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IN THE COLLEGE OF EDUCATION USING THE OPINION,
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A STUDY OF ACADEMIC ACHIEVEMENT
OF STUDENTS IN THE COLLEGE OF EDUCATION USING THE
OPINION, ATTITUDE AND INTEREST SURVEY AS A PREDICTIVE DEVICE

DISSERTATION

Presented in Partial Fulfillment of the Requirements for
the Degree of Doctor of Philosophy in the Graduate
School of The Ohio State University

By
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The Ohio State University
1967

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ACKNOWLEDGMENTS

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CHAPTER I
INTRODUCTION

Since the advent of Sputnik, there has been a tremendous emphasis placed on the need for quality education to develop superior students. More recently under the present administration program entitled the "Great Society," there has been a concern for upgrading our total society, with education playing an integral part. There presently is a felt need for quality education designed not only to produce superior individuals capable of adding to scientific process, but also to upgrade the educational achievement of our whole younger generation.

The first logical step in achieving such a goal would be to provide the best possible teaching talent for our nation's schools. This will be a task of major proportions because a shortage of qualified teachers has existed for some time and because the number of children of school age is increasing as a result of the population explosion. In comparison with the school population of 1900, there are about twice as many elementary students and twelve times as many high school students. Some estimates for the immediate present indicate that 147,600 new elementary teachers and
92,400 new high school teachers are needed.¹ In fact, it was recently predicted that approximately 55 per cent of all the college graduates of 1965 would have to enter the teaching field to meet the demand at this time.²

Various means have been used to encourage more prospective college students to enter the teaching profession. First of all, more institutions have been developing programs to qualify their graduates for the classroom.³ Secondly, an effort has been made to encourage more young people to become teachers by awarding more scholarships and by pointing out the advantages of entering the teaching profession through a variety of communication channels. Finally, salaries for beginning teachers have been made more attractive.

This effort has been effective in encouraging more people to enter the teaching profession which was in keeping with the previous philosophy that the way to meet the teaching shortage is to encourage everyone capable of graduating from college to enter the teaching profession. It is apparent now that such an approach not only leads to the lowering of the quality of teaching, but also discourages many qualified persons from entering teaching.

²Ibid., p. 315.
Only quality students should be encouraged to enter the teaching profession. Every effort must be made to direct as many talented students into teacher education programs as possible and, at the same time, identify and counsel out of teacher education programs those students who show no promise of becoming successful classroom teachers. This may be a difficult task due to the image of teaching as a field for those students unable to succeed in other fields and the great need for talented persons in other fields. Therefore, it is doubly important that an extreme effort be put forth to solve this problem.

Despite the critical importance of the problem and a half-century of prodigious research effort, very, very little is known for certain about the nature and measurement of teacher personality or about the relation between teacher personality and teaching effectiveness.

Since the personal qualities of the teacher affect, for better or for worse, the personalities of his pupils, much more needs to be learned about this problem. The teacher teaches not only what he knows, but what he is. Therefore, research is sorely needed to determine what characteristics of teachers have a positive affect on pupil growth. Since these students enrolled in teacher education programs will eventually be the nation's teachers, this would be the logical place to start in examining this problem.
I. THE PROBLEM

Statement of the Problem. In this study, the problem of predicting teacher effectiveness will be examined. The study will be conducted from the standpoint of selecting quality students for teacher education programs. More specifically, this study will involve the prediction of academic achievement of students in the College of Education.

Despite continued refinement of measuring instruments over the past forty years, the highest correlation obtained between predictors of academic achievement and college grade-point average has been .70. The average correlations were even lower. These results have been very discouraging, especially to those researchers working with students in professional areas, such as teacher education.

Intellectual factors such as high school academic record, scores on scholastic aptitude tests, and combinations of these various factors in multiple correlation or in regression equations are the usual predictors used. Since intellectual factors account for only 50 per cent of the variance according to correlations obtained, it is possible that academic achievement may be affected by other factors such as personality traits of the individual and the college environment. This is especially true in teacher education, since, in professional courses such as student teaching, students are judged on more than just their scholastic ability.
The purpose of this study is to develop a means of predicting more accurately than in the past the academic achievement of professional students enrolled in the College of Education. The Opinion, Attitude, and Interest Survey is a new instrument specifically designed to make an accurate appraisal of students enrolled in colleges and universities.

In this investigation, the OAIS will be used to test the following null hypotheses in an effort to provide information concerning the feasibility of using it to assess the potential of students enrolled in the College of Education. The null hypotheses are as follows:

1. There is no relationship between college grade-point averages of seniors in the College of Education and their performances on the OAIS.
2. There is no relationship between grades in student teaching and performances on the OAIS.

Importance of the Study. This study is important for the following reasons:

1. It may be helpful in the process of selecting quality students for teacher education programs.
2. It may be valuable in screening out students who will not be effective in the role of a teacher.
3. As a counseling tool, it may yield information of value to students pondering over whether
or not to choose teaching as a career.

4. Information compiled may be useful to those considering using the OALS in studies with professional students in other fields.

5. This study may stimulate further research in the prediction of teacher effectiveness.

6. Data may be found which could prove useful in training prospective teachers.

Since little is known about how personality factors affect the effectiveness of teachers, this study is needed. In some universities, teacher education programs have become a dumping ground for students unable to cope with the rigors of other college programs. If teaching is to gain status as a profession, it will be necessary to refine the selection procedures for admission to teacher education programs so that only quality students capable of assuming a professional role are admitted.

**Limitations of the Study.** There are three major factors that limit the validity of the conclusions that may be drawn from this study.

First of all, since this study is concerned with 150 students who were enrolled in Ohio State University in the Autumn Quarter of the 1965-66 school year, the validity of the generalizations that are arrived at as a result of the study is dependent upon the extent to which those students are representative of teacher education students at Ohio State University.
Finally, the results of this study are valid only insofar as student teaching grades are a true indication of each student's educational promise. Unless the student teaching evaluation is closely related to the actual teaching situation, the study will reveal some indication as to how well the OAIS can predict grades in student teaching, but not how well it can predict future success in the classroom.

II. OPERATIONAL DEFINITIONS

To facilitate the reading of this dissertation, the following terms have been defined operationally:

**Beta Coefficient (B).** Beta Coefficients are partial coefficients expressed in terms of standard scores.\(^4\) They are used to determine from the correlations alone the relative weight with which each independent variable contributes to the criterion independently of the other factors.

**Grades in Student Teaching.** These grades are the instructor or teacher ratings of students' performances under an actual classroom situation. The following points were given to ratings used in this study:

- A equals 8 points; A- equals 7 points;
- B+ equals 6 points; B equals 5 points;

B- equals 4 points; C+ equals 3 points;
C equals 2 points; C- equals 1 point.

**Multiple Coefficient of Correlation.** (R) The multiple coefficient of correlation is the correlation between scores actually earned on the criterion and the scores predicted in the criterion from the multiple regression equation.²

**Multiple Regression Equation.** A correlation involving the prediction of a dependent variable from two or more independent variables in such a way that best linear relationship is obtained is a multiple regression equation.

**Non-intellectual Factors.** In this study, non-intellectual factors are factors other than those measured by scholastic ability tests which are related to the prediction of success in college.

**Standard Error of Estimate.** Throughout the report of this investigation, the term "standard error of estimate" indicates a measure of the accuracy of predicting one variable from a knowledge of another factor variable.

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²Ibid., p. 410.
III. ORGANIZATION OF THE STUDY

The first chapter has included an introduction to the subject of the investigation, a statement of the problem, the importance of the problem, and the limitations of the study.

The second chapter contains a review of the related literature on the prediction of success in college, the prediction of success in teaching, and an analysis of the literature pertaining to predictive studies using the OAIS as a predictive device.

Chapter III deals with the procedures used in conducting the study. Chapter IV contains an analysis of the results.

Chapter V is a summary of the results. It includes conclusions drawn from the data and recommendations for future studies.
CHAPTER II

REVIEW OF THE LITERATURE

This chapter is divided into three main divisions. The first division is concerned with the general area of predicting success in college and deals with predictive studies using both intellectual and non-intellectual factors as a basis for prediction.

The second division includes a review of studies in the prediction of teacher effectiveness. A final section is devoted to reporting on studies using the OAIS as a predictive device.

There have been scores of studies on predicting academic success in college and almost as many studies on prediction of teacher effectiveness. The merit of examining all of these studies seems questionable; therefore, an attempt was made to examine only those studies which were most applicable.

I. PREDICTION OF ACADEMIC SUCCESS

Intellectual Predictors

High School Grades as Academic Predictors. The admissions philosophy of a great majority of colleges has been to admit those applicants whose academic qualifications
indicate that they will be able to obtain at least passing grades in the courses required for a baccalaureate degree. The attempt to predict college grades from the college applicant's educational background is reflected in the almost innumerable research studies on this topic which are found in the educational and psychological literature.

In a study of the literature, Harris (1940) evaluated 328 studies published between 1930 and 1937. He found that high school grade average, performance on intelligence tests, and other measures of intellectual ability were the predictors reported to have the highest correlation with the college grade criterion. Evance (1940), summarizing studies through 1941, found that secondary school performance was reported as the best predictor of college grades. More recently, Garrett (1949) published a survey of more than 300 research investigations which were directed toward the problem of predicting academic success as measured by grades. Of the 61 studies in which a measure of secondary school performance was employed as the primary predictive measure, correlations with college grades ranged from 0.18 to 0.83 with an average correlation of 0.55.6

The fact that grades have been shown to be the best single evidence from which to predict college achieve-

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ment does not alter the fact that the level and precision of predictions from grades have remained relatively low and unstable. Concerning the fallibility of grades as predictors, Bloom and Peters state:

It is not necessary to go into a lengthy analysis to discover why raw high school grades do not provide better predictors of college success than they do. There is extensive literature on the variability of grading standards and the unreliability of grades. Such differences can be traced partly to the variations mentioned before among schools in purposes and programs, partly to differences in the levels of expectations of teachers and faculties, and partly to differences in the general aptitude of students. Equally important reasons for variability in the meaning of grades stem from differences in the purposes of teachers and in the traits or qualities which are considered in the assignment of grades.

Aptitude Test Scores as Academic Predictors. Aptitude tests have been widely used to predict college achievement. In 1934, Segel in a review of college prediction studies, cited 103 reported correlations between general mental tests and college scholarship. Of the 103, 83 were in the range .35 to .54; 9 were smaller than .35; and only 11 of the 103 were greater than .54. At the time of Segel's report, psychologists and educators were generally convinced that much improved, if not perfect, prediction would soon be possible, contingent upon the further refinement of tests and prediction.

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techniques. However, almost forty years of efforts to refine and improve academic aptitude measures have not markedly enhanced their effectiveness. Current findings of correlations between such tests and college grades are almost identical in level and precision to the correlations found in the 1920's, a level of prediction which still leaves much room for improvement.\(^8\)

**Achievement Test Scores as Academic Predictors.** Although less widely used than school grades or aptitude tests, achievement tests have been extensively tried in prediction of college success. They have proved to be equal or superior to aptitude tests for prediction of college success. In summarizing his analyses of prediction studies, Segel (1934) concluded that "general achievement tests at the end of the high school course are more prognostic of general college scholarship than general mental tests." Travers, (1949) too, reported that subject matter tests are generally second only to high school grades in their usefulness for the prediction of college achievement.\(^9\)

These studies support the conclusion that achievement tests should be given consideration as a predictor of academic achievement in college. Nevertheless, they leave much to be desired as a single predictor of college achievement.

\(^8\)Ibid., pp. 19-22.

\(^9\)Ibid., pp. 22-24.
Use of Academic Predictors in Combination. In addition to efforts to find a single predictor or type of data which will provide reliable estimates of academic success, many colleges combine several predictors in making such estimates. The most common procedure involves combining school grades and aptitude tests by using multiple correlation or regression. The problem in such an approach is to find predictors that are relatively independent of one another.

If grades and test scores were perfectly correlated, the use of both would not provide any better prediction than using either one separately. Since school grades and test scores are not perfectly correlated, they can be used together, and the combination will ordinarily provide somewhat improved estimates of probable college success. While school grades, aptitude test scores or achievement test scores will ordinarily each correlate with college grades within the range .40 to .60, multiple correlations using two or more of these in combination will usually be in the range .55 to .65.\(^\text{10}\)

The use of multiple correlations or regression techniques has definite possibilities as academic predictors. However, although they might be somewhat superior to other known predictors, the general level and precision of predictions from them still leave much to be desired.

\(^{10}\)Ibid., pp. 24-25.
II. USE OF NON-INTELLECTUAL FACTORS
AS A MEASURE OF ACADEMIC ACHIEVEMENT

Review of Literature

M. M. P. I. Scale as a Predictor of College Achievement. The Minnesota Multiphasic Personality Inventory (M.M.P.I.) has probably been investigated more than any other personality test as an academic predictor. A study by Frick employed scores obtained on the American Council on Education Psychological Examination (ACEP) and the M.M.P.I. clinical scales (MP excluded) by 267 freshman women at the University of California, Santa Barbara College, as the independent variables in a multiple-correlation procedure with grade-point average for two semesters of the freshman year as the dependent variable. He found negative correlations between grade-point average and the majority of M.M.P.I. scales. He explained these negative correlations by stating "an examination of the scale descriptions (immaturity and lack of insight (HS), asocial and disinterested attitudes (PD), existence in a fantasy world (Sc) and hypomanic activity (Ma) can scarcely be considered as conducive to academic achievement. His conclusions were that whether the influence of the individual adjustment scales is positive or negative, their inclusion in a prediction battery with an aptitude test is justified by the resultant increase in the correlation coefficient."

In a study by Hackett, evidence was compiled through an item analysis of M.M.P.I. records of male freshmen to support the following hypotheses:

1. That high and low-achieving male students tend to make different self-reports about themselves on a questionnaire such as the M.M.P.I.

2. That such self-reports can be used to predict future academic achievement of male students.

3. That certain trends seem to exist in the identified items which permit analysis and tentative hypothesis formation regarding the personalities of low and high achievers.

Jensen compared non-achieving students of low scholastic ability with three other groups in order to better understand the influence of personality traits on academic success. The conclusions reached are as follows:

1. The most obvious trend throughout the study was for the non-achieving students of low ability consistently to obtain higher scores on the M.M.P.I. than the achieving students of high ability.

2. On the F, Sc and Ma scales, the non-achieving students of low ability were significantly higher on mean scores than the achievers of low scholastic ability.

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3. The non-achievers of low scholastic ability also scored significantly higher than the non-achievers of high scholastic ability on the F, Pd, Pf, Sc and Ma scales.

4. On one of the M.M.P.I. scales, there was a complete reversal in the general trend. The results of the Mf scale showed the male achievers of high scholastic ability to be higher on mean scores than the male non-achievers of low ability.

5. On the basis of the above conclusions, there appears to be a definite tendency for the non-achievers of low scholastic ability to deviate further from the average than other groups as far as M.M.P.I. mean scores are concerned.

