row 0) and the difference (.6589) is entered under K^2 in Row 1. The value of Column d is calculated. Column e is equal to the product of Columns c and d. The value in Column e is subtracted from 1.0000 to obtain the value of $\bar{R}^2$; one then solves for $\bar{R}$.

Table 18 was prepared as an aid in selecting a second test to add to the battery. The calculation is as follows: Row a_1 is left blank. Row b_1 is entered with correlations of the Mechanics of Expression (ME)

[1] R. J. Wherry, "A New Formula for Predicting the Shrinkage of the Coefficient of Multiple Correlation," Annals of Mathematical Statistics, II (1931), pp. 440-51.

TABLE 18.--Third auxiliary table for the calculation of the coefficient of multiple correlation

	OT	ME	MA	RE	-GP	Check Sum	Test
a_1							
b_1	.675	1.000	.553	.631	-.584	2.275	ME
c_1	-.675	-1.000	-.553	-.631	.584	-2.275	
a_2	.758	.631	.498	1.000	-.526	2.361	
b_2	.3321		.1490	.6018	-.1575	.9255	RE
c_2	-.5518		-.2476	-1.000	.2617	-1.5379	
a_3	.663	.553	1.000	.498	-.448	2.266	
b_3	.2075		.6573		-.08605	.7788	MA
c_3	-.3157		-1.0000		.1309	-1.1849	
a_4	1.000	.675	.663	.758	-.523	2.573	
b_4	.2956				-.01473	.2808	OT
c_4	-1.0000				.04982	-.9499	

test scores with each of the other test scores shown in Table 13. The check sum is the algebraic sum of the values in the columns in a given row. Each entry in Row b_1 is multiplied by the negative reciprocal of the entry in the ME column (-1.000) for the corresponding c_1 entry.

The formula

$$V_j = V_{j-1} + b_{j-1} \text{ (criterion)} \cdot c_{j-1} \text{ (each test)} \quad (j = 2,3,4) \qquad (5)$$

is used for entries in Row V_j of Table 15. After a test is selected no

new entry is written under that test.

The formula

$$Z_j = b_{j-1} \text{ (given test)} \cdot c_{j-1} \text{ (same test)} \qquad (j = 2,3,4) \qquad (6)$$

is used to obtain the jth row of Z entries (after the first).

The test having the largest V_j^2 / Z_j quotient is selected as the jth test of the battery. This is the Reading Comprehension (RE) test with a quotient of .0412 for the second selected test. The appropriate entries are shown in Table 17 where $K_j^2 = K_{j-1}^2 - V_j^2 / Z_j$.

Recorded in Row a_j of Table 18 are the correlation coefficients of the previously selected test with each of the other tests and the criterion from Table 13. The general formula

$$b_j = a_j + b_{j-1} \text{ (given test)} \cdot c_{j-1} \text{ (jth selected test)} + b_{j-2} \text{ (given test)} \cdot c_{j-2} \text{ (jth selected test)} + \ldots \qquad (j = 2,3,4) \qquad (7)$$

is used to calculate the b_j row entries.

Three checks are made for the b_j row:

1. The entry for the jth selected test is found to be equal to the Z_j entry for the same test in Table 16.

2. The entry in the X_c column is found to be equal to the V_j entry of the jth selected test in Table 15.

3. The entry in the check sum column is found to be equal to the sum of all the entries in the b_j row.

Each b_j entry is then multiplied by the negative reciprocal of the b_j entry for the jth selected test for the c_j row entries.

Three checks are made for the c_j entries:

1. The c_j row entry for the selected test is found to be -1.000.

2. The c_j entry in the check sum column is found to be equal to the sum of all other c_j entries.

3. The product $b_j \cdot c_j$ of the criterion column entries is found to be V_j^2 / Z_j of Table 17 in absolute value.

After the b_j and c_j rows of Table 18 are entered, the j + 1st row in Table 17 is completed.

The entries for Tables 15, 16, 17, and 18 for this problem are entered and it is determined that the scores on the three tests--Mechanics of Expression, Reading Comprehension, and California Mathematics--yield a maximum multiple correlation coefficient of .625. The Otis test score does not increase the multiple coefficient of correlation. The standard error of coefficient of multiple correlation is found to be .027 by use of formula (3).

Multiple Regression Equation

The coefficient of multiple correlation which has been determined gives an indication as to how well the test scores predict the grade point averages for the first-semester freshmen for the academic years 1952-53 and 1953-54. An equation is to be written so that--given the raw score a student has made on the Mechanics of Expression, Reading Comprehension, and California Mathematics tests--a prediction of his freshman grade point average may be made.

This multiple regression equation for those tests selected by the Wherry-Doolittle method[1] is determined by the following procedure. Table 19 was prepared to exhibit the c_1, c_2, and c_3 entries of the ME, RE, MA,

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[1]Garrett, pp. 415-18.

and -GP columns of Table 18.

TABLE 19. --Coefficients of beta weight equations

	ME	RE	MA	GP
c_1	-1.000	-.6310	-.553	.584
c_2		-1.0000	-.2476	.2617
c_3			-1.0000	.1309

The entries in Table 19 are the coefficients of three linear equations the variables of which are the beta weights of Equation 1. The equations

$$-1.0000\beta_2 - .6310\beta_4 - .5530\beta_3 + .5840 = 0 , \quad (8)$$

$$-1.0000\beta_4 - .2476\beta_3 + .2617 = 0 , \text{ and} \quad (9)$$

$$-1.0000\beta_3 + .1309 = 0 \quad (10)$$

are solved for the beta weights.

On solving it is found that $\beta_2 = .367$, $\beta_4 = .229$, and $\beta_3 = .1309$; and the corresponding multiple regression equation expressed in standard scores is written

$$\bar{z}_c = .367\, z_2 + .229\, z_4 + .1309\, z_3 . \quad (11)$$

To write the regression equation in raw score form the formula

$$b_i = \frac{\sigma_c}{\sigma_i} , \qquad (i = 2,3,4) \quad (12)$$

is used, where σ_c is the standard deviation of the criterion (.710) and the σ_i are the standard deviations of the test scores (See Table 7). On

substituting it is found that $b_2 = .0267$, $b_4 = .0172$, and $b_3 = .00403$. On substituting these values in Equation 2 for the b_i and the means of the tests for the X_i and the criterion for the X_c it follows that $K = -.172$.

Therefore, the multiple regression equation in raw score form is found to be

$$\bar{X}_c = .0267\ X_2 + .0172\ X_4 + .00403\ X_3 - .172\ . \qquad (13)$$

Using the multiple coefficient of correlation (.625) and the standard deviation of the criterion (.710) the standard error of estimate[1] of $\bar{X}_c$ is found to be .554.

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[1] Ibid., pp. 161-62.

CHAPTER V

EVALUATING THE TEST DATA

In this chapter the zero order and multiple coefficients of correlation will be evaluated in the light of results of other studies. The usefulness of the regression equation in predicting college success will be considered.

Coefficients of Correlation

The zero order coefficients between test scores and the criterion are rather high compared with results found in other studies but are certainly in the range of expected correlation values for these tests. The correlations between test scores are also high, so the coefficient of multiple correlation is comparable to coefficients found in other studies. In studies using high school marks in addition to test scores the coefficient of multiple correlation is usually higher than it is when the test scores alone are used. This may be because the high school marks indicate, to some extent, a student's willingness to do academic work.

The zero order and multiple coefficients of correlation found in this study are approximately what one would expect and are not enough different from any study considered to warrant any special investigation.

The Regression Equation

One purpose of this study is--by using the 1952-53, 1953-54 combined classes of first-semester freshmen--to attempt to formulate a multiple regression equation that will predict the freshman grade point averages of future students. The 1956-57 freshman class was selected to test the regression equation (See Equation 13) because the test battery was the same and because it was the most recent freshman class at this writing.

The regression equation (Equation 13) calculated in Chapter III is used on the random sample of fifty first-semester freshmen for the academic year 1956-57 to predict their freshman grade point averages from the raw scores these students made on the Mechanics of Expression, Reading Comprehension, and California Mathematics tests.

The predicted grade point averages ($\bar{X}_c$), the actual grade point averages (X_c), and the differences between these grade point averages are tabulated in Appendix IV for each student comprising the sample. The difference in total grade point average between $\bar{X}_c$ and X_c is only .01 for the random sample of fifty students in the study. Twenty-seven students made a higher grade point average than predicted and twenty-three a lower grade point average. A difference in which the actual grade point average is higher than the estimated grade point average is considered positive and is so entered in Appendix IV.