McKenzie compared under and overachievers with normal achievers on the clinical and validity scales of the M.M.P.I. Differences emerged that were interpreted as suggesting that both deviant groups are more anxious than normal achievers, with underachievers tending to internalize their anxiety. Further hypotheses regarding underachievement arose from an attempt to formulate the psychological nature of a cross-validated M.M.P.I. underachievement scale. Underachievers were characterized as impulsive, lacking long-range goals, and dependent for guidance upon

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the standards of others. Hostility was seen as playing an important role in the dynamics of underachievement.\textsuperscript{14}

Drake studied male freshmen in the upper half of an entering class on college aptitude tests. He found that low achievers were significantly high on the (Pd) and (Ma) scales and that the (Mf) scale acted as a suppressor variable.\textsuperscript{15}

Not all current studies investigating the M.M.P.I. as an academic predictor have produced favorable findings. Seegars replicated Hackett's study using female upper class students with matched I.Q.'s instead of freshman male students. His findings were inconsistent with those of Hackett since no significant results were found.\textsuperscript{16}

\textbf{Other Personality Tests as Academic Predictors.}

While the M.M.P.I. has been the most extensively investigated personality test concerning the value as an academic predictor, other personality tests have been investigated. In two parallel studies, scores on the fifteen personality variables of the Edwards Personal Preference Schedule (EPPS)


were compared for over and under-achieving college students.\(^{17}\) (Gebhart and Hoyt, 1958; Krug, 1961). Although the scales that were found to discriminate between subjects who over or underachieved in relation to measured aptitude were not identical, the results of the two studies did agree to a considerable extent. In the Gebhart and Hoyt study, overachievers scored higher than underachievers on the Achievement, Order, Intraception and Consistency scales, and significantly lower on the Nuturance and Affiliation scales. In the study by Krug, overachievers scored significantly higher on the Achievement, Order and Endurance scales and significantly lower in Affiliation and Heterosexuality scales.

Kazmier replicated the Krug and Gebhart and Hoyt studies except that in these studies, the middle range of achievers was eliminated and in the Kazmier study, no subjects were eliminated. The results of his study, while not indicating a lack of usefulness of the EPPS, highlighted the shortcomings of many of the research studies which have reported success in prediction with the EPPS scales.\(^{18}\)

Kelland found that the California Personality Inventory (CPI) is useful in predicting college freshman grades for a sample of high aptitude seniors. The CPI was


\(^{18}\) Ibid., pp. 195-196.
found to have useful predictive validity, both alone, and in combination with the Scholastic Aptitude Test (SAT).

Kelland concluded that the significant correlation of the CPI Socialization (Sc) scale with grades in all four major samples supports Gough's theory that achievement and under-achievement among gifted persons is a specific facet of the general problem of socialization. 19

Wagner and Sober used the Guilford-Zimmerman Temperament Survey in conjunction with a scholastic aptitude examination in the prediction of first semester grade-point averages for a large class of entering college freshmen. Only one trait, masculinity-feminity, contributed any significant variance to the R, raising the correlation from .401 to .466. 20

Other Non-intellectual Factors as Measures of Academic Achievement. Personality tests are not the only measure of non-intellectual variables used in current years as a prediction of academic achievement. Indices of motivation, study habits, biographical data, and numerous other measures have been used in an attempt to improve prediction. Worell attempted to determine the theoretical


and empirical utility of the level of aspiration method in predicting college grades and attrition. The general assumption was that discrepancy scores between various estimates related to academic performance reflected the reality-unreality level at which the individual operated. Individuals with large discrepancy scores were considered unrealistic and were expected to perform more poorly in academic situations since they would be more likely to employ unrealistic and avoidance problem solution behavior. Discrepancy measures related to the general hypothesis were obtained from the combination of estimates given to varying pairs of five level aspiration questions. The correlation between the discrepancy aspiration scores and academic performance provided strong support for the hypotheses dealing with reality-unreality. 21

The hypothesis that college students of high ability who are more willing to accept limitations will achieve at a higher level was tested by Berger. The results of his study supported this hypothesis. 22

21 Leonard Worell, "Level of Aspiration and Academic Success," Journal of Educational Psychology, L (April, 1959)

Weitz and Wilkinson explored the relationship between academic success in college and six kinds of non-intellectual conditions or experiences. The conditions studied included:

1. Only child status at the time of entering college.
2. One or both parents deceased at the time of entering college.
3. Parents divorced at the time of entering college.
4. Graduation from a civilian private secondary school.
5. Graduation from a private military academy.
6. Two or more of the above.

It was found that students who were only children, military academy graduates, and who had experienced two or more of the above conditions were significantly inferior to "normal" college freshmen in academic performance during their first college semester. The writers suggest a need for a greater understanding of the non-intellectual aspects of college students which influence their academic success.

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Michael, Baker, and Jones investigated the predictive validity of several cognitive and non-cognitive measures. They found that the Carter California Study Methods Survey (CSMS) shows some promise as a predictor of academic success.

Asher and Gray studied the relationship of personal history data to college success to see whether such data, when combined with ability test scores would materially increase the accuracy of prediction of college success. It was found that the personal history score, when combined with intelligence test scores, did increase the accuracy of predicting success in college.

Malloy conducted an investigation to determine the effectiveness of a biographical inventory when used in conjunction with certain pre-registration test scores for the prediction of college marks and to identify biographical experiences and attitudes associated with first semester

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the ACE-L Psychological Examination and the University of Nebraska English Placement Test. The writer concluded from the results that student characteristics other than scholastic aptitude and achievement that contribute to college performance can be identified.

A study was undertaken by Watson to attempt to determine the usefulness of factors concerning the educational and geographic backgrounds of students as predictors of academic achievement in a large state university. The relationship between family, educational, and geographic variables and academic aptitude and achievement was studied. Only educational level of the father was statistically related to either academic aptitude or achievement.

III. STUDIES OF TEACHER EFFECTIVENESS

Introduction

Since this study deals with the investigation of teacher effectiveness, this section is a very important part of the review of the literature. Although little has been learned about predicting success in teaching, there has been an extensive amount of research done on this topic. Researchers have studied the relationships of attitudes, personality, cognitive abilities, and other factors as measures of teacher effectiveness. This section will

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Comprehensive Reviews of Teacher Effectiveness

One of the most comprehensive reviews of teacher effectiveness was made by Long in 1957.28 On the basis of a synthesis of significant studies done within the past decade on the prognosis of teaching efficiency, the following conclusions were reached:

1. There is a definite trend toward accepting changes in the pupil as the ultimate criterion

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of teacher effectiveness, but the researchers of the past decade have not actually studied pupil change.

2. Methods of appraisal of teacher effectiveness have remained the same as in the past. Ratings by skilled observers, by supervising teachers, by supervisors and principals remain paramount; but there is increased interest in the value and use of students' ratings.

3. Certain personality inventories including the MTAI seem to have predictive value.

4. It is apparent from the studies that there is not a consistent relationship between degrees of intelligence as measured by the ability tests used in the studies and corresponding success in teaching.

Barr made some observations concerning the major findings of a series of investigations on teacher effectiveness conducted at the University of Wisconsin. His observations are as follows:

1. Investigations of the measurement and prediction of teacher effectiveness may serve many purposes.

2. Investigations on the measurement and prediction of teacher effectiveness differ greatly in scope.

3. Investigations relative to the measurement and prediction of teacher effectiveness employ different criteria of teacher effectiveness.

4. Investigations relative to the measurement and prediction of teacher effectiveness have different psychological concerns.

5. Investigations of the measurement and prediction of teacher effectiveness define teaching differently.

6. Investigations of the measurement and prediction of teacher effectiveness employ different sorts of data-gathering devices, constructed for different purposes, and representing different theories of measurement.

7. Investigations of the measurement and prediction of teacher effectiveness have been predominantly correlation studies and have all the limitations of such studies.

8. Investigations of the measurement and prediction of teacher effectiveness employ different psychological orientations.

Getzel and Jackson's Review of Studies on the Teacher's Personality and Effectiveness

Getzel and Jackson made a comprehensive review of studies on the relationship of a teacher's personality to
teaching effectiveness.\textsuperscript{30} The studies are organized by Getzel and Jackson under the following headings:


The authors reviewed more than 50 research studies that reported using the Minnesota Teacher Attitude Inventory. Some of the significant findings they reported are as follows:

1. Developed at the University of Minnesota after ten years of investigations, the MTAI emerged as an instrument to measure those attitudes that predict how a teacher will get along with pupils in interpersonal relationships. By comparing tests given to teachers with ratings by principals, pupils and the researcher, significant correlations were obtained.

2. Studies revealed that the first six months of professional training produced significant changes in the desired direction in 20 per cent of the attitudes of teachers, while the experience of the first six months produced significant changes in the undesirable direction in 11 per cent of the attitudes of teachers.

3. Significant differences were found among three curricular groups of education students. Those majoring in elementary education scored highest on the attitude test; the academic field majors scored next, and the special field majors (Home Economics, Art, Music, Physical Education) scored lowest.

4. The type of teacher training institution, liberal arts, or teachers' colleges made no difference in the attitudes of teachers.

5. An examination of MTAI scores of various educational personnel reported the following results: 31

(a) guidance workers had highest mean scores of experienced personnel, (b) administrators had the lowest mean scores, (c) female teachers scored higher than men, (d) elementary teachers scored higher than secondary teachers, (e) elementary teachers with over 15 years' experience scored higher than those with less experience, (f) secondary teachers with one year's experience scored highest among the secondary teachers.

6. Teachers who taught pupils for longer periods of time appeared to be more interested in the pupils' whole personality. 32

31Ibid., p. 513.
32Ibid., p. 513.
tended to think in terms of subject matter rather than about the development of self-directing personality of pupils.

7. There was a negative relationship between the MTAI score and the failure rate of teachers, those teachers who maintained harmonious relations with the pupils being less likely to fail them.

8. Practice teaching increased MTAI scores, but courses in mental hygiene did not change the attitude of those teachers with high MTAI scores.  

9. There appeared to be significant differences in values of teachers in different subject matter areas. For example, teachers in early elementary education evidenced noticeably higher aesthetic and social values than did teachers of home economics. Teachers as a group could be distinguished from the general population in at least two value areas, namely, economic and social. Despite these differences between teacher groups and population norms, the usefulness for Value Tests to discriminate between good and poor teachers on the criterion of classroom performance has yet to be established.

10. The Kuder Vocational Preference categories are not so much distinctive of teachers qua teachers as of

33 Ibid., p. 514.
Teachers in specific subject areas. However, some investigations showed good teachers are less interested in literary, mechanical, computational, scientific, and clerical pursuits, and more interested in social service and persuasive activities.

11. Studies seem to give evidence that the Strong Vocational Interest Blank is not a suitable instrument for predicting teaching success when all items are considered together. When differentiating items were examined alone, however, a number of noteworthy relationships were found. The best student teachers appeared to be interested in working with people and in pursuing intellectual interests, whereas the poorest student teachers tended to select occupations offering personal gain. The interests of secondary teachers differed somewhat from those of elementary teachers. More noteworthy is the fact that, within the secondary school teacher group, the subject taught is a more discriminating factor than teaching itself.

12. Studies indicate different kinds of teachers get varying amounts of achievement from different kinds of children.

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34 Ibid., p. 527.
36 Ibid., p. 528-531.
37 Ibid., p. 531.
13. The studies reviewed seemed to offer little encouragement to researchers seeking to discriminate between teachers and non-teachers with standard MMPI scales. The "K" scale was the only MMPI variable found that discriminated between superior and inferior teachers. It also distinguished both of these groups from the norms, thus giving the "K" scale a double discriminating power.

14. Studies using the Edwards Personality Schedule are too few to be useful in predicting teacher efficiency.

15. The use of projective techniques with teachers has been limited and is not considered valid. It is felt that the biggest problem is in knowing what aspects of personality are crucial in determining the kind of person a teacher should be.

16. Data gathered on teacher attitude indicate the following findings: (a) attitudes of elementary teachers toward pupils and fellow workers seem to be more favorable than those of secondary teachers, (b) educational viewpoints of secondary teachers are more traditional, while those of elementary teachers tend to

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38 Ibid., p. 540.
39 Ibid., pp. 545-547.
40 Ibid., pp. 554-566.
be more permissive, (c) verbal understandings are higher among secondary teachers, and (4) women teachers are more friendly and permissive, but male teachers are more emotionally stable.

17. There was little empirical support for very high cognitive ability when considering characteristics that are important for teacher effectiveness.

Getzel and Jackson concluded that there are three great problems in studying teacher effectiveness. First, the definitions of personality are varied and often contradictory, there being three different types—behavioral, social-stimulus, and depth. Second, a wide number of instruments have been used, and the data on one may not be the same as on another. Third, and perhaps the most important, studies have been conducted without regard for theoretical meaning; weak hypotheses have lead to inadequate methodology and to wrong conclusions. Studies should be carried on within the context of sound theory which can provide a framework for interpretation of observations already made and can serve as a guide in resolving inconsistencies and in finding useful, applicable results.

**Personality Measures**

The MMPI as a Predictor. The Minnesota Multiphasic Personality Inventory (MMPI) is one of the wider known

\[\text{Ibid.}, \ p. \ 574.\]
group personality tests and has been used by a number of investigators in studies on teacher effectiveness. Gough and Pemberton used the MMPI as a predictive device in a study of 96 males enrolled in a course in secondary school practice teaching. His attempt to predict success in practice teaching from the MMPI indicated that single scales on the MMPI showed little validity, but various patterns and indices revealed considerable promise.

Flanagan used the MMPI as a predictive device in her investigation of the relationship between certain aspects of personality and teacher efficiency. She studied the relationship between scores and profile patterns on the MMPI and success in teaching as indicated by principals' and superintendents' ratings. The study was concerned with students who were enrolled as freshmen at the University of Wisconsin during the fall semesters of 1949, 1950, and 1951 who received the University Teacher's Certificate in 1953, 1954, 1955, or 1956, and who subsequently taught in the public schools in Wisconsin. Supervisory ratings

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were obtained for those individuals by submitting a letter and a rating blank to the superintendents, principals, and supervisors of the schools in which they taught. Measures of the various phases of the teacher's personality were obtained from the results of the group form of the MMPI which had been given to the subjects when they were freshmen.

The findings of the study briefly summarized were:

1. There were differences in personality patterns among female teachers with different supervisory ratings. A high coding of scale 3 (Hy) for women was positively related to a supervisory rating of outstanding effectiveness.

2. Scale 5 (Mf) seems to be positively correlated to supervisory ratings for women teachers. The findings in this respect were not very significant statistically. Scale 5 coded high was the most frequent noted aspect of the male personality profiles. It was coded among the highest three scales 65 per cent of the time.

3. There appears to be an inverse relationship between scale 2 (d) and supervisory ratings for women teachers.

Cole used the MMPI, along with the group Rorschach in a five-year study of 140 undergraduates to determine
whether these personality devices would be useful in predicting success in elementary and secondary teaching.\textsuperscript{44} These instruments were administered to subjects who were then classified in quartiles according to tentative descriptions derived from prior data from other groups using the same instruments. The researcher observed the subjects twice for the purpose of rating their performance on the Ryans scale. The correlations between instrument scores and conventional selection criteria, such as grades, A.C.E. scores, and faculty ratings were made with the observer ratings. Findings indicated that prediction based on conventional selection criteria was not significantly above chance. By contrast, the personality test materials correlated with the observer rating with an $r$ of 0.65.