Using the standard error of estimate ($\sigma_e = .554$), it is noted that twenty-one differences vary from the zero difference by one-half σ_e or less. There are thirteen differences from $\sigma_e / 2$ to $3\ \sigma_e / 2$, and two differences from $3\ \sigma_e / 2$ to $5\ \sigma_e / 2$. Also, there are nine dif-

ferences from $-\sigma_e / 2$ to $-3\sigma_e / 2$, and five differences from $-3\sigma_e / 2$ to $-5\sigma_e / 2$. This information is presented in a graphical form in Figure 1. The continuous line histogram represents these data on the graph and the broken line histogram represents a normal distribution.

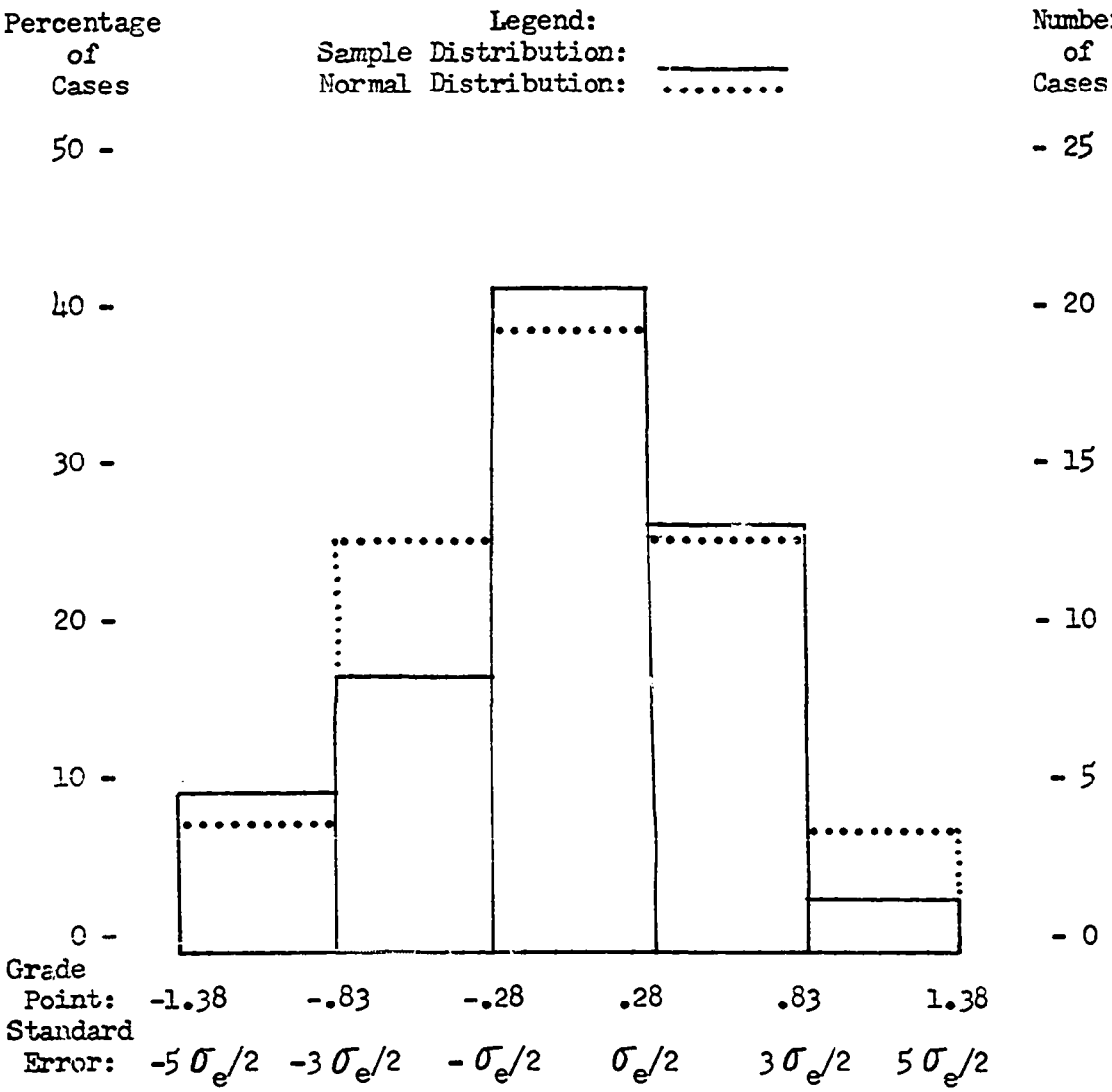

Figure 1.--Histogram of differences between estimated grade point averages and actual grade point averages for 50 first-semester 1956-57 freshmen.

On examining the histogram one may see that the regression equation appears to predict freshman grade point averages to the expected degree of accuracy. To evaluate the predictive efficiency of the regression equation more accurately the chi-square technique[1] was used on the results stated on pages 54-55 and illustrated in Figure 1. Table 20 was prepared to display the data needed for testing the hypothesis that the differences between predicted grade point averages and actual grade point averages are distributed normally.

TABLE 20.--Statistical data for chi-square test for predicted results on 50 first-semester 1956-57 freshmen

Information	Differences between Predicted and Actual Grade Point Averages		
	-1.38 to -.28	-.28 to .28	.28 to 1.38
Observed (fo)	14	21	15
Expected (fe)	15.5	19	15.5
(fo - fe)	1.5	2	.5
$(fo - fe)^2$	2.25	4	.25
$\frac{(fo - fe)^2}{fe}$	.15	.21	.02
$\chi^2 = .38$	df = 2	P = .85	

An examination of Table 20 indicates that, according to the chi-

[1] Ibid., pp. 254-66, 428.

square test, the hypothesis must be accepted as the chi-square value of .38 or less can be expected to occur on other samples for this class in approximately 85 per cent of the trials.

The regression equation requires more arithmetic manipulation than an adviser may reasonably be expected to perform; therefore, the more practical function

$$(3\ X_2 + 2\ X_4 + \tfrac{1}{2}\ X_3 - 55) \,/\, 100 \qquad (14)$$

where X_2 = raw score on the Mechanics of Expression test

X_4 = raw score on the Reading Comprehension test

X_3 = raw score on the California Mathematics Test

may be employed to predict the grade point average a student will make during his freshman year. This function should predict the grade point average with a probable error of one-half of a grade point.

CHAPTER VI

THE QUESTIONNAIRE

To determine how much use is made by members of the faculty of Southeastern State College of the results of the freshman testing program a questionnaire was developed (See Appendix V for a copy of the questionnaire and the covering letter). This questionnaire was also used as an instrument to evaluate the opinion of faculty members concerning the testing program and to elicit suggestions for modifying the program.

Distribution and Collection

Copies of the questionnaire were distributed through the faculty mail exchange to fifty-seven members of the 1957 summer faculty and members of the administration who have faculty status and are concerned with this program. This number includes all members of the faculty who were employed during the second semester of the academic year 1956-57, with the exception of six persons who were not members of the 1957 summer school faculty when this survey was made.

As indicated in the covering letter, recipients were asked to return the questionnaires by placing them in the author's faculty exchange box. The questionnaires were returned anonymously; however, each respondent was asked to mark his name off a list posted on a bulletin board near the faculty exchange boxes. This request was made in order that follow-

up contacts might be made with the individuals who delayed in returning their questionnaires.

Fifty-six questionnaires, representing a 98 per cent response, were returned.

Tabulation of Responses

A tabulation of the items selected from the multiple choice battery which comprises the main body of the questionnaire is presented in Table 21.

In the space on the questionnaire provided for comment, thirty-one of the fifty-six faculty members--55 per cent of those returning the questionnaire--included comments and suggestions concerning the cumulative records, the testing program, specific uses made of the information, and the questionnaire.

Suggestions submitted concerning the cumulative record information and the testing program are as follows:

1. Seven members stated that more information should be given to the faculty concerning the nature of the freshman testing program and the location and availability of test results.

2. The opinion that all test results should be available to the faculty before the freshmen enroll for the first time in order that the results of the complete battery could be used in advising each student in his initial enrollment was expressed by six members.

3. Five members believe additional information should be included in the cumulative record folder; material suggested includes the student's photograph, teachers' evaluation sheets, and newspaper clippings--if any--

TABLE 21.--A tabulation of the responses to questionnaire items by fifty-six faculty members returning the questionnaire

Questionnaire Items Reported On	Faculty Members	
	Number	Percentage
1. Where are the students' cumulative record folders filed?		
(1) Office of the director of testing	19	34
(2) Near lobby of deans' offices	26	46
(3) Registrar's office	0	0
(4) President's office	0	0
(5) Don't know	9	16
No selection made	2	4
Totals	56	100
2. How many times during the past year (or usual year) have you used the test data in the cumulative records or in your possession?		
(1) In no cases	16	28
(2) 1 -- 5 cases	18	32
(3) 6 -- 10 cases	10	18
(4) 11 -- 25 cases	0	0
(5) More than 25 cases	10	18
No selection made	2	4
Totals	56	100
3. In using the test scores in advising or teaching, how valuable have they been?		
(1) Very helpful	8	14
(2) Helpful	23	41
(3) Better than nothing	7	13
(4) Of no value	0	0
(5) Have not used the test scores	14	25
No selection made	4	7
Totals	56	100

TABLE 21.--Continued.