Button and Mawrer did a study of "unsuccessful" student teachers using the MMPI.\textsuperscript{45} No general pattern in the pathological scores of the MMPI was found for unsuccessful student teachers; however, a consistently high score on "K" scale of the MMPI was found. After examining the research concerning the MMPI "K" scale and reviewing the


reports of student teacher supervisors, the conclusion was reached that the "unsuccessful" student teachers were highly defensive and quite rigid. The "k" score seemed, at its upper range, to measure defensiveness.

Other Personality Devices as Predictor Instruments

Hill undertook a study to see whether selected psychological traits as measured by the California Psychological Inventory could be used effectively in predicting student teacher excellence. Three of the CPI scales were used in the analysis. They were d (dominance), Ac (achievement via conformity), and Py (psychological-mindedness). It was hypothesized that each of these psychological characteristics would contribute to favorable personality attributes which may be causal factors in the case of the better student teachers. From the results, the following conclusions were reached:

1. The dominance trait as measured by the CPI is not significant at the 5 per cent level. What contribution the dominance trait does make in this study is negative.

2. The psychological-mindedness trait as measured on the CPI was not significant at the 5 per cent level.

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3. The CPI scale which colleges use to measure achievement via conformance was significant at the 5 per cent level.

Allan used the California Psychological Inventory to find out if certain personality characteristics were significantly associated with student teachers' choice of teaching majors.\(^{47}\) The CPI was administered to 180 students at the University of Maryland who planned to enroll in secondary student teaching and who planned to teach either English, social studies, mathematics, science, or physical education. It was found that certain personality characteristics, as measured by the achievement-via-conformity scale, the responsibility scale, the socialization scale, and the intellectual efficiency scale, were significantly related to differences in the choice of teaching majors as made by this group of student teachers. It was recommended that more worthwhile information would be obtained in future studies if criterion categories of teaching majors were dichotomized into "most successful student teachers of (subject)" and "least successful student teachers of (subject)."

Sheldon, Coale, and Copple studied the question about how individuals who score high and low on certain

\(^{47}\text{Thomas K. Allan, "Personality Patterns of Student Teachers Planning to Teach Different Subjects," The Student Personnel Associations for Teacher Education, IV, (December, 1965), pp. 89-94.}\)
psychological scales differ with respect to other personality measures. The ten persons scoring highest and the ten scoring lowest on the MTAI and four scales on the MMPI (K, Ho, P, and Tp) from a sample of 176 students at Colorado State College were given: (a) the Study of Values, (b) the Edwards Personal Preference Schedule, (c) the California F Scale, (d) the Wechsler Adult Intelligence Scale, and (6) the Thematic Apperception Test. The high and low groups were found to differ significantly in intelligence, authoritarianism, and introversion manifest and latent needs. On the Edwards Personal Preference Schedule, the high group demonstrated a significantly higher need for dominance and a significantly lower need for aggression.

Attitudes

It is felt by many professional educators that interpersonal relationships are of primary importance in teaching and that to be successful as a teacher, one must be understanding and tolerant of the needs and values of members of the group. Numerous studies have been conducted to measure teacher attitudes. By far the most popular instrument for the measurement of teacher attitudes is the

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Minnesota Teacher Attitude Inventory (MTAI). It is designed to measure those attitudes of a teacher which predict how successful he will be with teaching as a vocation.49

One of the most comprehensive studies using the MTAI was one done by Riccio in 1959.50 Riccio studied the relationship that exists between selected variables and an individual's attitudes toward teaching or toward pupil-teacher relationships. He found that there are definite relationships between the personal characteristics of an individual and his attitudes toward teaching as measured by the MTAI. He concluded if attitude toward teaching is to be a factor in the recruitment of teacher education students, attention should be given to students who rank high in their high school classes and whose home environment may be described as middle class or lower.

Another important conclusion reached by Riccio was that despite the fact that the Study of Values and the MTAI allegedly measure the extent to which one views human nature from a positive and democratic vantage point, there is little relationship between the scores achieved by students on these tests. He suggested that the implications


of this finding are that any instrument employed in the recruitment, selection, and evaluation of teachers be carefully appraised before any major decisions be based upon them.

Munro studied the extent to which the MTAI could be put to use in selection of students for teacher preparation at the University of British Columbia. The MTAI was administered to two groups of students from the University of British Columbia and correlated against the criterion measure of final practice teaching grade in order to make an assessment of the predictive value of the MTAI. The following conclusions were reached:

1. The Minnesota Teacher Attitude Inventory does not seem to have sufficiently high predictive validity to be used by itself in the selection of teacher training candidates at the University of British Columbia.

2. It is quite possible that MTAI scores used in conjunction with other measures would provide a reasonable basis for predicting teaching success.

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One part of the general study of teachers' preparation and performance conducted by Standlee and Popham was to test the hypothesis that a teacher's performance on the MTAI is significantly related to an administrator's evaluation of this teacher's overall teaching effectiveness. The results of this study supported the notion that the MTAI may be utilized, not only as an index of the type of social atmosphere a teacher will maintain in the classroom, but also, with caution, as an index of a teacher's overall teaching performance.

Popham and Trimble investigated the hypothesis that the MTAI discriminates between public school teachers judged to be "superior" and "inferior" in terms of general competence. The results of this investigation confirmed the suggestion proposed in the above study (Standlee and Popham, 1959) that the MTAI can be used not only as a measure of the type of social atmosphere a teacher will maintain in the classroom, but also as an index of a teacher's general effectiveness. It was pointed out that the criterion of effectiveness employed in the study was an

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an administrative rating which is subject to several well-known limitations. However, to the extent that such writings are empirically employed as an indication of a teacher's effectiveness, it was suggested that the MTAI could be used with a comparable assurance of accuracy.

Dounie and Bell investigated the possibility of using the MTAI as an aid in the selection of men and women to be trained as teachers. The MTAI was administered to second semester freshmen in their first course in education and sophomores in their second course in education. Scores on the MTAI were first compared with scores on the American Council of Education Psychological Examination, over-all grade-point average, and grades received in education courses. Later materials from the confidential folders of the eight students in both the freshman and sophomore groups who scored highest and lowest in the MTAI were analyzed to see what sort of an individual each was. The following conclusions were reached:

1. There was a significant relationship between scores on the MTAI and total scores on the ACE Psychological Examination.

2. There was a significant relationship between the scores on the MTAI and over-all grade-

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point average. There was a definite relationship between MTAI scores and grades in education for the sophomores, but not for the freshmen.

3. The students who scored high on the MTAI tended to have a background of experiences with young people and an expressed interest in teaching, and were rated as good prospects by their instructors. Poor students tended to show the opposite of these traits.

Values, Interests and Activities and Teacher Effectiveness

One of the issues underlying studies of teacher personality is how the values, interests and leisure-time activities of a teacher influence the intellectual, social, and emotional growth of the children he or she teaches.

Carleton Washburne and Louis M. Heil reported a study in 1960 in which they hypothesized that teachers who deal with children all day long throughout the year have a definite and determinable influence on these children, and that influence is determined by the type of teacher and the kind of children she has under her supervision.

Fifty-five teachers of grades 4, 5, and 6 in nine public schools and their pupils were subjects for this study. All of the children were given the Stanford Achievement Test early in the year and again at the end of the year. They also were given the Ohio Social Acceptance Scale at the beginning of the year and again at the end of the year. This test is a sociometric test that measures children's friendliness. At the end of the year, the Otis Group Intelligence Test, Form A-S was administered and a form called "Assessing Children's Feelings" was given them. The latter instrument was used to classify the children as Conformers, Opposers, Waverers, and Strivers.

The teachers were rated on the Teacher Observation Scales on Democratic-Authoritarian categories. They took the Teacher Education Examination (Educational Testing Series, Princeton) and the Manifold Interest Schedule. On the basis of these tests, the teachers were classified as (1) turbulent teacher, (2) self-controlling teacher, and (3) fearful teacher. The turbulent teacher placed little emphasis on structure and order, freely expressing her impulses. The self-controlling teacher focused on structure, order, and planning. She was empathetic and warm toward her pupils. The fearful teacher was anxious and variable in her behavior. She had a severe conscience and liked to have rules to guide her actions.
The following results were important:

1. On the negative side, there was no significant relation between teachers' scores on the Teacher Examination and any kind of growth of their pupils.

2. No significant relation between teachers' scores on the Teacher Observation Scale and the children's progress was noted either.

3. On the positive side, there was clear evidence that the teacher's personality had a measurable effect on the academic and the social progress of her pupils.

4. There appeared to be a relationship between the type of teacher and her children's emotional adjustment.

The results verified the major hypothesis that different kinds of teachers get different results with different kinds of children. The self-controlling teacher got the most achievement from several different kinds of children; the fearful teacher got the least achievement; the turbulent teacher got almost as much achievement as the self-controlling one from the children classed as opposers and waverers. The turbulent teacher, although getting less total achievement, did get markedly more achieve-

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Ibid., p. 425.
ment from children in science and arithmetic. While the self-controlling teacher was superior in obtaining academic achievement and social acceptance, children under this type of teacher appeared to be less self-reliant and to be less free in the expression of their feelings.

The above study explored the interactions between the personalities of students and teachers to determine whether teacher training courses are giving proper insights in their courses.

**Leisure Time Activities of Teachers.** In recent years, educators have been regarding the use of leisure time as important in increasing one's happiness and also in improving the effectiveness of professional performance.

A study, "Out-of-School Activities and Professional Performance of Teachers" was made by W. James Popham and Lloyd S. Standlee to determine the relationship between teachers' favored out-of-school activities and their professional performance as measured by ratings of their principals and their scores on the MTAI (Minnesota Teachers Attitude Inventory), which reflected their attitudes toward their pupils. The activities included education, employment, daily living, organizations, sports, entertainment, and hobbies. Eight hundred and eighty teachers employed by schools of Indiana were the subjects.

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The authors of the study made the following conclusions:

1. The teachers' professional performance as rated by MTAI and the principals' ratings was not related to the entire range of teachers' out-of-school activities, but only to particular activities.

2. Teachers' performance, as measured by the MTAI, was related to their out-of-school activities which were of a professional nature.

3. The teachers' performance, as determined by the principals' ratings, was related to non-professional organizations and sports activities of teachers.

4. The principals' ratings and the MTAI assessed different dimensions of teachers' performance. The principals' ratings evidenced considerable relationship to areas of teachers' conduct associated with community life. On the other hand, the MTAI seemed to be based more substantially on the professional aspects of the teachers' conduct.

**Personality and Interests of Effective Teachers.**

A small sample of selected elementary teachers was studied in depth by interviews and standardized personality tests.
The purpose of this study was to study intensively outstanding teachers to discover similarities in background or personality characteristics. Twenty teachers were chosen from 3,000 elementary teachers who had participated in another study in Southern California.

Each teacher was given the Guilford-Zimmerman Temperament Survey, the California Psychological Inventory, the All-port Vernon Study of Values (Revised), and the Kuder Preference Record (form BM). The selected teachers cooperated in a one and a half hour biographical interview.

Following are major findings in this study:

1. There was ample evidence that home backgrounds of the teachers were favorable. There was permissiveness and love, with resultant identification for at least one parent in almost every instance. In family groups and in social groups, the teachers had a sense of "belonging." There seemed to be early development of participative responsibilities to the family group, and then outward to the school, the church, and other social groups.

2. The teachers showed an early interest in teaching. They were literary and generally more scholarly.

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than their peers. They had clerical and computational interests.

3. They evidenced a genuine love for children.

4. They had strong work libido and lacked orientation toward money or power.

5. They were emotionally stable and had excellent personal relations.

6. They were controlled in behavior and usually more dedicated.

7. They were friendly and co-operative, but not gregarious in the ebullient social sense.

8. They had good impressions of themselves.

9. They appeared to be democratically oriented.

Two conclusions were made:

1. Teachers had very favorable backgrounds with positive attitudes toward education.

2. Distinct personality traits and interest differences were noted. As children, they developed responsibility, conformity, and social co-operativeness. They showed an early interest in teaching and literary activities as reading and writing.

Another investigation, "Interest Patterns of Best and Poorest Student Teachers," was made by Raymond E. Schultz

\[59\] _Ibid., p. 124._
and Merle M. Ohlsen. This study dealt with analyzing
the Strong Vocational Interest Blank responses made by a
group of "best" student teachers and a group of the "poorest"
student teachers. These groups were selected by the
University of Illinois supervisors. The author concluded
that, in spite of the fact that the sample was too small
for conclusive evaluation of Strong's ability to discrimi­
inate between good and poor teachers, the analysis revealed
some relations that warrant further study.

The most significant relationships noted were:

(1) The best students, as rated by the supervisors, were
interested in working with people, selecting occupations
involving teaching, and in pursuing intellectual interests.

(2) The poorest students, as rated by the supervisors,
tended to avoid occupations related to teaching and to
select those which offered personal gain. Their prefer­
ences dealt with things or with activities where they worked
by themselves. These students were inclined to consider
salary as one of the most important requisites for selection
of an occupation, and they failed to identify themselves with
interests requiring intellectual ability.

60 Raymond E. Schultz and Merle M. Ohlsen. "Interest
Patterns of Best and Poorest Student Teachers," Journal of
Educational Sociology, XXIX, (October, 1955), No. 2,
pp. 108-112.
An interesting study on the personality of good teachers was made by William Tanner, Jr., and reported in the Phi Delta Kappan in 1954. Tanner portrayed verbal pictures of superior and inferior teachers:

A picture of the superior male prospective teachers showed them having these characteristics:

1. They were better adjusted.
2. They were emotionally steady.
3. They had made better social adjustment in youth and were less argumentative and quarrelsome.
4. They had broad interests, belonged to many organizations, frequently started activities in their own group, leading discussions at home, and their advice was sought by many people.
5. They enjoyed leadership roles and preferred vocations dealing with people on high professional levels.
6. They evidenced greater scholarly interests.

The picture he obtained of inferior male prospective teachers was different. He listed the following characteristics for them:

1. They were moody, anxious individuals—not whole heartedly accepted by the group.

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2. They had more problems and complained of sleeplessness and fatigue.
3. They had limited social experience and few friends.
4. Their preferences in occupations dealt with things rather than with people.
5. In leadership roles, they preferred subordinate positions.
6. They preferred to belong to only a few groups.
7. Physical activity was preferred to mental activity by them.
8. A greater per cent of these students did not attend church at all.

Tanner made the following findings about the superior female teaching prospect:

1. She had a more desirable home environment during her early life.
2. Life with her parents had been more congenial.
3. She felt she had too few brothers and sisters to satisfy her.
4. Her social development was superior.
5. She had scholarly interests.
6. More school activities claimed her attention during high school years than were enjoyed by those prospects classed as "inferior."
7. She was a friendly person.
8. More stress was placed by her on human and social values than on technological science and physical advancement.

9. She was less hampered by fears.

10. She was a light sleeper.

11. Leadership activities were desired by her, and she expressed a greater interest in mental activities than in physical activities. She also expressed an interest in detailed work.