Questionnaire Items Reported On	Faculty Members	
	Number	Percentage
4. How available are the freshman test data?		
(1) Too difficult to obtain	2	4
(2) Too easily obtained (available to too many people)	2	4
(3) Availability about average	35	62
(4) No opinion	6	10
(5) Don't know	9	16
No selection made	2	4
Totals	56	100
5. Is the testing program general enough in scope?		
(1) Too many areas are tested	0	0
(2) Not enough areas are tested	12	22
(3) Areas tested are adequate	22	39
(4) No opinion	19	34
No selection made	3	5
Totals	56	100
6. Are you satisfied with the choice of tests?		
(1) Yes	18	32
(2) In general yes, but some should be added/ changed	17	31
(3) In general no, many should be changed/dropped	0	0
(4) No, all tests should be changed/dropped	0	0
(5) No opinion	18	32
No selection made	3	5
Totals	56	100
7. Do you feel that you are well enough informed on location, availability, contents, and use of freshman test data on our campus?		
(1) Well informed	15	27
(2) Better than average informed	17	31
(3) Poorly informed	16	28
(4) No information	5	9
No selection made	3	5
Totals	56	100
Check if you are a Freshman - Sophomore adviser	17	

concerning the student.

4. Five written comments described definite uses made of the test results. Two faculty members said they use test results to determine whether they give a clue as to why some of their students are doing especially good or poor work. Three faculty members said test results are used for sectioning in their departments.

5. Two members stated that they feel there is a definite need for folders prepared for transfer students in the same manner that the folders are prepared for beginning freshmen.

6. One member suggested that test results should be sent to the chairman of the student's major department.

7. One member stated that test results should be used as an aid in selecting candidates for the teacher training program.

8. One faculty member challenged the value of the testing program by stating that, in his opinion, the test results are of questionable validity.

Three faculty members criticized the questionnaire. Two members stated that Question 4 should have as a choice the item "Readily available." The other criticism was that Question 7 should have as a choice the item "Average."

A few other suggestions and comments were made by various members of the faculty, but they concerned the Orientation program in general and not the testing program in particular.

Evaluation of Questionnaire Data

The results obtained on the tabulation of the responses to the

questionnaire (See Table 21) indicate that the majority of the members of the faculty are aware of the location of the files in which records of the test scores made by each freshman student are maintained. The fact that two members did not answer Question 1 and that nine members replied that they did not know indicates that eleven of the fifty-six faculty members responding to the questionnaire do not know where test results may be obtained. Although the cumulative record files were moved from the office of the director of testing to a filing room near the lobby of the deans' offices during the second semester of the 1956-57 academic year, nineteen faculty members have not been made aware of this move. The move was made in order that the records would be more accessible to the deans and more easily available for faculty use.

As sixteen faculty members responded that they did not use the test results and two members did not answer Question 2, it appears that eighteen members--32 per cent--do not use test results. Since only eight members of the faculty either answered that they had no information on the testing program or did not answer Question 7, it follows that eight members who have information about the program are not using the results.

A few members of the faculty indicated they teach advanced students only and feel that for this reason freshman test results are of little value to them. It would appear that, since grades are generally such a good predictor of success, this would be a valid reason for not using test results.

Of the thirty-eight faculty members who said they use the test results, thirty-one find them helpful and seven said they are of some value. The remaining eighteen either said they had not used the test results or

gave no answer to the question; this number is to be expected as the same number of faculty members either said they did not use the test scores or gave no answer to Question 2.

A great majority--90 per cent of the members who expressed an opinion--feel that the availability of the test results is adequate.

Twelve faculty members indicated that they believe that not enough areas are being tested in the present program, but no faculty member expressed an opinion as to specific areas he believes should be included in the test battery.

The faculty expressed a general satisfaction with the choice of tests for the program; however, seventeen members said that some tests should be either added or changed. A tabulation of the responses to Questions 5 and 6 reveals that twelve members believe additional tests should be used and five members believe some tests should be changed.

Only five faculty members, by responding "No Information," and three members, by failing to answer the question, indicated that they have no information concerning the freshman testing program. Sixteen members indicated that they are poorly informed concerning the location, availability, contents, and use of freshman test data. The most frequently occurring comment is that more information concerning the testing program should be given to the faculty.

CHAPTER VII

CONCLUSIONS AND RECOMMENDATIONS

In this chapter conclusions will be drawn from a review of the evaluated data. Recommendations concerning the program will be made and suggestions concerning possible areas for future investigation will be presented.

Coefficients of Correlation

The aptitude and achievement tests included in the test battery all appear to be good predictors of college success. The Mechanics of Expression test appears to be the best single predictor, although it is not significantly better than the Otis or Reading Comprehension tests.

The multiple coefficient of correlation of .625 with a standard error of .027 indicates that as a battery the tests are fairly good predictors of college success, but that the scores should probably not be used alone as a selective criterion for college admission.

Multiple Regression Equation

The multiple regression equation

$$\bar{X}_c = .0267\ X_2 + .0172\ X_4 + .00403\ X_3 - .172 \qquad (13)$$

appears to predict the grade point average a student will make with a

standard error of estimate of .554. The accuracy of prediction seems to be comparable to the conclusions of other studies.

The more practical regression function

$$(3\ X_2 + 2\ X_4 + \tfrac{1}{2}\ X_3 - 55) / 100 \qquad (14)$$

seems to predict a student's grade point average with a probable error of estimate of one-half of a grade point.

Questionnaire

The members of the faculty of Southeastern State College seem to be generally aware of the freshman testing program and the majority indicates satisfaction with the battery of tests in use at the present time. Approximately one-third of the faculty members express the opinion that additional areas should be tested.

Approximately two-thirds of the members of the faculty indicate that they use the freshman test data, and the majority of these--81 per cent--says that they find the results helpful. The remaining 19 per cent of the members indicate that, although they use the results, they find them to be only "better than nothing."

A great majority of the faculty members expressing an opinion--90 per cent--feel that the freshman test data are of average availability.

Recommendations

Based on the results of this investigation of the testing program of Southeastern State College, the following specific recommendations are hereby presented:

1. The present testing program should be continued and the advisa-

bility of testing additional areas should be studied.

2. Greater effort should be exerted to inform the members of the faculty concerning the location, availability, contents, and use of freshman test data. This effort should especially be increased as a part of the indoctrination of new faculty members.

3. Members of the faculty should be informed as to the predictive quality of the tests in the local situation as found in this study. The function

$$(3 X_2 + 2 X_4 + \tfrac{1}{2} X_3 - 55) / 100 \qquad (14)$$

where X_2 = raw score on Mechanics of Expression test

X_4 = raw score on Reading Comprehension test

X_3 = raw score on California Mathematics Test

should be explained to members of the faculty and presented to them as a usable tool which seems to predict a student's freshman grade point average within one-half of a grade point 50 per cent of the time.

Possible Areas for Future Investigation

Future investigations which may yield results that can be used to strengthen and improve the freshman testing program of Southeastern State College are suggested as follows:

1. While this study indicates that the tests comprising the battery in use at the present time in the freshman testing program of Southeastern State College would be an aid in selecting students for college admission, it appears that additional criteria to supplement these results should also be investigated.

2. Previous studies have found that high school grade averages are of value in predicting college success, and their special value in being available for use during the initial enrollment period should be investigated for possible use in addition to the freshman test scores.

3. Case studies of students who succeed well beyond their predicted grade point averages and of those who significantly fail to achieve their estimated success should probably be made in order to discover additional areas for possible consideration in the prediction of success or admission to college.

4. As freshmen are placed either in an English course which meets five hours per week for three semester hours credit or a course which meets three hours per week for the same credit according to scores made on the Mechanics of Expression test, an investigation should possibly be undertaken to determine whether this criterion provides optimum discriminative information.

BIBLIOGRAPHY

Educational Tests and Manuals

Afflerbach, Janet, et al. Cooperative English Test; Higher Level, Form Y: Mechanics of Expression, Test A. Princeton, N. J.: Educational Testing Service, 1948.

_____. Manual, Cooperative English Test. Princeton, N. J.: Educational Testing Service, 1948.

Bell, Hugh M. The Adjustment Inventory; Student Form. Stanford, California: Stanford University Press, 1939.

_____. Manual for The Adjustment Inventory; Student Form. Stanford, California: Stanford University Press, n.d.

Davis, Frederick B., et al. Cooperative English Test; Higher Level, Form Y: Reading Comprehension, Test C2. Princeton, N. J.: Educational Testing Service, 1948.

_____. Manual, Cooperative English Test. Princeton, N. J.: Educational Testing Service, 1948.

Kuder, G. Frederick. Kuder Preference Record: Vocational, Form CH. Chicago: Science Research Associates, 1950.

_____. Examiner Manual for the Kuder Preference Record: Vocational, Form C. Revised. Chicago: Science Research Associates, 1950.

Otis, Arthur S. Manual of Directions and Key, Otis Self-Administering Tests of Mental Ability. Revised. New York: World Book Company, 1928.

Otis, Arthur S., and Barrows, Thomas N. Otis Self-Administering Tests of Mental Ability; Higher Examination: Form D. New York: World Book Company, 1928.

Thurstone, L. L., and Thurstone, Thelma G. American Council on Education Psychological Examination for College Freshmen. New York: Educational Testing Service, 1942.

Tiegs, Ernest W., and Clark, Willis W. California Mathematics Test; Advanced Forms AA, BB, CC. Los Angeles: California Test Bureau, 1950.

_____. Manual, California Mathematics Test; Advanced Forms AA, BB, CC. Los Angeles: California Test Bureau, 1950.

Troops, Herbert A. Ohio State University Psychological Examination. Chicago: Science Research Associates, 1950.

Books

Adkins, Dorothy C., et al. Construction and Analysis of Achievement Tests. Washington, D. C.: U. S. Government Printing Office, 1947.

Cronbach, Lee J. Essentials of Psychological Testing. New York: Harper and Brothers, 1949.

Educational Measurement. Edited by E. F. Lindquist. Washington, D. C.: American Council on Education, 1951.

Fisher, R. A. Statistical Methods for Research Workers. 11th ed. London: Oliver and Boyd, Ltd., 1950.

Fisher, Ronald A., and Yates, Frank. Statistical Tables for Biological, Agricultural and Medical Research. 2d ed. London: Oliver and Boyd, Ltd., 1943.

Garrett, Henry E. Statistics in Psychology and Education. 4th ed. New York: Longmans, Green and Company, 1953.

The Nineteen Forty Mental Measurements Yearbook. Edited by Oscar K. Buros. Highland Park, N. J.: The Mental Measurements Yearbook, 1941.

Segel, David. Prediction of Success in College. U. S. Office of Education Bulletin No. 15. Washington, D. C.: U. S. Government Printing Office, 1934.

Stead, W. H., et al. Occupational Counseling Techniques. New York: American Book Company, 1940.

The Third Mental Measurements Yearbook. Edited by Oscar K. Buros. New Brunswick, N. J.: Rutgers University Press, 1949.

Thorndike, Robert L. Personnel Selection. New York: John Wiley and Sons, 1949.

Yates, Frank. Sampling Methods for Censuses and Surveys. 2d ed. London: Charles Griffin and Company, Ltd., 1953.

Yule, Udny G. An Introduction to the Theory of Statistics. 2d ed. London: Charles Griffin and Company, Ltd., 1912.

Articles

Anderson, Scarvin B. "Prediction and Practice Tests at the College Level," The Journal of Applied Psychology, XXXVII (1953), pp. 256-59.

Blatz, Mike. "2500 Limit for O. U.'s Next Freshman Class," The Daily Oklahoman (Oklahoma City), March 20, 1955, p. 1.

Cross, Orrin H. "A Study of Faking on the Kuder Preference Record," Educational and Psychological Measurement, X (1950), p. 277.

Gordon, Mary Agnes. "Empirical Comparison of Three Multiple Correlation Techniques," Educational and Psychological Measurement, XIV (1954), pp. 133-37.

Pierson, George A., and Jex, Frank B. "Using the Cooperative General Achievement Tests to Predict Success in Engineering," Educational and Psychological Measurement, XI (1951), pp. 397-402.

Super, Donald E. "Testing and Using Test Results in Counseling," Occupations, XXIX (1950), pp. 95-97.

Tiedeman, David V., and Wilson, Kenneth M. "Development and Applications of Nonprojective Tests of Personality and Interest," Review of Educational Research, XXIII (1953), p. 56.

Webb, Sam C., and McCall, John M. "Predictors of Freshman Grades in a Southern University," Educational and Psychological Measurement, XIII (1953), p. 662.

Wherry, R. J. "A New Formula for Predicting the Shrinkage of the Coefficient of Multiple Correlation," Annals of Mathematical Statistics, II (1931), pp. 440-51.

Theses and Dissertations

Fisher, William O. "A Study of the Prediction of the Collegiate Success of Veterans at Oklahoma University." Unpublished Ed.M. thesis, The University of Oklahoma, 1948.

Quaid, T. D. D. "A Study in the Prediction of College Freshman Marks." Unpublished Ph.D. dissertation, The University of Oklahoma, 1937.

APPENDIX I

FRESHMAN TEST PREDICTIVE STUDY

INDIVIDUAL DATA SHEET

_____Number _____Year Name_____

_____Age _____Sex High School_____

Raw Score	Test	%ile Score S	%ile Score L
_____	Otis (College Aptitude)		_____
_____	Mechanics of Expression (English Achievement)		_____
_____	California Mathematics Test (Mathematics Achievement)		_____
_____	Reading Comprehension (Reading Achievement)		_____
_____	Grade Point Average - Freshman Year		
	Hours of A _____ X 4 = _____		
	Hours of B _____ X 3 = _____		
	Hours of C _____ X 2 = _____		
	Hours of D _____ X 1 = _____		
	Hours of F _____ X 0 = 0		
	Total _____		_____

APPENDIX II

RAW DATA FOR THE FIRST-SEMESTER FRESHMAN CLASS

1952-53

Class Number	Age	Sex	Test Scores				Grade Point Average	Case Number
			OT X_1	ME X_2	MA X_3	RE X_4	X_c	
1	18	1[a]	41	32	102	46	1.25	1
2	23	1	31	30	82	36	1.60	2
3	20	1	46	60	90	54	2.26	3
4	17	1	54	49	98	39	2.19	4
5	18	2	40	56	74	53	3.10	5
6	18	2	52	60	97	57	3.58	6
7	21	1	31	34	66	53	Withdrew	
8	21	1	38	36	66	46	1.04	7
9	17	1	37	69	108	44	2.42	8
10	24	1	46	42	101	47	2.23	9
11	16	2	39	54	66	47	2.89	10
12	18	1	29	32	50	36	1.21	11
13	19	2	38	56	74	57	3.26	12
14	20	1	19	31	87	35	.80	13
15	17	2	36	52	74	48	2.89	14
16	18	1	42	42	76	38	2.47	15
17	18	1	54	47	114	64	3.16	16
18	17	2	63	69	131	67	3.10	17
19	17	2	49	66	90	66	3.47	18
20	18	2	24	48	50	41	1.65	19

[a]The Figure 1 designates male; 2, female.

APPENDIX II--Continued

Class Number	Age	Sex	Test Scores				Grade Point Average	Case Number
			OT X_1	ME X_2	MA X_3	RE X_4	X_c	
21	19	1	43	32	82	50	1.97	20
22	18	1	41	38	100	54	2.22	21
23	18	1	40	50	116	46	1.56	22
24	21	1	40	32	82	44	1.43	23
25	19	2	38	58	82	50	2.32	24
26	17	2	52	64	124	55	2.82	25
27	18	1	38	50	71	52	1.84	26
28	18	2	49	58	115	43	2.43	27
29	22	2	46	60	97	51	3.07	28
30	20	2	33	42	105	50	1.47	29
31	17	2	54	48	102	49	2.73	30
32	18	2	51	58	116	52	2.76	31
33	18	2	35	50	82	46	2.19	32
34	17	1	61	50	116	58	2.22	33
35	19	2	22	46	40	35	1.97	34
36	21	1	35	42	58	48	2.13	35
37	19	1	46	40	90	40	1.97	36
38	18	2	39	52	66	48	1.87	37
39	18	2	42	52	82	46	Quit attending	
40	19	1	67	59	121	55	2.31	38
41	23	1	57	47	93	57	2.50	39
42	18	2	44	51	66	48	2.52	40
43	20	1	28	44	90	38	2.03	41
44	18	2	35	46	102	54	1.78	42
45	19	1	42	37	102	50	2.30	43
46	18	1	39	52	90	44	1.33	44
47	20	1	38	42	74	46	2.26	45
48	22	1	66	60	124	62	3.60	46
49	20	1	39	54	74	50	2.04	47
50	23	1	36	38			Withdrew	
51	18	1	57	70	123	52	3.00	48
52	18	1	44	34	106	40	2.94	49
53	20	2	57	70	130	68	4.00	50