12. An irreligious trend was evidenced by her.

13. In childhood, she engaged in petty thievery.

These qualities made up the picture of the inferior female teaching prospect:

1. She was more introverted with few social activities.

2. Suspiciousness, procrastination, social ineptitude were some of her characteristics.

3. She preferred listening to rather than telling stories.

4. Detailed work and activities with personal relations were disliked by her.

5. Her stronger religious beliefs caused her to be guided by religion rather than by ideals of beauty.

6. She accepted people but not always their behavior.

7. A mild, manic depressive trend was evidenced in her personality.

8. She was somewhat unpredictable.
9. She believed she was more sensitive than normal individuals.

10. She recognized quick tempers of her family more than did the superior female teaching prospect.

The above verbal pictures were drawn from a study of 575 students in elementary and secondary education at the University of Utah. The students were rated as "superior" or "inferior" by the faculty. Instruments used in the study included the Minnesota Teacher Attitude Inventory, Strong's Vocational Interest Blank, The Study of Values, the Kuder Preference Record, and a Biographical Inventory. The investigators found much overlapping of traits and concluded, therefore, that the personal characteristics listed for inferior and superior teacher prospects should be considered as trends and not as absolute traits.

Believing that teaching success is related to the interests and the values of a teacher, Thomas Alexander Ringness made a study of the motivations of teachers to teach.\(^62\) Sixty-three men and thirty-seven women undergraduates in the University of Wisconsin School of Education were used as subjects. Various instruments were used: (1) autobiographies, (2) Strong Vocational Inventory, (3) a paired-comparison test, (4) a ranking questionnaire, (5) comparison questionnaire during college.

In terms of raw scores, men placed interest in subject matter their first reason for teaching and service to society second. Women reversed this order, placing service to society as the first reason for choosing teaching and the interest in subject matter second. The interest in subject matter was attained at an early age and had been encouraged by parents or teachers.

Other interests manifested by the teachers were: (1) interests in working conditions, (2) preferences in working with people rather than with things, and (3) an interest in a job with security.

Little relationship was found between factors of the Strong Vocational Blank and factors found in this study.

The Relationship of Cognitive Abilities to Teacher Effectiveness

One important study on the relationship of cognitive factors to effective teaching was reported by Dorothy Knoell. She found one type of word fluency ability—ideational fluency—significantly correlated with teaching success.

Ideational fluency is a divergent thinking factor, in which a person is able to call up many ideas in a situation relatively free from restrictions where quality of

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response is relatively unimportant. For instance, one test question required the subject to write down all the adjectives he could think of that could be used to describe a house. The time limit for this performance was four minutes. Knoell's study was carried on at the University of Wisconsin where a battery of word fluency tests was given to 112 undergraduate students. A year later, these teachers were rated by principals and outside observers on acceptability and efficiency.

Knoell also noted that verbal versatility and word fluency obtained positive correlations but had lower correlations with the supervisors' ratings than did the ideational fluency.

In Ryan's study, Characteristics of Teachers in 1960, similar findings were made. He found that superior verbal intelligence was a characteristic that distinguished the teachers in his high group. Those in the lower group had lower verbal intelligence. 64

Ryan's findings indicated a slight superiority in verbal understanding by female teachers over male teachers, single teachers over married teachers, secondary teachers over elementary teachers, foreign language and English teachers over business education and boys' physical education

teachers, teachers in large cities over those in small communities; teachers from high or low socio-economic status over teachers in middle socio-economic status, teachers from private schools over those in public schools, and teachers from the Middle Atlantic and the West Coast states over those from Southern and Mountain states.

Writers in educational literature and researchers differ on the importance of high intelligence for effective teaching. P. E. Vernon, in his article, "The Psychological Traits of Teachers," expresses the opinion that in selecting teachers, more attention should be given to emotional and attitudinal factors than to intellectual factors.65

Some writers feel that people with lower intelligence will have more sympathetic understanding for the problems of slower pupils.

In his book, Education as a Profession, Myron Lieberman66 has this to say regarding intellectually inclined teachers:

The more a teacher knows about a subject the more he is able to present the subject in a stimulating way to students. He is able to perceive when he is confusing and discouraging his students and to know what remedial action to take ........... No doubt some expert teachers do confuse and discourage their pupils, but they do

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not do so because they are intellectually minded. They do so in spite of this characteristic.

In educational literature, the proposition that very high cognitive ability is a necessary characteristic of the good teacher has had relatively little empirical support, and it is of little value for predictive purposes. Numerous tests of intelligence were administered before 1950 in studies of teacher effectiveness. In general, the results were discouraging. Different types of ability, such as divergent thinking have seemed to have some bearing on teacher effectiveness.

**Characteristics of Teachers Study.** The Teacher Characteristics Study was a research project sponsored by the American Council on Education and supported by the Grant Foundation. It was directed by Dr. David Ryans, and it is the most extensive study to date. During the study, approximately 6,000 teachers in 1,700 schools and 450 school systems participated.67

The major purpose of the study was to gather information on significant teacher characteristics and to develop objective instruments that would appraise these traits so that they might be used in evaluation of teachers and in predicting teaching effectiveness.

67 Ryans, op. cit.
The goals of the researcher were:

1. Identification and description of specific teacher behaviors and collection of data relative to teacher manifestation of such behaviors.

2. Determination of major patterns into which such teacher behaviors fall.

3. Carrying out the research within a framework of sound educational and psychological theory.

The standardized procedure called for two observations of each teacher by different observers and use of an assessment form called Classroom Observation Record. Three interdependent patterns of teacher behavior seemed to stand out in separate factor analyses of elementary and secondary teacher data:

Pattern X—warm, understanding, friendly versus aloof, egocentric, restricted teacher behavior.

Pattern Y—responsible, businesslike, systematic versus evading, unplanned, slipshod teacher behavior.

Pattern Z—stimulating, imaginative, surgent versus dull, routine teacher behavior.

Patterns of Teacher Behavior. Among elementary school teachers, patterns X, Y, and Z were highly intercorrelated, and each seemed to be highly correlated with pupil behavior in classes. However, in secondary school,

68 Ibid., p. 382.
the intercorrelations of the patterns were less high. The correlation between X and Y was very low. The three teacher behavior patterns correlated less highly with pupil behavior than they did in the elementary grades.

The major findings were:

1. Elementary and secondary teachers as groups differed little in mean assessments on Patterns X, Y, and Z.

2. Grades 5-6 women teachers were higher than other elementary teachers on some patterns, especially Y.

3. In secondary grades, social studies teachers and women English teachers were high on Pattern X (friendly behavior).


5. Women social studies and science teachers surpassed other groups on Pattern Z (stimulating classes).

6. Teachers over 55 received distinctly lower assessments on friendliness and were slightly lower on stimulating than younger teachers.

7. Teachers over 40 tended to be higher on Pattern Y (businesslike, systematic).

8. Among elementary teachers, the mean assessments on all patterns were slightly higher for married than for single teachers.

9. Among secondary mathematics and science teachers, single teachers received higher mean scores on all patterns than did the married ones.

10. Single English-social studies teachers were higher than married teachers in Y (businesslike) but lower in X and Z (friendly and stimulating).

In general, the differences between the teacher groups compared on the three patterns, X, Y, and Z, were not pronounced.

Patterns of Values, Verbal Ability and Emotional Stability. To understand teacher behavior better, the researchers undertook a number of studies to analyze teachers' attitudes, emotional adjustments, verbal intelligence, and educational viewpoints.

Some of the trends observed were: 70

1. Teachers' attitudes toward pupils, administrators, and fellow teachers were more favorable in elementary school than in secondary school.

2. Those teachers rated superior by their principals had more favorable attitudes toward pupils and administrators than did those teachers who received a low rating by their principals.

3. Neither experience nor age appeared to affect teacher attitude although secondary teachers with more experience tended to have more favorable attitudes toward administrators and less favorable attitudes toward pupils.

70 Ibid., p. 384.
4. More favorable attitudes toward pupils were noted in high school women teachers, but in the elementary grades, the men teachers had more favorable attitudes than the women teachers.

5. Classroom behavior of pupils did not appear to be related to teachers' attitudes.

6. The secondary teachers held more traditional educational viewpoints. Elementary teachers were more permissive.

7. Warm, understanding teachers held more permissive educational viewpoints.

8. Warm, understanding teachers, as well as those classed as stimulating, had more favorable attitudes toward administrators and pupils.

9. Men teachers at both high school and elementary levels were markedly more emotionally stable than women teachers.

10. In elementary school, the warm, understanding teachers and the stimulating teachers manifested superior emotional adjustment.

11. Secondary teachers surpassed elementary teachers in verbal understanding, particularly the English and the foreign language teachers.

12. There was no relationship between validity of the response scale and classification of teacher by sex, age, grade, subject taught or pattern of behavior.
Some other interesting findings in the study were:
The men and women teachers in elementary grades differ on only four of the personal-social characteristics studied. Men appeared to be less businesslike but more inclined to permissiveness, child-centered educational viewpoints and more emotionally stable than women teachers.

There were greater differences among the sexes in high school. Women teachers scored higher on scales measuring friendliness, businesslike classroom behavior, stimulating methods, favorable attitudes toward pupils, permissive educational viewpoints, verbal understanding, and democratic classroom practice. The men scored much higher than the women in emotional stability.

Avocational activities tended to raise the scores of teachers. Those teachers who participated in Sunday School appeared to be more understanding.

Those teachers who were considered "good" students rated high in all areas considered. Those who selected teaching because of social service opportunities or because they liked school were higher than those who considered primarily favorable advancement. Participation in school-like activities in childhood tended to make the score higher. Teachers in large schools scored higher, in small schools lowest, especially in verbal understanding.

Teachers from the West Coast scored highest in emotional stability. Teachers from the West Coast and the
Middle Atlantic states were more permissive and child-centered, while those from the Mid-Western and East Southern states were more traditional in educational viewpoints. Midwestern states were lowest in stimulating; Mountain and Southern states were lowest in verbal; and Southern and East Southern were lowest in emotional stability.

No differences were noted among the teachers in different geographical areas in friendliness, attitude toward pupils, attitude toward administrators, or attitude toward democratic practices.

Some characteristics that distinguished the high group from the low group follow: 71

The high group:
1. Were generous in appraisals of behavior and motives of others.
2. Expressed more interest in reading and literary affairs.
3. Showed greater interest in painting, music, and art.
4. Participated more in social groups.
5. Enjoyed pupil relationships.
6. Preferred permissive class procedure.
7. Evidenced superior verbal intelligence.
8. Had superior emotional adjustment.

71 Ibid., pp. 397-398.
The low group:

1. Were restrictive and critical of others.
2. Preferred activities not involving close personal relationships.
3. Expressed less favorable opinions of students.
4. Had lower verbal intelligence.
5. Had made a less satisfactory emotional adjustment.
6. Were older in age.

Validation and Use of the Opinion Attitude and Interest Survey

Since the OAIS has only recently been available for research purposes, very few studies have made use of this instrument. There have been a number of validation studies done at the University of Michigan where it originated. Recently some studies have been conducted at Ohio State and several other universities employing the OAIS. This section will include a review of all known available research conducted with the OAIS.

Fricke reports that the (AP) Achiever Personality Scale of the OAIS predicts college grades about as well as ability tests predict college grades (about 35 versus 37). He also states that the AP Scale and ability tests both produce scores which correlate the same, about .21 or .22 with the high school grade record.\(^7\)

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He points out that the AP Scale and the ability tests measure something different. This can be seen by the low correlation between the AP Scales and ability tests which is about .08.

Dr. W. S. Watson, Director of Admissions for the Cooper Union, did research on the utility of the OAIS for selection purposes. Data he presented at the annual meetings of the Educational Research Association of New York in November of 1963 and 1964 showed: (1) that students tested as applicants for admission obtain scores on the academic promise scales which are almost identical to the scores of students tested as enrolled freshmen and (2) that the average gain in predictive validity due to the OAIS is the same for applicants as for enrolled students (about .07 multiple correlation points for Cooper Union engineering, art, and architecture freshmen).

Some of the important research with the OAIS is summarized in the OAIS Interpretation Leaflet.

The following findings indicate the correlation between the Achiever Personality Scale and grades in college at several institutions of higher learning.

<table>
<thead>
<tr>
<th>Institution</th>
<th>Correlation</th>
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<tr>
<td>Emory</td>
<td>.42</td>
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<tr>
<td>Princeton</td>
<td>.38</td>
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73 Ibid., p. 48.
74 Ibid., p. 48.
76 Ibid., p. 4.
Michigan .34
Millsaps .34

Sister Maurice McManama of Seaton Hill College, found a correlation of .35 between Achiever Personality scores and first-year grades of freshman women and .49 between Achiever Personality scores and two-year cumulative grades of sophomore women. Dr. Joseph U. West of Baylor University found the validity coefficient to be .47 for a combined group of freshman men and women. Other representative reports of similar Achiever Personality validity coefficients are: Dr. J. W. Little, University of North Carolina, .41; Dean W. J. Lanier, Wittenberg University, .27; Dr. W. R. Brown, Canisius College, .31; Dr. J. U. Heston, Albion College, .48; and Dean R. A. Sandercox, Bethany College, .39.

The majority of the significant research with the OAIS is reported in the Opinion, Attitude and Interest Survey Handbook. The most important findings are as follows:

1. Achiever Personality scores of 534 men at Michigan correlated .39 with first-year grade-point average. The Achiever Personality for 567 women at Michigan correlated .36 with grade-point average.

77Ibid., p. 4.
2. Research was conducted at Michigan which proved that Achiever Personality is not merely measuring factors already measured by the ability tests and High School Percentile Rank. Correlations with Quantitative and Linguistic aptitude, and with English and mathematics achievement, and with high school standing are: .03, .14, .16, and .18, respectively.

3. Findings from multiple-regression analyses shows that Achiever Personality enhances predictive efficiency when statistical equations involving several variables are developed to predict grade-point average.

4. Int. Q. scores of Michigan men correlated appreciably with scores from standard ability tests: .24 with ACE Quantitative Aptitude, .55 with ACE Linguistic Aptitude, .48 with English Achievement, and .26 with Mathematics achievement. Int. Q. scores of Michigan women correlated about .35 with tested ability and .08 and .24 with grades in high school and college.

5. Scores from Cre. P. for men at Michigan and Minnesota do not correlate appreciably with GPA. For women at both institutions, the correlations are positive. At both institutions,
for both sexes Cre. P. correlates positively with tested ability.

6. Creative rating of 124 students at Michigan correlated with Cre. P. .31, which suggests that Cre. P. predicts college instructors' ratings of creativity about as well as the usual academic quality indicators predict instructors' grades.

7. The Soc. A. scores of 534 Michigan freshman men correlated .28 with social adjustment peer ratings. A correlation of .37 was obtained between the Soc. A. scores of 567 women and the social adjustment criterion.

8. According to validation studies done at Michigan and Minnesota, almost without exception, each of the eleven scales correlated more highly with the criterion it was designed to predict than it did with any other criterion.

9. Emo. A. scores correlate appreciably with scores from the MMPI Scales reflecting general emotional instability.

10. The K or suppressor scale of the MMPI closely correlates with the Set T scale of the QAIIS.

A study was done involving two separate groups of students at Emory University for the purpose of cross
validating the Opinion, Attitude and Interest Survey.\textsuperscript{79}

The first cross validation was based on data from a representative third \((N = 205)\) of the entering freshman class in the fall of 1962; the second was based on data from a representative third \((N = 209)\) of the entering class in the fall of 1963. Two of the academic promise scales, Achiever Personality and Intellectual Quality, were found to contribute significantly to a multiple regression equation using intellectual factors as predictors when correlated against the criterion--first year college grade-point average.