APPENDIX II--Continued

Class Number	Age	Sex	Test Scores				Grade Point Average	Case Number
			OT X_1	ME X_2	MA X_3	RE X_4	X_c	
54	17	2	44	56	97	41	Withdrew	
55	19	2	36	54	50	50	2.71	51
56	18	2	33	48	90	34	2.33	52
57	18	1	40	34	82	48	Withdrew	
58		1	58	56	116	56	Did not enroll	
59	18	1	44	54	111	42	1.65	53
60	21	2	45	54	97	53	2.63	54
61	22	1	57	64	116	60	2.59	55
62	18	1	38	43	90	42	1.16	56
63	18	2	42	55	82	53	2.67	57
64	19	1	60	64	113	70	3.00	58
65	17	2	62	70	108	76	3.74	59
66	18	2	49	52	129	50	2.71	60
67	20	1	46	46	97	56	2.39	61
68	19	1	48	52	50	56	1.71	62
69	18	2	53	64	129	59	3.88	63
70	17	1	45	54	90	70	2.44	64
71	18	2	40	57	82	54	2.76	65
72	17	2	44	52	82	56	2.49	66
73	17	2	36	42	74	45	Withdrew	
74	20	1	36	44	108	60	2.10	67
75	20	1	27	29	50	38	1.53	68
76	19	1	43	42	82	40	1.80	69
77	20	1	24	30	50	38	1.74	70
78	18	1	45	42	74	41	2.78	71
79	18	1	36	40	66	34	1.00	72
80	17	2	48	69	74	47	1.81	73
81	18	2	43	59	97	54	2.38	74
82	18	1	36	43	74	50	1.75	75
83	24	1	27	42	74	42	2.69	76
84	19	1	38	40	99	50	1.26	77
85	19	1	25	32	40	36	2.09	78

APPENDIX II--Continued

Class Number	Age	Sex	Test Scores				Grade Point Average	Case Number
			OT X_1	ME X_2	MA X_3	RE X_4	X_c	
86	21	1	48	44	102	54	2.19	79
87	18	1	34	29	82	50	1.71	80
88	25	1	38	53	108	52	1.66	81
89	21	1	30	46	66	38	1.45	82
90	35	1	24	30	66	38	1.88	83
91	25	1	39	50	50	52	1.66	84
92	17	2	60	66	124	50	3.28	85
93	20	1	43	44	82	50	1.38	86
94	19	1	27	32	66	42	1.39	87
95	19	1	29	42	50	38	0.93	88
96	19	1	47	46	102	42	1.67	89
97	17	1	41	41	95	34	1.00	90
98	19	1	17	30	40	36	1.29	91
99	17	2	53	56	97	46	2.35	92
100	18	1	23	36	50	46	1.07	93
101	17	1	69	70	116	63	Withdrew	
102	18	2	58	70	127	68	3.66	94
103	18	1	67	60	129	54	3.37	95
104	18	1	48	56	127	48	3.28	96
105	18	1	31	42	66	34	0.93	97
106	19	1	47	70	127	52	2.82	98
107	19	1	24	40	66	34	2.07	99
108	20	2	21	42	90	37	Withdrew	
109	18	1	41	40	90	50	2.16	100
110	17	1	53	56	96	44	Quit attending	
111	19	2	37	42	82	37	2.09	101
112	18	2	50	64	66	54	3.22	102
113	20	1	57	46	82	54	2.22	103
114	19	2	56	44	102	49	2.76	104
115	18	1	50	52	127	54	2.57	105
116	18	1	40	52	95	44	2.16	106
117	18	2	44	54	97	41	3.13	107
118	18	1	26	42	50	40	2.07	108

APPENDIX II--Continued

Class Number	Age	Sex	Test Scores				Grade Point Average	Case Number
			OT X_1	ME X_2	MA X_3	RE X_4	X_c	
119	18	1	37	44	102	48	1.78	109
120	18	2	44	48	97	40	2.27	110
121	18	1	36	40	64	47	3.24	111
122	16	2	45	48	113	43	2.48	112
123	18	2	53	54	102	64	2.87	113
124	17	1	50	44	108	52	2.16	114
125	21	1	39	36	74	48	2.08	115
126	22	1	52	37	129	51	1.36	116
127	18	2	32	52	108	38	2.35	117
128	19	1	45	46	79	48	1.78	118
129	20	1	48	48	116	52	2.84	119
130	17	2	56	66	111	60	3.35	120
131	19	1	39	48	97	42	2.25	121
132	18	2	51	60	116	55	3.44	122
133	23	1	51	48	111	62	2.07	123
134	18	1	54	50	129	50	2.28	124
135	18	1	52	70	116	52	3.17	125
136	17	2	47	54	102	57	2.55	126
137	19	1	53	48	66	58	2.35	127
138	17	2	55	64	111	56	2.82	128
139	21	1	47	42	82	56	2.55	129
140	19	1	51	55	82	58	Withdrew	
141	20	1	28	36	97	42	0.86	130
142	17	2	47	50	82	51	3.12	131
143	17	1	14	30	90	34	1.07	132
144	20	1	44	54	90	52	2.42	133
145	19	2	44	56	90	48	2.79	134
146	27	2	44	54	74	49	Withdrew	
147	36	2	38	34	52	46	2.00	135
148	21	2	43	44	82	46	0.87	136
149	19	2	28	51	74	45	2.23	137
150	26	1	39	40	102	48	2.16	138

APPENDIX II--Continued

Class Number	Age	Sex	Test Scores				Grade Point Average	Case Number
			OT X_1	ME X_2	MA X_3	RE X_4	X_c	
151	18	2	36	50	66	40	2.19	139
152	18	1	26	32	66	38	1.87	140
153	18	2	44	52	82	57	2.57	141
154	20	1	37	41	69	41	1.88	142
155	18	1	35	36	53	38	Did not enroll	
156	18	2	55	70	102	62	3.28	143
157	19	1	40	40	66	42	2.43	144
158	17	1	64	52	102	58	2.07	145
159	19	1	37	46	82	48	2.61	146
160	18	2	44	48	74	42	1.87	147
161	28	2	42	55	82	60	3.77	148
162	19	1	28	46	74	50	1.69	149
163	18	2	49	58	82	42	2.94	150
164	21	1	40	36	50	50	2.50	151
165	19	2	44	52	66	47	2.78	152
166	18	2	46	54	74	49	2.64	153
167	18	2	43	46	82	43	2.34	154
168	17	2	20	38	50	37	1.47	155
169	19	1	39	48	90	38	1.40	156
170	18	2	40	59	82	40	2.60	157
171	19	1	53	54	108	52	1.66	158
172	18	1	34	42	66	50	1.48	159
173	18	1	28	29	66	40	1.50	160
174	18	2	43	58	108	50	Withdrew	
175	18	2	57	63	105	68	3.58	162
176	18	2	57	63	105	68	3.58	162
177	18	1	42	50	75	46	0.80	163
178	18	2	43	58	82	53	2.19	164
179	18	1	46	48	108	48	2.64	165
180	18	2	45	52	108	47	1.73	166
181	27	2	29	38	50	44	2.84	167
182	28	1	45	34	74	46	3.17	168
183	19	1	36	55	60	40	0.73	169

APPENDIX II--Continued

Class Number	Age	Sex	Test Scores				Grade Point Average	Case Number
			OT X_1	ME X_2	MA X_3	RE X_4	X_c	
184	18	1	33	32	66	34	0.69	170
185	20	2	26	49	39	39	1.70	171
186	18	1	44	36	82	44	2.29	172
187	18	2	31	48	74	39	2.04	173
188	18	2	35	54	124	39	2.32	174
189	16	2	44	56	82	46	2.00	175
190	17	2	72	64	90	76	3.12	176
191	18	1	54	52	116	46	1.38	177
192	18	1	44	29	90	48	1.93	178
193	18	2	34	43	66	50	2.25	179
194	20	1	46	60	116	54	3.00	180
195	18	1	43	60	80	44	Did not enroll	
196	21	1	54	56	111	65	2.61	181
197	18	1	36	48	108	34	Withdrew	
198	18	1	43	42	66	40	Withdrew	
199	18	1	36	42	--	38	Withdrew	
200	22	1	33	34	73	36	2.07	182
201	20	1	32	36	66	44	1.50	183
202	18	2	40	48	97	46	2.39	184
203	17	2	47	61	124	51	2.97	185
204	17	1	39	52	90	50	1.63	186
205	19	1	36	50	102	38	1.72	187
206	18	2	49	52	108	62	3.58	188
207	23	1	44	44	102	50	2.56	189
208	24	1	31	38	66	36	1.52	190
209	18	1	44	50	97	40	2.32	191
210	18	2	33	52	82	38	2.09	192
211	18	1	37	54	66	42	1.26	193
212	22	1	56	37	97	48	2.03	194
213	17	2	52	58	121	52	2.75	195
214	18	1	59	53	110	57	3.16	196
215	23	1	44	36	102	62	2.68	197