In the same study, the Social adjustment Scale was correlated against end-of-year dormitory ratings. The Emotional adjustment Scale was validated against end-or-year supervisor ratings, and educational-vocational interest scales were validated in terms of their ability to predict choice of major for the junior year. In terms of the criteria used, the data available offered little support for the validity of either the psychological adjustment or the educational-vocational interest scales relative to prediction.

In a study conducted by Graves and Ingersoll, two comparable groups of 75 first-year medical students were exposed to different methods of learning during a nine  

month period in 1962-1963 in the Department of Anatomy at the Ohio State University College of Medicine.\textsuperscript{80} Predictors, including the California Omnibus Personality Inventory, the Opinion, Attitude and Interest Survey, the MCAT scores, and the Pre-medical point-hour ratio, were used to predict success in embryology, gross anatomy, and histology. The Opinion, Attitude, and Interest Survey and the point-hour ratio proved to be significant factors in prediction when used in a multiple regression equation.

In a later study, Graves and Ingersoll used the OAIS, along with 35 other factors, in a multiple regression analysis to predict the success of 150 medical students in their first year of medical school.\textsuperscript{81} Several of the OAIS scales, including the Emotional Adjustment Scale and the Humanities Interest Scale, proved to be significant factors. It was concluded that (1) the non-intellectual factors should be measured objectively as part of the procedures for selection of the applicants for medical school and (2) that combinations of intellectual and non-intellectual information need to be considered, both objectively and in the interview, to determine an individual's possibility of success in a medical program.

\textsuperscript{80} Grant O. Graves and Ralph W. Ingersoll, "Predictability of Success in the First Year of Medical School," The Journal of Medical Education, XL, (April, 1965), pp. 351-364.

\textsuperscript{81} Grant O. Graves and Ralph W. Ingersoll, "Comparison of Learning Attitudes," The Journal of Medical Education, XXXIX, (February, 1964), pp. 100-110.
The OAIS was used in a test battery, along with the Cooperative English Test and Watson-Glaser Critical Thinking Appraisal in an evaluation of the medical dietetic program in the College of Medicine at the Ohio State University. Results were compiled for the 47 students who sought admission to the program from 1961 to 1964. The group of students evaluated obtained the following scores on the academic promise scales: achiever personality, 69 percentile, intellectual quality, 58 percentile, creative personality, 38 percentile, showing that they have a strong motivation to succeed.

Interest scores presented an expected pattern with the group's major expressed interest in biological science and social science. The investigators concluded that the analysis of the test battery tests for these students and others in the medical dietetic program indicate that this test battery is valuable as a selective and guidance tool. Another conclusion was that no one score or test in the test battery can stand alone as a predictive tool. Profiles drawn from the combination of scores serve best as a guide for both selection and teaching.

The OAIS was used in a study of the self-perceptions and behavior characteristics of Trade and Industrial

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Education teachers. The following conclusions were reached as the result of using the OAIS in the study:

1. An analysis of the total group of teachers (228) indicated that these individuals possess a driving force to succeed which is well above average as evidenced by a high achiever-personality score coupled with a somewhat lower intellectual quality score.

2. For this group, the creative personality score was relatively low.

3. Teacher personality, in terms of self-concept, is an indicator of how students will achieve. Teachers of the high-achieving groups displayed a higher Intellectual Quality concept than did teachers of the low-achieving groups.

4. Teachers who are creative, as measured by the Opinion, Attitude and Interest Survey, are typically rated by local supervisors as poor or poorer performers. Students of teachers who are identified as creative but have low Intellectual Quality scores achieve at a lower level than do other students.

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The Opinion, Attitude, and Interest Survey was used in the study of 813 entering freshmen at Ohio State University in an effort to find its predictive possibilities at that university. The study investigated the relative contribution of the scales of the OAIS to prediction of college performance when combined with high school rank (HSR) and the composite score of the American College Test (ACT). It was concluded that the personality attributes measured by the OAIS did not add enough to the presently available prediction of first quarter grades to warrant the use of this inventory for this purpose at Ohio State University.

Although most of the research with the OAIS has proved promising, the above study points out that not all investigators have had positive results. Two recent reviews in the Mental Measurements Yearbook indicate that not all authorities in the field of Tests and Measurements share the same optimism about the instrument that the author does. Crites says that despite the many years of research which have gone into the construction and development of the OAIS, it must be concluded that, with the possible exceptions of the Achiever Personality and Creativity Personality scales, the inventory does not fulfill the claims which are made.

for it. He feels it is not ready for use in either vocational-educational counseling or in academic selection. His major criticisms are that it has scant theoretical significance, that it has only minimal reliability, and that it measures neither variables nor constructs with acceptable validity.

Webster also felt the inventory did not have sufficient reliability. However, his most serious criticism was that the scale scoring is not available in the manual. He pointed out that the absence of scale scoring in the manual makes it impossible to study scale content in order to formulate hypotheses about why the scales work as well as they do. His overall appraisal of the OAIS was that it represents a good beginning in the study of the expressed attitudes of college students but will require considerable more work before it does more than contribute a small increment of predictability to a few criteria that are presently not understood.

SUMMARY

The review of the literature pointed out how little has been learned about the prediction of success in college and the prediction of the success of students in the

curriculum in particular despite the extensive amount of research done in this field. The majority of studies indicated that factors other than intellectual abilities are important in determining how successful a student is in college and in the field of teaching. Many studies have been conducted to find out the relationship of non-intellectual factors to success and in the field of teaching. Although they failed to disclose how to predict the relationship between non-intellectual factors and success in college, they indicated that it is important to study these factors, and the recommendations contained in much of this research are that further research be conducted.

As a result of this multitude of research, an instrument called the Opinion, Attitude, and Interest Survey was developed in order to provide more information about the relationship between non-intellectual factors and success in college. After ten years of extensive research, the authors are able to give valid evidence that is helpful in predicting academic success of college freshmen. In the past few years, studies with medical students and other groups have proved it is valuable in predicting success with groups other than college freshmen. These studies suggest that it should be particularly helpful in predicting the success of students enrolled in the education curriculum since personality factors are very important in being successful in the field of teaching. Since the need for top-notch people is
becoming increasingly important in the field of education, it is important, as the studies point out, to learn as much as possible about who will make a good teacher. The Review of the Literature points out that the OAIS could be of great value in screening potential teachers and finding out the characteristics which make up an outstanding teacher. In other words, research is needed to find out more about the validity of the Opinion, Attitude, and Interest Scale in predicting success in the teaching curriculum and in the field of teaching.
CHAPTER III
RESEARCH DESIGN

This chapter deals with the manner in which the study was conducted. First, information regarding the setting where the study was done is discussed. Second, the students who participated in this investigation are described. Third, the instrument used in the study is reviewed in detail. Fourth, the criteria employed in the study are analyzed. Fifth, information on the collection of the data examined in this study is presented. Finally, attention is focused on the treatment of the data.

The Setting

This study took place at Ohio State University during the Autumn Quarter of the 1965-1966 academic year. Established in 1870, the Ohio State University is the only land grant institution to be established in Ohio and the largest of the "state-assisted universities." It is presently the bustling center of higher education for nearly 40,000 students. The University is the major center for graduate education in Ohio. The Master's degree is awarded by 74 departments, and the Ph. D. by 60. Ohio State ranks

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seventh in the nation in the number of baccalaureate and first professional degrees conferred and eighth in the number of doctorates.

The University is comprised of five undergraduate colleges, a graduate school, and professional schools of law, medicine, pharmacy, and veterinary medicine. It is required to admit all graduates of accredited Ohio high schools. Freshmen ranking in the lowest third of their high school classes may enter the University in the Summer, Winter or Spring quarters, but not in the Autumn quarter unless they score in the upper two-thirds on the American College Test. Emphasis is placed on progressive retention rather than on selective admission. Standards are high, and most of the weaker students are eliminated before they reach their junior year.

The Subjects

The students who served as subjects for this study were from the College of Education, one of the five undergraduate colleges, and enrolled in either Education 515, Elementary Education Student Teaching, or Education 536, Student Teaching in Secondary Schools. In order to enroll for these courses, these students were required to have senior standing and a minimum point-hour ratio of 2.25 or higher in all required professional courses taken
at this university. In addition, those students enrolled in the secondary education curricula were required to have a point-hour ratio of 2.25 or higher in all courses in the major teaching area which had been taken at this University. All the students enrolled in the course had had some experience working with children and adults and had met the university academic requirement of maintaining a minimum cumulative point-hour ratio of 2.00. They had also met all the standards for Provisional Acceptance for Teaching and were pursuing one of the degree or certification programs offered by the College.

The Instruments

The instruments employed in this study were the Opinion, Attitude and Interest Survey and the Ohio State Psychological Examination. These instruments are described as follows:

The Opinion, Attitude and Interest Survey. The Opinion, Attitude, and Interest Survey was developed by Benno G. Fricke at the University of Michigan in order to improve student assessment for guidance and selection purposes. It was constructed for the purpose of

89 Ibid.
90 Fricke, op. cit.
measuring individual characteristics not reflected in the usual academic aptitude tests. Included among those factors measured are such non-intellectual factors as motivations, attitudes, and self-perceptions important in academic success, personal adjustment, and creativity.

The OAIS was developed by means of empirical methods over a period of ten years at the universities of Michigan and Minnesota. It contains 396 statements of opinion, attitude, and interest to which the student responds "True or False." Groups of statements or items dispersed throughout the inventory form scales, and the student is given a score on each scale. Most of the items contribute to the score from several scales; only one of the 396 statements is not counted on any scale.

The OAIS contains fourteen scales which are of two types. Three of these scales supply information on how the student behaved on the test, and eleven supply information on the personality and interest characteristics of students. The set of scales containing information on how the student behaved on the test are called the Response Bias Scales. The other scales are divided into three groups. The academic Promise Scale has three divisions, as does the Psychological Adjustment Scale. The Educational-Vocational Interest Scale has five divisions. A description of these scales is as follows:
I. Response Bias Scales

Scale I. Set for True Scale (Set I; 83 Items)
This scale measures a student's tendency or set to answer "True," to acquiesce to statements of opinion, attitude, and interest. A high score on this scale indicates that the individual has answered "True" more often than most students.

Scale 2. Infrequent Response Scale (Inf. R; 93 Items)
This scale measures a student's tendency to give atypical or uncommon response. A high score on this scale indicates the individual has marked many responses that are usually not marked by the typical student. A low score on this scale indicates the individual has given many typical, common or popular responses.

Scale 3. Social Undesirability (Soc. U.; 87 Items)
This scale measures a student's tendency to give socially desirable or undesirable responses. The Soc. U. scale reflects a student's image of what he thinks he is like, or how he would like to be perceived. A high score on this scale indicates that the individual has been overly frank, honest, and perhaps self-deprecatory. A low score on this scale indicates that the individual has attempted to make himself appear socially and emotionally better than he is.

Interpretation of the Response Bias Scales. A high score on the Bias Scales is defined as a percentile of 95 and above, and a low score as a percentile of 5 and below.
A percentile between 5 and 95 on a single response bias scale normally does not represent a significant amount of distortion. Students may obtain high or low bias scores as a result of a test-liking bias, or they may be generally acquiescent, atypical, or lacking in social insight and sensitivity, and on the test they are simply behaving the way they are. High scores and low scores on the Response Bias Scales alert the test user only to the possibility that a student's personality and interest scores may be distorted.

Group II. Three Academic Promise Scales.

Scale 4. Achiever Personality (Ach. P.; 86 Items). This scale measures personality factors associated with the traditional criterion of academic success, grades. Individuals who score high on this scale generally achieve high grade-point averages in college. This scale predicts college grades about as well as the typical academic ability test. There is no significant correlation between scores on this scale and scores on ability tests, suggesting that something other than what is usually measured by ability tests is being assessed.

Scale 5. Intellectual Quality (Int. Q.; 85 Items). This scale measures personality factors associated with intelligent behavior and an intellectual orientation. Individuals who do well on this scale tend to receive high
scores on verbal aptitude and intelligence tests; they also obtain above average grades. This scale indicates intelligence through non-intellectual factors.

Scale 6. Creative Personality Scale (Cre. P.; 101 Items). This scale measures personality attributes associated with creative behavior. Individuals who score high on this scale tend to be the ones who show the greatest imagination and originality in their thinking and the highest capacity for reorganizing ideas. In other words, this scale is designed to measure creative potential.

Group III. Three Psychological Adjustment Scales

Scale 7. Social Adjustment Scale (Soc. A.; (91 Items). This scale measures personality factors associated with interest in and capacity for having good interpersonal relations. Individuals scoring high on this scale tend to get along well with others and tend to be well liked by their classmates.

Scale 8. Emotional Adjustment (E. A.; 91 Items). This scale measures personality attributes associated with feelings of security, optimism, personal worth and calmness. Individuals who score low on this scale tend to be judged by counselors to be anxious, hypersensitive, nervous, and in need of personal-emotional counseling.

Scale 9. Masculine Orientation Scale (Mas. O.; 96 Items). This scale measures personality factors associated with sex. Regardless of the sex of the student, high percentiles indicate responses given more typically
by men; low percentiles indicate responses that are
given more typically by women. A high score suggests that
the individual is interested in athletics and the out-of-
doors and that he is aggressive, independent, inconsiderate,
unpolished, immature, and has an interest in the more
masculine occupations such as engineering.

Group IV. Five Educational-Vocational Interest Scales

The following five scales involve more than interest
alone. They assess the extent to which the student has
personality traits, characteristics, and values similar to
those who enter five educational-vocational areas:
(1) business and commerce; (2) humanities; (3) social and
behavioral sciences; (4) physical sciences, engineering,
and mathematics; and (5) biological and health sciences
and agriculture. Individuals in these five areas seem to be
primarily motivated by and interested in, respectively:
(1) money, status, power, and practical matters; (2) ideas
and artistic expressions; (3) people and human interactions
and problems; (4) inanimate objects and symbols and their
manipulation; and (5) living things and life processes.

Scale 10. Business Interest Scale (Bus; 104 Items).
This scale measures personality factors associated with an
interest in such areas as accounting, commerce, contracting,
finance, management, investments, merchandising, production,

\[^90\text{Ibid.}, p. 5.\]
real estate, secretarial science, and selling.

**Scale 11. Humanities Interest Scale (Hum.; 100 Items).**
This scale measures personality attributes associated with interest in art, classics, foreign languages, history, dramatic arts, journalism, and writing, literature, library science, music, philosophy, religion, speech, etc.

**Scale 12. Social Science Interest Scale (Soc.; 99 Items).** A high score on this scale indicates an interest in anthropology, economics, criminology, government, education, guidance, human relations, political science, psychology, social work, sociology.

**Scale 13. Physical Science Interest Scale (Phy.; 117 Items).** This scale measures personality factors associated with interest in astronomy, chemistry, electronics, engineering, geology, mathematics, mineralogy, physics.

**Scale 14. Biological Science Interest (Bio.; 108 Items).** This scale measures personality attributes associated with interest in anatomy, animal husbandry, bacteriology, botany, horticulture, medicine, nursing, occupational therapy, physiology, veterinary science, wildlife management, zoology.