APPENDIX II--Continued

Class Number	Age	Sex	Test Scores				Grade Point Average	Case Number
			OT X_1	ME X_2	MA X_3	RE X_4	X_c	
216	18	1	40	40	74	34	Withdrew	
217	18	2	42	42	102	48	2.12	198
218	29	1	37	31	90	53	2.52	199
219	18	2	38	56	74	51	2.74	200
220	18	2	44	57	82	60	2.41	201
221	19	1	50	54	101	46	2.52	202
222	19	1	33	40	75	42	Quit attending	
223	18	1	35	40	64	43	1.94	203
224	19	1	48	50	108	44	2.13	204
225	18	1	51	50	90	44	1.41	205
226	18	2	42	52	72	42	2.22	206
227	21	2	43	50	82	46	2.33	207
228	20	1	35	36	50	48	1.64	208
229	19	1	47	44	108	54	1.46	209
230	17	2	47	55	66	42	2.44	210
231	18	2	50	62	97	44	3.65	211
232	17	2	40	52	50	61	1.80	212
233	22	1	37	42	82	40	Withdrew	
234	18	1	46	37	102	50	1.66	213
235	19	1	32	34	--	--	Withdrew	
236	22	1	23	34	40	36	1.31	214
237	20	2	21	38	40	38	1.80	215
238	18	2	64	70	97	76	3.57	216
239	18	2	47	62	102	51	3.88	217
240	19	1	37	50	66	40	2.14	218
241	18	2	41	52	116	36	2.73	219
242	18	1	59	46	102	56	2.24	220
243	18	1	53	54	107	54	0.17	221
244	18	1	53	58	116	73	3.20	222
245	19	2	40	48	97	44	2.63	223
246	20	1	38	44	57	46	2.63	224
247	18	2	31	42	40	34	2.20	225
248	22	1	61	58	116	74	2.60	226

APPENDIX II--Continued

Class Number	Age	Sex	Test Scores				Grade Point Average	Case Number
			OT X_1	ME X_2	MA X_3	RE X_4	X_c	
249	16	1	39	44	97	41	2.04	227
250	18	1	30	44	50	46	1.58	228
251	18	2	47	54	82	49	2.06	229
252	21	1	50	56	82	50	1.07	230
253	20	1	36	40	68	45	1.00	231
254	20	1	29	30	--	38	Withdrew	
255	19	1	43	32	--	36	Did not enroll	
256	18	1	41	44	82	42	1.43	232
257	20	1	52	60	111	56	2.07	233
258	18	2	51	58	66	57	3.10	234
259	18	1	31	36	74	38	Withdrew	
260	20	1	49	52	131	60	3.26	235

APPENDIX III

RAW DATA FOR THE FIRST-SEMESTER FRESHMAN CLASS

1953-54

Class Number	Age	Sex	Test Scores				Grade Point Average X_c	Case Number
			OT X_1	ME X_2	MA X_3	RE X_4		
1	33	1[a]	60	60	116	65	Withdrew	
2	23	2	33	37	57	46	2.20	1
3	18	2	32	41	89	39	3.36	2
4	19	1	33	39	96	47	1.19	3
5	18	2	53	58	131	56	3.41	4
6	37	1	64	65	116	76	3.40	5
7	18	1	48	63	108	52	3.16	6
8	18	1	47	43	107	46	1.97	7
9	18	1	51	45	99	51	2.22	8
10	19	1	19	36	46	36	0.90	9
11	19	2	19	38	46	34	1.31	10
12	18	2	40	49	90	43	1.97	11
13	18	2	28	48	118	41	2.78	12
14	18	1	45	45	99	48	2.11	13
15	21	1	33	46	99	34	2.06	14
16	19	2	24	40	56	34	1.94	15
17	18	1	46	56	119	49	3.77	16
18	18	2	66	70	136	71	3.82	17
19	19	1	41	43	101	46	2.61	18
20	18	2	59	62	119	60	3.63	19

[a]The figure 1 designates male; 2, female.

APPENDIX III--Continued

Class Number	Age	Sex	Test Scores				Grade Point Average	Case Number
			OT X_1	ME X_2	MA X_3	RE X_4	X_c	
21	18	1	24	38	84	36	1.21	20
22	16	2	52	56	112	54	2.37	21
23	18	2	48	59	76	55	2.81	22
24	18	1	53	48	119	49	3.04	23
25	18	2	19	37	31	34	1.10	24
26	22	1	23	34	66	37	1.68	25
27	18	2	43	53	75	46	2.91	26
28	18	1	28	36	66	37	1.21	27
29	19	1	35	37	82	45	2.10	28
30	18	2	31	44	99	43	2.13	29
31	18	2	35	53	91	46	2.80	30
32	18	1	29	48	98	45	2.14	31
33	18	2	36	45	94	37	2.75	32
34	18	1	25	30	57	43	1.97	33
35	19	2	39	48	86	52	2.31	34
36	18	2	39	54	73	53	2.62	35
37	21	1	45	41	77	60	2.61	36
38	20	1	25	38	66	48	0.22	37
39	21	1	46	41	103	47	1.63	38
40	20	2	30	36	58	48	2.25	39
41	47	2	39	33	54	40	3.07	40
42	18	2	40	57	116	48	3.65	41
43	19	2	58	65	108	73	3.35	42
44	20	1	37	38	71	42	2.17	43
45	17	1	62	51	128	52	2.62	44
46	17	1	33	37	84	48	2.03	45
47	19	1	59	53	117	65	1.70	46
48	19	1	35	38	60	45	1.97	47
49	18	2	60	68	123	76	3.78	48
50	17	2	53	56	99	59	3.71	49
51	17	1	35	34	58	38	0.87	50
52	18	1	30	33	49	48	0.91	51
53	22	1	49	45	76	54	2.50	52

APPENDIX III--Continued

Class Number	Age	Sex	Test Scores				Grade Point Average	Case Number
			OT X_1	ME X_2	MA X_3	RE X_4	X_c	
54	19	1	30	38	78	38	1.03	53
55	47	1	30	34	60	50	2.44	54
56	17	1	51	45	105	61	3.04	55
57	19	1	35	40	70	40	1.77	56
58	21	1	25	33	68	34	1.61	57
59	19	1	45	60	102	59	3.24	58
60	18	1	57	65	116	61	3.82	59
61	18	2	33	43	72	42	1.45	60
62	21	2	36	38	59	46	2.11	61
63	18	1	47	48	87	49	1.35	62
64	18	1	45	33	67	47	Withdrew	
65	18	2	49	51	50	51	2.16	63
66	18	2	--	55	--	55	Withdrew	
67	18	1	39	46	106	34	1.62	64
68	18	1	31	34	68	37	0.93	65
69	18	2	46	57	96	41	2.72	66
70	19	2	42	45	81	48	2.42	67
71	19	1	29	35	113	43	2.50	68
72	18	1	61	60	115	64	2.91	69
73	19	2	39	52	86	41	3.14	70
74	18	2	48	61	111	57	3.28	71
75	18	2	30	52	73	48	3.18	72
76	21	1	51	63	99	52	2.84	73
77	19	1	41	52	77	40	2.67	74
78	18	1	35	45	83	50	2.10	75
79	18	2	28	44	51	37	2.03	76
80	19	2	43	47	53	48	2.52	77
81	18	2	51	69	97	64	3.36	78
82	19	1	28	38	60	37	1.70	79
83	18	2	44	46	108	53	2.74	80
84	18	1	38	39	82	51	1.31	81
85	18	2	53	61	114	63	3.46	82

APPENDIX III--Continued

Class Number	Age	Sex	Test Scores				Grade Point Average	Case Number
			OT X_1	ME X_2	MA X_3	RE X_4	X_c	
86	18	1	65	70	129	76	3.38	83
87	17	1	29	--	--	47	Withdrew	
88	18	1	33	30	104	39	2.00	84
89	16	2	36	45	104	48	2.27	85
90	16	2	47	51	100	64	2.72	86
91	18	1	43	46	101	51	2.33	87
92	18	1	49	57	99	48	0.33	88
93	18	1	40	50	104	40	2.79	89
94	18	1	54	58	112	55	3.50	90
95	24	1	23	38	77	37	2.94	91
96	18	2	29	45	64	48	2.40	92
97	18	2	42	51	115	48	2.78	93
98	18	2	41	57	86	57	2.25	94
99	18	1	40	41	89	49	2.09	95
100	19	2	41	57	92	48	2.26	96
101	18	1	49	40	100	50	1.75	97
102	19	2	45	50	126	47	2.74	98
103	19	1	42	40	81	47	1.76	99
104	25	1	48	42	103	50	2.50	100
105	18	1	29	35	79	34	1.48	101
106	18	2	45	63	116	47	2.40	102
107	18	1	48	46	103	52	2.97	103
108	21	1	63	58	125	59	2.12	104
109	18	2	26	37	54	39	2.49	105
110	18	1	37	38	73	45	Withdrew	
111	18	1	44	50	103	40	2.25	106
112	22	1	43	36	89	45	1.93	107
113	21	1	45	48	109	54	3.28	108
114	18	2	42	48	82	56	2.46	109
115	17	2	34	44	99	50	2.25	110
116	18	1	67	66	134	65	3.76	111
117	18	2	40	46	99	40	3.22	112
118	20	2	31	44	68	38	2.03	113