Students who obtain a high score on one of these five interest scales are more likely to concentrate or specialize in that interest area than in any other area.91

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Students who obtain a high score on two interest scales are likely to concentrate or specialize in either one of these areas or a "combination" of them.

The Ohio State Psychological Examination

The Ohio State Psychological Examination is a verbal test of scholastic ability based upon college grade level as a criterion. Three subtests comprise the test: some opposites, word relationships, and reading comprehension. There are 150 items in all. No time limit is specified; but usually two hours is required for its administration. The test is of the power-limit or power type.

The OSPE has been refined over the years by means of repeatedly applying item selection procedures based upon a general ability to earn college grades regardless of any specialization in the college curriculum. Percentile norms for total scores and subtests are available based on a sample of 3,799 freshmen in Ohio colleges. Norms are also available for Ohio high school freshmen, sophomores, juniors, and seniors.

This test is reported to correlate highly with academic achievement. Correlations around .60 have been

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consistent, and an occasional coefficient greater than .70 has been obtained at Ohio State University in 1952-53. The OSPE showed a correlation of .58 with first semester grades of 1,158 freshmen of both sexes, and in 1953-54, a correlation of .60 for 1,491 freshmen. In addition, the test is reported by the authors to have a satisfactory level of reliability.

The OSPE is highly regarded as a test of college aptitude. It is particularly useful in providing accurate differentiation in ability in the upper half of the general high school population from which most college freshmen are drawn.

The Criteria

The criteria used in this study were point-hour ratio and grades in student teaching. Point-hour ratio is simply an average of grades a student has obtained over his four years of college education. At Ohio State, it is based on a four-point system, with A = 4, B = 3, C = 2, D = 1, and F = 0.

Grades in student teaching are the instructor or teacher ratings of students' performances under an actual classroom situation. These grades are assigned by an instructor or, in some cases, by a professor who supervises

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approximately 18 students. Since the students are evaluated by different supervisors, and since this evaluation is based on only a sampling of students' performance in the classroom, the rating is somewhat subjective. The instructors realize this and try to be as objective as possible. First of all, they rely quite heavily on the judgment of the supervising teacher. This person is a teacher within the school where the student is assigned who remains in the classroom with the student and offers constructive criticism to him.

Secondly, they try to obtain as many samples of the student's performances as possible. The instructor attempts to observe the student eight or nine times during the course of his classroom experience. Students who are having a lot of difficulty are observed more often. In cases where the instructor feels the student is doing an exceptionally good job or where he has great confidence in the supervising teacher's ability to rate the student's performance, he may observe the student only three or four times. Each instructor uses his own discretion in these matters; however, he attempts to be as objective as possible since the student's final rating may have a bearing on his teaching career.

Collection of the Data

This part of the chapter is concerned with the collection of the data used in the study. During the Autumn Quarter, 1965, the Opinion, Attitude, and Interest Survey
was administered to 107 students enrolled in an elementary education student teaching class and 46 students enrolled in a secondary education student teaching class (Social Studies). Administration took place during the last six weeks of the quarter. All of the elementary students were tested at once. Since the social studies students were divided into three separate classes, it was necessary to test them in three separate groups.

Information concerning each student's grade-point average and grade in student teaching was obtained. Data on the elementary group were obtained from the student teaching office during the Winter Quarter, 1966. Data on the social studies group were obtained during the final week of the Fall quarter, 1965, and the second week of the Winter quarter, 1966.

**Treatment of the Data**

The data for this study group were punched on the Hollerith work cards. The student's name, sex and OSPE and OATS raw scores were transferred to the working deck automatically by machine. The student's number, point-hour ratio, and grade in student teaching were recorded on each card in the working deck and later punched in by a key puncher.

The first quarter point-hour ratios were recorded on the basis of a five-point scale with A = 4 points, B = 3
points, C = 2 points, D = 1 point, and F = 0 points. The point-hour ratios were reported to three decimal places.

Grades in student teaching were recorded on the basis of an eight-point scale with the following grades assigned the following scores:

A  --  8
A-  --  7
B+  --  6
B   --  5
B-  --  4
C+  --  3
C   --  2
C-  --  1

An eight-point scale was used rather than a four-point scale because it was felt that a four-point scale would not provide enough discrimination in ranking the subjects.

Multiple regression analysis was performed in order to investigate the predictive abilities of the OAIS. Fourteen independent variables were used in this study. They included: the three OAIS Academic Promise Scales, the three OAIS Psychological Adjustment Scales, the five OAIS Educational-Vocational Interest Scales and the three Response Bias Scales.
Multiple regression equations using the OAIS Scales as independent variables and point-hour ratio as a dependent variable were computed for the total group and separately for the Social Study Group and the Elementary Education Group. Multiple regression equations were developed for the total group and separately for the Social Study Group and the Elementary Group using the OAIS Scales as independent variables with grades in student teaching as the dependent variable. In addition, regression equations were devised for both males and females in the Social Study Group but not the Elementary Group which included only one male.

Multiple regression equations were developed using the OSPE and OAIS Scales as independent variables and point-hour ratio as a dependent variable for the total group and the various subgroups described above. Regression equations for the same groups were computed, using the OAIS Scales, the OSPE, and point-hour ratio as independent variables, and grades in student teaching as the dependent variable. An analysis of variance was run for all regression weights to determine the statistically significant predictors.

The statistical processing of the data was accomplished almost entirely by the Numerical Computation Laboratory at the Ohio State University Research Foundation. The statistical analysis was performed on an IBM 7094 computer and the Stepwise Regression Program--BMD02R was employed. The Appendix contains a complete summary of this program.
CHAPTER IV

ANALYSIS OF THE DATA

The Opinion, Attitude, and Interest Survey was administered to students of the College of Education at Ohio State University who were enrolled in student teaching during 1965. The group consisted of 152 students. This total group was broken down into four sub-groups as follows:

<table>
<thead>
<tr>
<th>Sub-group</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students enrolled in Elementary Curriculum</td>
<td>107</td>
</tr>
<tr>
<td>Students enrolled in Social Studies Curriculum</td>
<td>45</td>
</tr>
<tr>
<td>Social Studies Males</td>
<td>25</td>
</tr>
<tr>
<td>Social Studies Females</td>
<td>20</td>
</tr>
<tr>
<td>Total</td>
<td>152</td>
</tr>
</tbody>
</table>

PHR and student teaching grades were available for all the students; however, OSPE scores were available for only 130 students. The study groups in which OSPE was involved as an independent variable were comprised of the following students:

<table>
<thead>
<tr>
<th>Sub-group</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students enrolled in Elementary Curriculum</td>
<td>91</td>
</tr>
<tr>
<td>Students enrolled in Social Studies Curriculum</td>
<td>39</td>
</tr>
</tbody>
</table>
Social Studies Males 21
Social Studies Females 18
Total 130

In this study, OAIS scores are employed as predictors alone, in combination with the OSPE, and in combination with OSPE and PHR. In the first and second section of this analysis, the three OAIS Academic Promise Scales, the three OAIS Psychological Scales, the five OAIS Educational Vocational Interest Scales, and the three OAIS Response Bias Scales are employed as predictor variables. Point-hour ratio and grades in student teaching are the independent variables used. Correlations for the total group and various subgroups are presented. The analysis of the data includes correlations between point-hour ratio and the fourteen OAIS scales for the total group and the various subgroups. An interpretation of the findings will be made regarding predictability of the OAIS scales in terms of the two criterion measures.

In the third section of this analysis, the fourteen OAIS scales and the OSPE are employed as predictor variables. Point-hour ratio is the criterion measure used. The analysis of the data includes correlations between point-hour and the fourteen OAIS Scales combined with the OSPE total score for the total group and the various subgroups.
In the last section of this analysis, the fourteen OAIS scales, the OSPE, and the point-hour ratio are employed as predictor variables. Student teaching grades is the criterion measure used. The analysis of the data includes correlations between student teaching grades and the fourteen OAIS scales combined with OSPE total score and point-hour ratio for the total group and the various subgroups.

Validity of the OAIS in Prediction of Point-Hour Ratio for Senior Students in the College of Education.

Predictive Abilities of the Fourteen OAIS Scales for the Total Group. Tables 1 and 2 provide a regression analysis for the total groups of 152 students using point-hour ratio as the criterion. Table 1 shows zero-order correlations (r's), the coefficients of multiple correlation (R's), the order in which variables were selected to enter the regression equations, the F ratio for the partial correlation coefficients of the variables selected, and the standard errors of estimate for the total group.

The first variable selected was the Ach. P. since it had the highest r (.36) with PHR. It alone accounts for 13.2 per cent of the variance of PHR. When combined with the second variable selected, Int. Q., it accounts for 20.4 per cent of the variance of PHR. Other variables in the equation account for a much smaller increase in the multiple R.
The multiple R produced by using eight scales of the OAIS for the 152 subjects in the study is .509. This multiple R is significant at the .05 level. These OAIS scales account for 25.9 per cent of the variance of PHR. Most of the remaining 74.1 per cent of the variance of PHR must be attributed to factors not measured by the OAIS scales.

Table 2 shows the most effective combination of OAIS variables for predicting point-hour ratio. The standard error of estimate is improved very little by the addition of other variables in the regression equation. Ach. P. and Int. Q. are the only significant factors in the regression equation with Ach. P. being the most significant factor. Both are significant at the .01 level. The multiple R of this regression equation is .492. It is significant at the .01 level. The variables in this equation account for 24.2 per cent of the variance of PHR.
TABLE 1
PREDICTION OF PHR FOR THE TOTAL GROUP
FROM THE OAIS
(N = 152)

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>r with PHR</th>
<th>Steps</th>
<th>F to enter</th>
<th>R&lt;sup&gt;a&lt;/sup&gt;</th>
<th>R&lt;sup&gt;2&lt;/sup&gt;</th>
<th>S-Est.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ach. P.</td>
<td>.36</td>
<td>1</td>
<td>22.86&lt;sup&gt;b&lt;/sup&gt;</td>
<td>.364</td>
<td>.132</td>
<td>.402</td>
</tr>
<tr>
<td>Int. Q.</td>
<td>.22</td>
<td>2</td>
<td>13.48&lt;sup&gt;b&lt;/sup&gt;</td>
<td>.452</td>
<td>.204</td>
<td>.386</td>
</tr>
<tr>
<td>S. A.</td>
<td>-.18</td>
<td>3</td>
<td>3.65</td>
<td>.473</td>
<td>.223</td>
<td>.383</td>
</tr>
<tr>
<td>M. O.</td>
<td>-.17</td>
<td>4</td>
<td>2.14</td>
<td>.484</td>
<td>.235</td>
<td>.381</td>
</tr>
<tr>
<td>Phy.</td>
<td>.24</td>
<td>5</td>
<td>1.42</td>
<td>.492</td>
<td>.242</td>
<td>.381</td>
</tr>
<tr>
<td>Hum.</td>
<td>.05</td>
<td>6</td>
<td>1.13</td>
<td>.498</td>
<td>.248</td>
<td>.380</td>
</tr>
<tr>
<td>Bio.</td>
<td>.09</td>
<td>7</td>
<td>1.04</td>
<td>.503</td>
<td>.253</td>
<td>.380</td>
</tr>
<tr>
<td>Soc.</td>
<td>.05</td>
<td>8</td>
<td>1.05</td>
<td>.509</td>
<td>.259</td>
<td>.380</td>
</tr>
</tbody>
</table>

<sup>a</sup>The R in each step involves the variable in that step combined with all previously selected variables.

<sup>b</sup>Significant at .05 level.
### TABLE 2

**OPTIMUM PREDICTION EQUATION FOR TOTAL GROUP FOR PHR FROM OAIS**

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>Regression Coefficient</th>
<th>Standard Error</th>
<th>F to Remove</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ach. P.</td>
<td>0.025</td>
<td>.0058</td>
<td>18.68&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Int. Q.</td>
<td>0.016</td>
<td>.0054</td>
<td>8.52&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>S. A.</td>
<td>-0.010</td>
<td>.0057</td>
<td>3.06</td>
</tr>
<tr>
<td>M. O.</td>
<td>-0.007</td>
<td>.0045</td>
<td>2.54</td>
</tr>
<tr>
<td>Phy.</td>
<td>0.006</td>
<td>.0054</td>
<td>1.42</td>
</tr>
</tbody>
</table>

Standard Error of Estimate = .381

\[ R = .492 \]
\[ R^2 = .242 \]
\[ \text{d.f.} = 1 \]

\[ F = 9.32 \]

\[ a_F (05) = 3.94 \]
Predictive Abilities of the Fourteen OAIS Scales for Elementary Students. Tables 3 and 4 provide a regression analysis for the group of 107 elementary students using point-hour ratio as the criterion. As seen in Table 3, Ach. P. is again selected as the first variable in the equation since it has the highest r with PHR. Other variables which made a significant increase when added to the regression equation were Int. Q., S. A., and Bio. S. A. correlates negatively with the criterion measure. The other three significant variables have a positive correlation with the criterion.

The multiple R produced when the eight variables are selected is .643. This R is significant at the .01 level. These eight variables account for 41.3 per cent of the variance of PHR.

Table 4 shows that the four significant variables combined in a regression equation account for 38.9 per cent of the variance of PHR. Ach. P. has the highest level of significance; however, all four variables are significant at the .01 level.

Predictive Abilities of the Fourteen OAIS Scales for the Social Studies Group. A regression analysis for the 45 social studies students included in the study, using point-hour ratio as the criterion, is presented in Tables 5 and 6. Table 5 shows that Hum was the first
variable to be selected. It has a (r) of .34 and accounts for 11.8 per cent of the variance of PHR. When all eight variables are involved, a multiple R of .565 is obtained; this R is not statistically significant.