APPENDIX III--Continued

Class Number	Age	Sex	Test Scores				Grade Point Average	Case Number
			OT X_1	ME X_2	MA X_3	RE X_4	X_c	
119	18	2	43	57	45	51	3.10	114
120	18	1	42	38	76	44	1.50	115
121	18	1	37	43	85	39	2.09	116
122	19	1	26	30	48	37	1.94	117
123	19	1	31	38	63	38	2.22	118
124	18	2	42	51	70	45	1.97	119
125	17	1	47	57	106	55	2.59	120
126	18	1	30	32	90	45	2.27	121
127	18	1	48	41	73	55	1.64	122
128	50	2	41	54	89	54	2.94	123
129	17	2	40	47	98	41	2.61	124
130	23	1	27	32	65	49	2.22	125
131	18	2	40	55	61	51	2.69	126
132	19	2	32	43	85	35	1.57	127
133	37	1	29	38	43	42	2.54	128
134	19	1	36	41	50	51	Entered as soph.	
135	18	2	29	37	87	38	2.45	129
136	18	2	21	38	57	40	1.84	130
137	18	1	35	37	62	46	1.50	131
138	24	1	28	30	57	43	1.97	132
139	20	1	39	55	79	51	2.50	133
140	19	1	38	31	71	35	1.62	134
141	22	1	28	39	77	34	2.18	135
142	19	1	20	29	43	35	1.33	136
143	18	1	30	30	44	36	Withdrew	
144	19	1	23	37	66	34	1.50	137
145	18	2	34	46	90	43	0.75	138
146	18	1	56	56	121	54	2.79	139
147	18	2	27	49	32	41	1.75	140
148	17	1	43	55	103	45	2.15	141
149	19	2	51	70	98	66	2.40	142
150	19	1	25	43	116	51	Quit attending	

APPENDIX III--Continued

Class Number	Age	Sex	Test Scores				Grade Point Average	Case Number
			OT X_1	ME X_2	MA X_3	RE X_4	X_c	
151	18	1	61	69	94	65	2.61	143
152	18	1	28	35	62	38	Not freshman	
153	19	2	49	50	100	59	2.81	144
154	29	1	35	40	74	44	2.91	145
155	18	1	25	41	85	44	2.50	146
156	18	2	54	57	122	62	2.97	147
157	17	2	48	56	86	55	2.94	148
158	18	1	48	44	82	54	1.82	149
159	19	1	30	36	22	42	1.82	150
160	18	2	50	60	117	52	2.35	151
161	17	2	50	53	71	54	2.29	152
162	--	1	46	--	--	51	Did not enroll	
163	19	1	41	48	101	54	2.74	153
164	19	1	35	34	65	44	2.15	154
165	17	2	60	70	120	76	3.72	155
166	20	1	24	33	53	42	1.00	156
167	20	1	44	48	113	51	2.28	157
168	18	1	29	43	97	45	1.39	158
169	30	1	22	30	98	45	0.97	159
170	18	2	48	48	73	47	2.19	160
171	18	2	43	50	101	57	3.10	161
172	18	2	40	50	104	43	2.48	162
173	18	2	66	66	119	66	3.90	163
174	23	1	20	31	45	34	1.39	164
175	18	1	35	50	117	51	1.97	165
176	18	1	37	42	72	35	1.73	166
177	18	1	69	50	134	76	3.65	167
178	17	2	25	46	63	36	2.28	168
179	19	2	38	--	74	Did not complete test		
180	18	2	55	60	97	62	2.55	169
181	19	1	44	51	78	53	1.59	170
182	18	2	43	48	71	43	1.60	171
183	24	1	52	50	97	64	1.77	172

APPENDIX III--Continued

Class Number	Age	Sex	Test Scores				Grade Point Average	Case Number
			OT X_1	ME X_2	MA X_3	RE X_4	X_c	
184	18	2	28	42	57	34	1.95	173
185	21	1	43	42	53	52	2.58	174
186	18	2	40	47	77	53	2.32	175
187	18	1	36	48	74	45	1.10	176
188	18	2	45	50	60	50	2.69	177
189	18	1	55	42	131	48	3.31	178
190	18	1	32	39	79	34	2.13	179
191	18	1	35	--	--	45	Quit attending	
192	18	2	44	61	114	59	3.50	180
193	18	2	55	63	110	59	3.32	181
194	19	1	24	30	78	36	1.06	182
195	18	1	36	35	98	36	1.19	183
196	19	1	33	27	51	43	2.00	184
197	21	1	50	44	77	43	2.22	185
198	18	1	35	39	91	36	Withdrew	
199	18	1	35	40	85	37	1.36	186
200	18	2	60	70	107	60	3.64	187
201	18	1	43	41	90	54	3.00	188
202	22	1	30	35	89	37	2.32	189
203	18	2	31	46	85	34	3.16	190
204	18	2	35	49	89	38	2.52	191
205	18	2	34	45	58	42	2.48	192
206	18	2	37	46	58	40	2.20	193
207	18	2	42	53	76	58	3.07	194
208	32	1	18	34	53	41	2.52	195
209	18	2	32	43	105	40	2.94	196
210	16	2	39	47	70	50	3.38	197
211	18	1	41	35	67	41	1.85	198
212	19	1	35	56	66	36	2.78	199
213	21	2	31	31	45	37	1.61	200
214	20	1	21	37	54	34	0.75	201
215	19	1	49	56	117	65	2.34	202

APPENDIX III--Continued

Class Number	Age	Sex	Test Scores				Grade Point Average	Case Number
			OT X_1	ME X_2	MA X_3	RE X_4	X_c	
216	19	2	41	58	111	48	2.28	203
217	19	1	52	48	91	50	Withdrew	
218	18	2	34	50	72	52	1.09	204
219	18	2	49	56	115	68	2.43	205
220	18	2	38	46	54	50	2.91	206
221	22	2	30	57	75	37	3.06	207
222	18	1	54	47	97	63	2.32	208
223	18	2	39	48	81	49	2.33	209
224	18	2	44	50	100	51	2.39	210
225	19	1	19	37	79	35	Withdrew	
226	24	1	29	41	94	37	2.40	211
227	18	1	25	34	66	34	2.67	212
228	20	1	48	46	95	48	2.39	213
229	18	1	21				Quit attending	
230	18	2	31	39	58	44	Withdrew	
231	23	1	39	38	75	56	2.11	214
232	18	2	56	52	106	65	3.30	215
233	19	1	48	47	110	49	1.57	216
234	19	2	29	56	67	42	2.13	217
235	19	1	46	34	87	56	2.08	218
236	19	1	51	52	125	48	2.36	219
237	21	1	50	29	50	49	1.70	220
238	25	1	41	35	38	43	2.23	221
239	18	2	30	56	72	52	2.07	222
240	18	2	45	53	90	52	2.39	223
241	17	2	34	40	68	37	1.38	224
242	18	1	41	35	80	44	1.75	225
243	16	2	68	58	107	69	3.03	226
244	17	2	45	56	84	51	1.86	227
245	18	2	59	54	95	61	3.07	228
246	18	1	39	38	65	42	1.73	229
247	18	2	38	53	78	47	1.64	230
248	18	1	21	39	62	53	Did not enroll	

APPENDIX III--Continued

Class Number	Age	Sex	Test Scores				Grade Point Average	Case Number
			OT X_1	ME X_2	MA X_3	RE X_4	X_c	
249	18	1	--	30	78	Did not complete tests		
250	18	2	50	58	114	52	2.17	231
251	19	2	25	52	91	51	2.42	232
252	18	1	33	50	101	52	1.88	233
253	18	1	45	38	84	47	2.23	234
254	19	2	35	42	65	36	1.27	235
255	19	1	19	38	64	36	1.32	236
256	18	1	30	41	105	36	1.64	237
257	50	1	57	53	100	65	3.26	238
258	18	2	45	56	112	40	2.98	239
259	20	1	32	35	66	37	Quit attending	
260	18	1	30	47	94	48	2.38	240
261	18	2	36	38	89	45	1.63	241
262	20	1	52	48	81	60	1.92	242
263	18	2	38	43	86	44	1.71	243
264	18	2	46	60	90	54	2.11	244
265	18	1	56	42	133	54	3.50	245
266	17	2	43	62	101	47	2.06	246
267	18	2	54	64	116	63	2.97	247
268	18	1	36	40	83	40	2.35	248
269	20	1	35	51	110	54	3.10	249
270	24	1	27	38	40	42	2.47	250
271	18	1	56	50	130	53	3.30	251
272	23	1	38	42	74	39	2.10	252
273	17	2	35	43	58	42	2.65	253
274	18	1	36	41	97	38	1.75	254
275	17	2	25	34	43	36	1.80	255
276	17	1	67	66	131	76	1.88	256
277	18	2	36	48	102	42	2.60	257
278	18	1	59	45	70	62	2.31	258
279	18	1	41	43	80	47	1.53	259
280	23	1	40	45	95	52	2.28	260

APPENDIX III--Continued

Class Number	Age	Sex	Test Scores				Grade Point Average	Case Number
			OT X_1	ME X_2	MA X_3	RE X_4	X_c	
281	18	1	48	49	101	52	1.81	261
282	18	1	50	52	115	46	Withdrew	
283	18	2	43	60	74	74	2.29	262
284	18	1	42	48	92	45	Withdrew	
285	18	2	58	53	104	76	3.04	263
286	---	-	50	62	99	61	Did not enroll	
287	18	2	24	44	71	39	2.24	264
288	18	1	37	32	88	43	1.79	265
289	22	1	41	53	88	60	2.97	266
290	17	2	43	53	91	55	2.87	267
291	19	2	23	43	111	34	2.42	268
292	17	1	42	44	93	56	2.31	269
293	19	1	28	29	42	36	2.00	270
294	23	1	42	44	67	49	1.97	271
295	18	1	42	40	54	51	1.89	272
296	19	2	30	45	69	43	3.00	273
297	22	1	47	38	98	50	3.00	274
298	18	1	55	56	122	43	2.48	275
299	21	1	40	30	98	43	2.78	276

APPENDIX IV

RAW DATA FOR A RANDOM SAMPLE OF FIFTY STUDENTS FROM THE FIRST-SEMESTER FRESHMAN CLASS 1956-57

Case Number	Random Sample Selection Number	Class Number	Test Scores			Estimated Grade Point Average	Actual Grade Point Average	Difference[a]
			ME X_2	RE X_4	MA X_3	$\bar{X}_c$	X_c	
1	14	4	47	34	62	1.92	1.63	-0.29
-	29	16	44	46	72	Quit attending		--
-	51	24	39	43	120	Quit attending		--
2	27	25	62	64	118	3.06	3.91	0.85
3	56	33	35	48	47	1.79	1.57	-0.22
4	31	37	51	48	96	2.40	2.50	0.10
5	54	48	39	53	65	2.04	2.44	0.40
6	12	49	47	43	91	2.19	2.42	0.23
7	41	54	50	49	103	3.42	1.36	-1.06
8	37	60	38	49	51	1.89	2.31	0.42
9	39	71	50	53	102	2.49	2.17	-0.32
10	48	78	33	43	49	1.82	2.22	0.40
11	30	88	43	54	77	2.22	2.93	0.71
12	42	90	42	38	91	1.97	2.52	0.55
13	50	94	46	42	62	2.03	1.04	-0.99
14	45	97	59	55	93	2.72	2.28	-0.44
15	53	108	36	48	69	1.89	2.10	0.21

[a]In the column headed "Difference" is recorded the difference between the estimated and the actual grade point averages. If the actual grade point average is greater than the estimated grade point average the difference is recorded as positive.

APPENDIX IV--Continued

Case Number	Random Sample Selection Number	Class Number	Test Scores			Estimated Grade Point Average	Actual Grade Point Average	Difference
			ME X_2	RE X_4	MA X_3	$\bar{X}_c$	X_c	
16	8	121	50	40	123	2.35	2.28	-0.07
17	11	140	40	36	68	1.79	1.73	-0.06
18	16	148	44	48	53	2.04	1.87	-0.17
19	40	162	43	52	115	2.33	2.56	0.23
20	28	169	43	56	84	2.28	2.15	-0.13
21	36	185	65	54	68	2.77	2.34	-0.43
22	46	186	47	39	58	1.99	2.12	0.13
23	6	188	37	40	70	1.79	0.87	-0.92
24	26	189	66	73	119	3.33	3.29	-0.04
25	20	198	51	58	106	2.62	2.66	0.04
26	23	199	50	56	103	2.54	3.10	0.56
27	32	201	46	61	91	2.47	1.85	-0.62
28	21	205	61	45	99	2.63	2.16	-0.47
29	9	207	45	54	111	2.41	3.12	0.71
30	25	232	56	59	106	2.76	3.31	0.55
--	22	237	29	42	--	Did not enroll		--
31	4	238	36	37	68	1.87	1.60	-0.27
--	13	246	40	Did not complete tests			2.27	--
--	35	253	33	--	--	Did not enroll		--
32	52	269	42	43	51	1.90	2.13	0.23
33	38	295	40	48	68	2.00	2.16	0.16
34	33	303	36	46	55	1.80	2.00	0.20
35	2	308	48	52	105	2.42	1.46	-0.96
36	47	313	33	40	53	1.61	1.78	0.17
37	7	316	66	53	95	2.89	3.60	0.71
38	19	320	49	51	90	2.38	2.91	0.53
39	3	329	55	45	74	2.37	1.56	-0.81
40	15	336	39	55	84	2.15	2.39	0.24
41	48	343	51	57	67	2.44	1.25	-1.19
42	34	344	40	49	87	2.09	2.39	0.30
43	10	346	61	45	95	2.61	2.87	0.26
44	5	350	32	52	62	1.83	2.56	0.73
45	49	352	42	55	55	2.12	2.45	0.33

APPENDIX IV--Continued

Case Number	Random Sample Selection Number	Class Number	Test Scores			Estimated Grade Point Average	Actual Grade Point Average	Difference
			ME X_2	RE X_4	MA X_3	$\bar{Y}_c$	X_c	
46	1	354	35	53	77	1.99	1.38	-0.61
--	18	359	54	40	88	--	Withdrew	--
47	55	360	42	42	69	1.95	1.93	-0.02
48	44	361	42	39	112	2.07	2.93	0.86
49	17	369	72	63	108	3.27	3.23	-0.04
50	24	370	30	36	44	1.42	0.75	-0.67

APPENDIX V

QUESTIONNAIRE SUBMITTED TO FACULTY MEMBERS

Covering Letter

Office of the Dean of Students
Southeastern State College
Durant, Oklahoma

July 8, 1957

Dear Faculty Member:

Attached is a questionnaire concerning our freshman testing program. I am making a study of this program concerning the value of the tests and the use made of the results.

Please fill out the questionnaire and place it in my mail box by Friday of this week. Also please mark your name off the list on the faculty bulletin board. Do not sign the questionnaire.

I will appreciate any comment in the space provided and solicit your criticism.

I hope to have one hundred per cent return by the faculty, and I thank you for your help.

Sincerely,

John T. Krattiger

Questionnaire

QUESTIONNAIRE
Freshman Testing Program
Southeastern State College, Durant, Oklahoma

Copies of raw scores and percentile scores made by our students are on file in cumulative record folders and a copy is sent to the student's freshman adviser. I am interested in discovering how much the faculty uses these scores and how the faculty feels about the freshman testing program.

Please check the blank that indicates your best answer to the question:

1. Where are the students' cumulative record folders filed?

_____(1) Office of the director of testing
_____(2) Near lobby of deans' offices
_____(3) Registrar's office
_____(4) President's office
_____(5) Don't know

2. How many times during the past year (or usual year) have you used the test data in the cumulative records or in your possession?

_____(1) In no cases
_____(2) 1 -- 5 cases
_____(3) 6 -- 10 cases
_____(4) 11 -- 25 cases
_____(5) More than 25 cases

3. In using the test scores in advising or teaching, how valuable have they been?

_____(1) Very helpful
_____(2) Helpful
_____(3) Better than nothing
_____(4) Of no value
_____(5) Have not used the test scores

4. How available are the freshman test data?

_____(1) Too difficult to obtain
_____(2) Too easily obtained (available to too many people)
_____(3) Availability about average
_____(4) No opinion
_____(5) Don't know

5. Is the testing program general enough in scope?

_____(1) Too many areas are tested
_____(2) Not enough areas are tested
_____(3) Areas tested are adequate
_____(4) No opinion

6. Are you satisfied with the choice of tests?

_____(1) Yes
_____(2) In general yes, but some should be added/changed
_____(3) In general no, many should be changed/dropped
_____(4) No, all tests should be changed/dropped
_____(5) No opinion

7. Do you feel that you are well enough informed on location, availability, contents, and use of freshman test data on our campus?

_____(1) Well informed
_____(2) Better than average informed
_____(3) Poorly informed
_____(4) No information

_____ Check if you are a Freshman - Sophomore adviser.

Please comment on any of the above questions or on any part of the freshman testing program or cumulative record folders you desire. Please indicate if test results have been used in your department in curriculum planning, sectioning students, or in other ways not covered in the questionnaire.

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(Use back of this sheet if added space is needed.)