Three variables account for all but 8.5 per cent of the variance in the PHR contributed by the OAIS variables selected for consideration in the regression equation. Table 6 indicates that these variables account for 23.4 per cent of PHR. Hum. is significant at the .01 level of significance. The other positive factor in the equation is not significant. M. 0., which has a negative correlation with PHR, is not significant either.
TABLE 3

PREDICTION OF PHR FOR THE ELEMENTARY GROUP FROM THE OAIS

(N = 107)

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>r with PHR</th>
<th>Steps</th>
<th>F to enter</th>
<th>aR</th>
<th>R²</th>
<th>S-Est.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ach. P.</td>
<td>.45</td>
<td>1</td>
<td>26.10 b</td>
<td>.446</td>
<td>.199</td>
<td>.415</td>
</tr>
<tr>
<td>Int. Q.</td>
<td>.22</td>
<td>2</td>
<td>13.50 b</td>
<td>.540</td>
<td>.291</td>
<td>.392</td>
</tr>
<tr>
<td>S. A.</td>
<td>-.25</td>
<td>3</td>
<td>7.56 b</td>
<td>.583</td>
<td>.340</td>
<td>.381</td>
</tr>
<tr>
<td>Bio.</td>
<td>.22</td>
<td>4</td>
<td>8.31 b</td>
<td>.624</td>
<td>.389</td>
<td>.368</td>
</tr>
<tr>
<td>Phy.</td>
<td>.37</td>
<td>5</td>
<td>1.49</td>
<td>.631</td>
<td>.398</td>
<td>.367</td>
</tr>
<tr>
<td>Hum.</td>
<td>.06</td>
<td>6</td>
<td>0.84</td>
<td>.635</td>
<td>.403</td>
<td>.367</td>
</tr>
<tr>
<td>Soc.</td>
<td>.11</td>
<td>7</td>
<td>0.99</td>
<td>.640</td>
<td>.409</td>
<td>.367</td>
</tr>
<tr>
<td>Bus.</td>
<td>-.29</td>
<td>8</td>
<td>0.68</td>
<td>.643</td>
<td>.413</td>
<td>.368</td>
</tr>
</tbody>
</table>

aThe R in each step involves the variable in that step combined with all previously selected variables.

bSignificant at .05 level.
TABLE 4
OPTIMUM PREDICTION EQUATION FOR ELEMENTARY GROUP
FOR PHR FROM OAlS

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>Regression Coefficient</th>
<th>Standard Error</th>
<th>F to Remove</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ach. P. . . . . . .</td>
<td>0.0309</td>
<td>.0070</td>
<td>19.54a</td>
</tr>
<tr>
<td>Int. Q. . . . . .</td>
<td>0.0245</td>
<td>.0065</td>
<td>14.39a</td>
</tr>
<tr>
<td>S. A. . . . . .</td>
<td>-0.0275</td>
<td>.0074</td>
<td>13.68a</td>
</tr>
<tr>
<td>Bio. . . . . . .</td>
<td>0.0203</td>
<td>.0071</td>
<td>8.31a</td>
</tr>
</tbody>
</table>

Standard Error of Estimate = .368

\[ R = .624 \]
\[ R^2 = .389 \]
\[ \text{d. f.} = 1, 98 \]
\[ F = 16.26 \]

\[ ^a F_{(05)} = 3.96 \]
TABLE 5
PREDICTION OF PHR FOR THE SOCIAL STUDIES TOTAL GROUP FROM THE OAIS
(N = 45)

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>r with PHR</th>
<th>Step</th>
<th>F to enter</th>
<th>R&lt;sup&gt;a&lt;/sup&gt;</th>
<th>R&lt;sup&gt;2&lt;/sup&gt;</th>
<th>S-Est.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hum. ................</td>
<td>.34</td>
<td>1</td>
<td>5.76</td>
<td>.344</td>
<td>.118</td>
<td>.325</td>
</tr>
<tr>
<td>Soc. ................</td>
<td>.21</td>
<td>2</td>
<td>3.60</td>
<td>.433</td>
<td>.188</td>
<td>.315</td>
</tr>
<tr>
<td>M. C. ...........</td>
<td>-.17</td>
<td>3</td>
<td>2.49</td>
<td>.484</td>
<td>.234</td>
<td>.310</td>
</tr>
<tr>
<td>Int. Q. ..........</td>
<td>.33</td>
<td>4</td>
<td>1.09</td>
<td>.505</td>
<td>.255</td>
<td>.309</td>
</tr>
<tr>
<td>E. A. ...........</td>
<td>.15</td>
<td>5</td>
<td>.84</td>
<td>.520</td>
<td>.270</td>
<td>.310</td>
</tr>
<tr>
<td>Crea. P. .......</td>
<td>.30</td>
<td>6</td>
<td>1.01</td>
<td>.538</td>
<td>.289</td>
<td>.310</td>
</tr>
<tr>
<td>Int. R. .......</td>
<td>-.002</td>
<td>7</td>
<td>1.06</td>
<td>.556</td>
<td>.309</td>
<td>.310</td>
</tr>
<tr>
<td>Ach. P. .......</td>
<td>.11</td>
<td>8</td>
<td>.53</td>
<td>.565</td>
<td>.319</td>
<td>.311</td>
</tr>
</tbody>
</table>

<sup>a</sup>The R in each step involves the variable in that step combined with all previously selected variables.

<sup>b</sup>Significant at .05 level.
TABLE 6

OPTIMUM PREDICTION EQUATION FOR SOCIAL STUDIES GROUP
FOR PR FROM O AIS

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>Regression Coefficient</th>
<th>Standard Error</th>
<th>F to Remove</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hum.</td>
<td>.017</td>
<td>.0056</td>
<td>8.32a</td>
</tr>
<tr>
<td>Soc.</td>
<td>.012</td>
<td>.0061</td>
<td>4.08</td>
</tr>
<tr>
<td>M. O.</td>
<td>-.010</td>
<td>.0063</td>
<td>2.50</td>
</tr>
</tbody>
</table>

Standard Error of Estimate = .310

\[ R = .483 \quad R^2 = .234 \]
\[ d.f. = 1, 38 \quad F = 4.18 \]

\[ a_{Fb (.05)} = 4.1 \]
Predictive Abilities of the Fourteen OAIS Scales for the Social Studies Males. A regression analysis for the 25 social studies male students using point-hour ratio as the criterion, is presented in Tables 7 and 8. Table 7 shows that Int. Q. was the first variable selected because it has the highest (r) with PHR. Other variables with high (r) are Soc. (.40) and Hum. (.35). The multiple regression correlation for the total number of variables selected is .747. It is not significant.

Table 7 shows the variables from the OAIS contributing the most to the variance of PHR. Soc. U. is a negative factor in the equation. Hum. and Soc. have the highest F ratios; however, none of the variables make a significant contribution.

Predictive Abilities of the Fourteen OAIS Scales for the Social Studies Females. A regression analysis for the 20 social studies female students, using point-hour ratio as the criterion, is presented in Tables 9 and 10. Table 9 shows that Soc. U. has the highest positive single (r), .48. Bus. has a high single (r), .48, but is a negative factor in the equation. The multiple regression correlation for this group is .886. It is significant at the .05 level.

Table 10 indicates that variables Soc. U., M. O., Crea. P., Bus. and Ach. P. contribute most of the variance
of PHR accounted for by OAIS Scales. Soc. U. is the variable contributing the most to the equation and is significant at the .01 level. M. O. is a negative factor in the equation and is also significant at the .01 level of significance. Crea. P. is significant at the .05 level.

In comparing the male and female social studies students, it appears that there are significant differences between these two groups. Because of the small sample sizes of these two groups, (20) and (25), it is difficult to justify any definite conclusions. However, it can be hypothesized that differences related to sex would be found if larger sample sizes had been used.
### TABLE 7

**PREDICTION OF PHR FOR SOCIAL STUDIES MALES FROM THE OAIS**

*(N = 25)*

<table>
<thead>
<tr>
<th>Variable</th>
<th>r with PHR</th>
<th>Steps</th>
<th>F to enter</th>
<th>R²</th>
<th>Rᵇ</th>
<th>S-Est.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Int. Q.</td>
<td>.42</td>
<td>1</td>
<td>5.00ᵇ</td>
<td>.422</td>
<td>.179</td>
<td>.342</td>
</tr>
<tr>
<td>Soc.</td>
<td>.40</td>
<td>2</td>
<td>4.44ᵇ</td>
<td>.563</td>
<td>.317</td>
<td>.319</td>
</tr>
<tr>
<td>Hum.</td>
<td>.35</td>
<td>3</td>
<td>2.17</td>
<td>.617</td>
<td>.381</td>
<td>.311</td>
</tr>
<tr>
<td>Soc. U.</td>
<td>-.07</td>
<td>4</td>
<td>2.57</td>
<td>.672</td>
<td>.451</td>
<td>.300</td>
</tr>
<tr>
<td>Int. R.</td>
<td>-.05</td>
<td>5</td>
<td>1.12</td>
<td>.694</td>
<td>.482</td>
<td>.299</td>
</tr>
<tr>
<td>Set T.</td>
<td>-.05</td>
<td>6</td>
<td>1.29</td>
<td>.719</td>
<td>.516</td>
<td>.297</td>
</tr>
<tr>
<td>E. A.</td>
<td>-.01</td>
<td>7</td>
<td>.76</td>
<td>.733</td>
<td>.537</td>
<td>.299</td>
</tr>
<tr>
<td>S. A.</td>
<td>-.04</td>
<td>8</td>
<td>.73</td>
<td>.747</td>
<td>.557</td>
<td>.301</td>
</tr>
</tbody>
</table>

ᵃThe R in each step involves the variable in that step combined with all previously selected variables.

ᵇSignificant at .05 level.
<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Regression Coefficient</th>
<th>Standard Error</th>
<th>F to Remove</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hum.</td>
<td>.0155</td>
<td>.0077</td>
<td>4.06</td>
</tr>
<tr>
<td>Soc.</td>
<td>.0149</td>
<td>.0077</td>
<td>3.78</td>
</tr>
<tr>
<td>Int. Q.</td>
<td>.0222</td>
<td>.0125</td>
<td>3.17</td>
</tr>
<tr>
<td>Soc. U.</td>
<td>-.0150</td>
<td>.0093</td>
<td>2.57</td>
</tr>
</tbody>
</table>

Standard Error of Estimate = .299

\[ R = .672 \]
\[ R^2 = .451 \]
\[ d.f. = 1, 16 \]
\[ F = 4.11 \]

\[^a F_{0.05} = 4.49 \]
TABLE 9

PREDICTION OF PHR FOR THE SOCIAL STUDIES FEMALES FROM THE OAIS

(N = 20)

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>r with PHR</th>
<th>Steps</th>
<th>F to enter</th>
<th>R²</th>
<th>R²</th>
<th>S-Est.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soc. U.</td>
<td>.48</td>
<td>1</td>
<td>5.37</td>
<td>.479</td>
<td>.230</td>
<td>.278</td>
</tr>
<tr>
<td>Bus.</td>
<td>-.48</td>
<td>2</td>
<td>8.18</td>
<td>.693</td>
<td>.480</td>
<td>.235</td>
</tr>
<tr>
<td>M. C.</td>
<td>-.19</td>
<td>3</td>
<td>3.82</td>
<td>.761</td>
<td>.581</td>
<td>.217</td>
</tr>
<tr>
<td>Crea. P.</td>
<td>.33</td>
<td>4</td>
<td>6.22</td>
<td>.839</td>
<td>.704</td>
<td>.189</td>
</tr>
<tr>
<td>Ach. P.</td>
<td>.06</td>
<td>5</td>
<td>1.33</td>
<td>.854</td>
<td>.729</td>
<td>.187</td>
</tr>
<tr>
<td>Bio.</td>
<td>-.25</td>
<td>6</td>
<td>1.31</td>
<td>.867</td>
<td>.754</td>
<td>.185</td>
</tr>
<tr>
<td>Set T.</td>
<td>.28</td>
<td>7</td>
<td>.34</td>
<td>.872</td>
<td>.761</td>
<td>.180</td>
</tr>
<tr>
<td>Int. Q.</td>
<td>.23</td>
<td>8</td>
<td>1.27</td>
<td>.886</td>
<td>.786</td>
<td>.188</td>
</tr>
</tbody>
</table>

*a* The R in each step involves the variables in that step combined with all previously selected variables.

*b* Significant at .05 level.
### TABLE 10

**OPTIMUM PREDICTION EQUATION FOR SOCIAL STUDIES FEMALES FOR PHR FROM OASIS**

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Regression Coefficient</th>
<th>Standard Error</th>
<th>F to Remove</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soc. U.</td>
<td>0.0297</td>
<td>0.0068</td>
<td>18.85(^a)</td>
</tr>
<tr>
<td>Set T. . . . .</td>
<td>0.0292</td>
<td>0.0097</td>
<td>9.14(^a)</td>
</tr>
<tr>
<td>M. O. . . . .</td>
<td>0.0250</td>
<td>0.0091</td>
<td>7.58(^a)</td>
</tr>
<tr>
<td>Crea. P. . . .</td>
<td>0.0159</td>
<td>0.0071</td>
<td>4.99</td>
</tr>
<tr>
<td>Bus. . . . . .</td>
<td>0.0121</td>
<td>0.0105</td>
<td>1.34</td>
</tr>
</tbody>
</table>

Standard Error of Estimate = 0.187

\[
R = 0.854 \\
R^2 = 0.729 \\
d.f. = 1, 9 \\
F = 7.55 \\
F_{0.05} = 5.12
\]
The Validity of the OAIS in Prediction of Student Teaching Grades for Senior Students in the College of Education.

Predictive Abilities of the Fourteen OAIS Scales for the Total Group. A regression analysis using student teaching grades as the criterion for the total group of 152 students is presented in Tables 11 and 12. Table 11 shows that the multiple regression correlation for the eight variables selected is .338. It is not significant at the .05 level of confidence. The variables with the highest single R's are Ach. P., 21, and E. A., 21.

Table 12 indicates the four variables which account for most of the variance of PHR contributed by OAIS Scales. These variables account for 9.9 per cent of the variance of STG, and all but 1.5 per cent of the variance attributed to the eight OAIS variables selected. Ach. P. and E. A. are the only factors in this equation which are significant. They are significant at the .05 level. The multiple regression correlation of this equation is .315. It is significant at the .05 level of significance.
TABLE 11

PREDICTION OF STUDENT TEACHING GRADES FOR THE TOTAL GROUP FROM THE OAIS

(N = 152)

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>r with STG</th>
<th>Steps</th>
<th>F to enter</th>
<th>R²</th>
<th>R</th>
<th>S-Est.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ach. P.</td>
<td>.21</td>
<td>1</td>
<td>6.90</td>
<td>.209</td>
<td>.044</td>
<td>1.78</td>
</tr>
<tr>
<td>E. A.</td>
<td>.21</td>
<td>2</td>
<td>5.74</td>
<td>.282</td>
<td>.079</td>
<td>1.75</td>
</tr>
<tr>
<td>Phy.</td>
<td>-.10</td>
<td>3</td>
<td>2.02</td>
<td>.303</td>
<td>.092</td>
<td>1.75</td>
</tr>
<tr>
<td>Bus.</td>
<td>-.04</td>
<td>4</td>
<td>1.19</td>
<td>.315</td>
<td>.099</td>
<td>1.75</td>
</tr>
<tr>
<td>Soc.</td>
<td>.16</td>
<td>5</td>
<td>.72</td>
<td>.322</td>
<td>.104</td>
<td>1.74</td>
</tr>
<tr>
<td>Soc. U.</td>
<td>-.10</td>
<td>6</td>
<td>.48</td>
<td>.326</td>
<td>.107</td>
<td>1.75</td>
</tr>
<tr>
<td>Int. Q.</td>
<td>-.03</td>
<td>7</td>
<td>.87</td>
<td>.335</td>
<td>.112</td>
<td>1.75</td>
</tr>
<tr>
<td>Bio.</td>
<td>.132</td>
<td>8</td>
<td>.41</td>
<td>.338</td>
<td>.114</td>
<td>1.75</td>
</tr>
</tbody>
</table>

aThe R in each step involves the variable in that step combined with all previously selected variables.

bSignificant at .05 level.
TABLE 12

OPTIMUM PREDICTION EQUATION FOR TOTAL GROUP
FOR STUDENT TEACHING GRADES FROM OAIS

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>Regression Coefficient</th>
<th>Standard Error</th>
<th>F to Remove</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ach. P. ........</td>
<td>0.0618</td>
<td>.0255</td>
<td>5.87*</td>
</tr>
<tr>
<td>E. A. ........</td>
<td>0.0394</td>
<td>.0167</td>
<td>5.56*</td>
</tr>
<tr>
<td>Bus. ........</td>
<td>-0.0266</td>
<td>.0244</td>
<td>1.19</td>
</tr>
<tr>
<td>Phy. ........</td>
<td>0.0415</td>
<td>.0244</td>
<td>2.87</td>
</tr>
</tbody>
</table>

Standard Error of Estimate = 1.7426

\[ R = .315 \quad R^2 = .099 \]
\[ d.f. = 1, 147 \quad F = 4.04 \]

\[^{a}F_{Pb (05)} = 3.94\]
Predictive Abilities of the OAIS Scales for the Elementary Group. Tables 13 and 14 provide a regression analysis for the elementary group of 107 students using student teaching Grades as the criterion. Table 13 shows that the multiple correlation for the variables selected is .439. It is not statistically significant. Variables having high single r's are Ach. P., .29, and E. A., .25. M. O. is a negative factor with a high single r, -.22.

Table 14 shows the variables which make the greatest contribution to the variance of STG. E. A., Ach. P. and Soc. U. are positive variables in the equation. M. O. is a negative variable in the equation. The variables in this equation account for 17.1 percent of the variance of STG. E. A. and Ach. P. are significant variables in the equation. Both are statistically significant at the .05 level. The multiple R in this equation is .413. It is statistically significant.

Predictive Abilities of the OAIS Scales for the Social Studies Group. A regression equation using student teaching grades as the criterion for 45 social studies students included in the study is presented in Table 15. Soc. U. was the first variable selected in the equation because it has the highest correlation with the criterion. Neither this variable nor any other variable makes a sufficient contribution to the equation to be statistically significant. The multiple regression correlation for the
### TABLE 13
PREDICTION OF STUDENT TEACHING GRADES FOR THE ELEMENTARY GROUP FROM THE OAIS
(N = 107)

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>r with STG</th>
<th>Step</th>
<th>F to enter</th>
<th>R^a</th>
<th>R^2</th>
<th>S-Est.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ach. P.</td>
<td>0.29</td>
<td>1</td>
<td>9.45^b</td>
<td>0.287</td>
<td>0.083</td>
<td>1.860</td>
</tr>
<tr>
<td>E. A.</td>
<td>0.25</td>
<td>2</td>
<td>6.24^b</td>
<td>0.367</td>
<td>0.135</td>
<td>1.816</td>
</tr>
<tr>
<td>M. O.</td>
<td>-0.22</td>
<td>3</td>
<td>3.07</td>
<td>0.400</td>
<td>0.160</td>
<td>1.798</td>
</tr>
<tr>
<td>Soc. U.</td>
<td>-0.09</td>
<td>4</td>
<td>1.34</td>
<td>0.413</td>
<td>0.171</td>
<td>1.795</td>
</tr>
<tr>
<td>Phy.</td>
<td>-0.09</td>
<td>5</td>
<td>0.63</td>
<td>0.419</td>
<td>0.176</td>
<td>1.798</td>
</tr>
<tr>
<td>S. A.</td>
<td>0.07</td>
<td>6</td>
<td>0.40</td>
<td>0.423</td>
<td>0.179</td>
<td>1.803</td>
</tr>
<tr>
<td>Bio.</td>
<td>0.20</td>
<td>7</td>
<td>0.84</td>
<td>0.431</td>
<td>0.186</td>
<td>1.805</td>
</tr>
<tr>
<td>Soc.</td>
<td>0.18</td>
<td>8</td>
<td>0.87</td>
<td>0.439</td>
<td>0.193</td>
<td>1.806</td>
</tr>
</tbody>
</table>

^a The R in each step involves the variable in that step combined with all previously selected variables.

^b Significant at .05 level.
## TABLE 14

**OPTIMUM PREDICTION EQUATION FOR ELEMENTARY GROUP FOR STUDENT TEACHING GRADES FROM OAIS**

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>Regression Coefficient</th>
<th>Standard Error</th>
<th>F to Remove</th>
</tr>
</thead>
<tbody>
<tr>
<td>E. A. ...............</td>
<td>.059</td>
<td>.0206</td>
<td>8.20</td>
</tr>
<tr>
<td>Ach. P. ............</td>
<td>.085</td>
<td>.0334</td>
<td>6.55</td>
</tr>
<tr>
<td>M. O. ..............</td>
<td>-.052</td>
<td>-.0310</td>
<td>2.84</td>
</tr>
<tr>
<td>Soc. U. ............</td>
<td>.030</td>
<td>.0263</td>
<td>1.34</td>
</tr>
</tbody>
</table>

**Standard Error of Estimate** = 1.795

\[
R = .413 \quad R^2 = .171
\]

\[
d.f. = 1, 99 \quad F = 5.24 \quad ^a_{Fb \ (05)} = 3.96
\]
### TABLE 15

**PREDICTION OF STUDENT TEACHING GRADES FOR THE SOCIAL STUDIES GROUP FROM THE OAIS**  
*(N = 45)*

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>r with STG</th>
<th>F to enter</th>
<th>R^a</th>
<th>R^2</th>
<th>S-Est.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soc. U. . . .</td>
<td>-.20</td>
<td>1</td>
<td>1.71</td>
<td>.196</td>
<td>.038</td>
</tr>
<tr>
<td>Int. R. . . .</td>
<td>.13</td>
<td>2</td>
<td>1.12</td>
<td>.252</td>
<td>.063</td>
</tr>
<tr>
<td>Phy. . . . .</td>
<td>-.09</td>
<td>3</td>
<td>1.12</td>
<td>.297</td>
<td>.088</td>
</tr>
<tr>
<td>Bio. . . . .</td>
<td>.02</td>
<td>4</td>
<td>.82</td>
<td>.327</td>
<td>.107</td>
</tr>
<tr>
<td>Ach. P. . . .</td>
<td>-.04</td>
<td>5</td>
<td>1.30</td>
<td>.368</td>
<td>.136</td>
</tr>
<tr>
<td>Int. Q. . . .</td>
<td>-.19</td>
<td>6</td>
<td>.55</td>
<td>.384</td>
<td>.148</td>
</tr>
<tr>
<td>Crea. P. . .</td>
<td>.08</td>
<td>7</td>
<td>.26</td>
<td>.392</td>
<td>.154</td>
</tr>
<tr>
<td>E. A. . . .</td>
<td>.04</td>
<td>8</td>
<td>.12</td>
<td>.395</td>
<td>.156</td>
</tr>
</tbody>
</table>

^a The R in each step involves the variables in that step combined with all previously selected variables.

^b Significant at .05 level.
variables selected is .395. It is not statistically significant. In this example, none of the variables can be combined to be of any value in predicting grades in student teaching.

**Predictive Abilities of the OAIS Scales for the Social Studies Males.** A regression equation using student teaching grades as the criterion for 25 social studies male students included in the study is presented in Table 16. Soc. U. was the first variable selected. It correlates negatively with the criterion and has a single r of .29. None of the variables selected in this equation has a significant F ratio. The multiple regression correlation for this regression equation is .598. It is not statistically significant. None of the variables in this regression analysis can be combined to be of any value in predicting grades in student teaching.

**Predictive Abilities of the OAIS Scales for the Social Studies Females.** Tables 17 and 18 provide a regression analysis for the social studies female students using student teaching grades as the criterion. The multiple regression correlation is .912. It is significant at the .05 level of significance.

The variable selected first was Hum. It has a single r of .38. The only other variable with a high single r is Bio. with an (r) of .34.
### TABLE 16

PREDICTION OF STUDENT TEACHING GRADES
FOR THE SOCIAL STUDIES MALE GROUP FROM THE OAIS
(N = 21)

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>r with STG</th>
<th>Steps</th>
<th>F to enter</th>
<th>R^a</th>
<th>R^2</th>
<th>S-Est.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soc. U.</td>
<td>-.29</td>
<td>1</td>
<td>2.11</td>
<td>.290</td>
<td>.084</td>
<td>1.62</td>
</tr>
<tr>
<td>Ach. P.</td>
<td>-.11</td>
<td>2</td>
<td>1.74</td>
<td>.389</td>
<td>.151</td>
<td>1.59</td>
</tr>
<tr>
<td>Bus.</td>
<td>-.10</td>
<td>3</td>
<td>1.57</td>
<td>.457</td>
<td>.210</td>
<td>1.574</td>
</tr>
<tr>
<td>M. O.</td>
<td>-.04</td>
<td>4</td>
<td>.73</td>
<td>.488</td>
<td>.238</td>
<td>1.584</td>
</tr>
<tr>
<td>E. A.</td>
<td>.12</td>
<td>5</td>
<td>.61</td>
<td>.512</td>
<td>.262</td>
<td>1.600</td>
</tr>
<tr>
<td>Int. R.</td>
<td>.18</td>
<td>6</td>
<td>1.26</td>
<td>.557</td>
<td>.310</td>
<td>1.589</td>
</tr>
<tr>
<td>Soc.</td>
<td>.05</td>
<td>7</td>
<td>.91</td>
<td>.587</td>
<td>.345</td>
<td>1.625</td>
</tr>
<tr>
<td>S. A.</td>
<td>.14</td>
<td>8</td>
<td>.33</td>
<td>.598</td>
<td>.358</td>
<td>1.625</td>
</tr>
</tbody>
</table>

^a The R in each step involves the variables in that step combined with all previously selected variables.

^b Significant at .05 level.
TABLE 17

PREDICTION OF STUDENT TEACHING GRADES FOR THE SOCIAL STUDIES FEMALE GROUP FROM THE OAIS

(N = 20)

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>r with STG</th>
<th>Step</th>
<th>R to enter</th>
<th>R&lt;sup&gt;a&lt;/sup&gt;</th>
<th>R&lt;sup&gt;2&lt;/sup&gt;</th>
<th>S.-Est.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hum. .................</td>
<td>.38</td>
<td>1</td>
<td>2.99</td>
<td>.377</td>
<td>.142</td>
<td>1.159</td>
</tr>
<tr>
<td>Bio. .................</td>
<td>.34</td>
<td>2</td>
<td>3.18</td>
<td>.527</td>
<td>.277</td>
<td>1.095</td>
</tr>
<tr>
<td>Bus. .................</td>
<td>-.05</td>
<td>3</td>
<td>3.43</td>
<td>.636</td>
<td>.405</td>
<td>1.024</td>
</tr>
<tr>
<td>Ach. P. .............</td>
<td>.09</td>
<td>4</td>
<td>1.68</td>
<td>.682</td>
<td>.465</td>
<td>1.003</td>
</tr>
<tr>
<td>Soc. .................</td>
<td>-.03</td>
<td>5</td>
<td>5.97</td>
<td>.790</td>
<td>.624</td>
<td>.869</td>
</tr>
<tr>
<td>M. O. ...............</td>
<td>.19</td>
<td>6</td>
<td>7.31</td>
<td>.872</td>
<td>.760</td>
<td>.722</td>
</tr>
<tr>
<td>E. A. ...............</td>
<td>-.09</td>
<td>7</td>
<td>2.98</td>
<td>.899</td>
<td>.808</td>
<td>.672</td>
</tr>
<tr>
<td>S. A. ...............</td>
<td>-.02</td>
<td>8</td>
<td>1.52</td>
<td>.912</td>
<td>.831</td>
<td>.658</td>
</tr>
</tbody>
</table>

<sup>a</sup>The R in each step involves the variable in that step combined with all previously selected variables.

<sup>b</sup>Significant at .05 level.
### TABLE 18

**OPTIMUM PREDICTION EQUATION FOR SOCIAL STUDIES FEMALE GROUP FOR STUDENT TEACHING GRADES FROM O AIS**

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>Regression Coefficient</th>
<th>Standard Error</th>
<th>F to Remove</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bio.</td>
<td>.3418</td>
<td>.0524</td>
<td>42.53&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Hum.</td>
<td>.2320</td>
<td>.0467</td>
<td>24.72&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Ach. P.</td>
<td>-.2769</td>
<td>.0583</td>
<td>22.59&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Soc.</td>
<td>.2367</td>
<td>.0524</td>
<td>20.41&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Bus.</td>
<td>.0804</td>
<td>.0296</td>
<td>7.37</td>
</tr>
<tr>
<td>M. O.</td>
<td>-.1108</td>
<td>.0487</td>
<td>5.18</td>
</tr>
<tr>
<td>E. A.</td>
<td>-.0554</td>
<td>.0290</td>
<td>3.65</td>
</tr>
<tr>
<td>S. A.</td>
<td>-.0480</td>
<td>.0390</td>
<td>1.52</td>
</tr>
</tbody>
</table>

Standard Error of Estimate = .658

R = .912

R<sup>2</sup> = .831

d.f. = 1, 3

F = 6.76

<sup>a</sup>F<sub>b</sub>(05) = 10.13
The best regression equation includes a combination of all eight variables selected. With this combination of variables, four variables make a significant contribution to the equation. Bio. is significant at the .01 level. Hum. and Soc. are positive variables significant at the .05 level. Ach. P. is a negative variable significant at the .05 level.

Because of the limited validity of the results obtained for the social studies males group, it is impossible to place any significance in the difference between the social studies male group and the social studies female group. A comparison of the two groups reveals differences; however, these differences could possibly be attributed to chance.

The OAIS as a Predictor of Grade-Point Average and Student Teaching Grades. In this study, the following null hypotheses were tested:

(1) There is no relationship between college grade-point average of seniors in the College of Education and their performance on the OAIS.

(2) There is no relationship between grades in student teaching and performance on the OAIS.

For the elementary group, three OAIS scales, Ach. P., Int. Q., and Bio., proved to be significant beyond the .01 level of significance in predicting grade-
point average. The S. A. scale of the OAIS correlated negatively with the grade-point average beyond the .01 level of significance. A regression equation consisting of these scales from OAIS had a multiple correlation coefficient with grade-point average of .624, which is significant beyond the .01 level of significance. For the social studies group, the OAIS scale, Hum. was significant beyond the .01 level, and the multiple regression coefficient obtained when using the most productive OAIS scales in predicting grade-point average for the social studies group is statistically significant at the .05 level.

On the basis of this investigation, it is possible to reject the null hypothesis that there is no relationship between college grade-point averages of seniors in the College of Education and their performance on the OAIS.

For the elementary group, two OAIS scales, Ach. P. and E. A., proved to be significant at beyond the .05 level of significance in the prediction of grades in student teaching. A regression equation, including the most productive OAIS scales, in the prediction of grades in student teaching had a multiple regression correlation of .413, which proved to be statistically significant at the .05 level of confidence. None of the OAIS scales proved to be a statistically significant predictor of grades in student teaching for the Social Studies group.
On the basis of this investigation, it is possible to reject the null hypothesis that there is no relationship between grades in student teaching and performance on the OAIS for the elementary group, but not for the social studies group.

In an effort to provide information concerning the feasibility of using the OAIS to assess the potential of students enrolled in the College of Education, the last two sections of this chapter will present findings concerning how valuable the OAIS is as a predictor of grade-point average and grades in student teaching when used in combination with other predictor instruments.

Validity of the OAIS and the OSPE in Prediction of Point-Hour Ratio for Senior Students in the College of Education.

Predictive Abilities of the OAIS Scales and the OSPE for the Total Group. A regression analysis for the total group using point-hour ratio as the criterion is presented in Tables 19 and 20. Table 19 shows that the OSPE has the highest single r with PHR. It has a .52 correlation with the criterion. The OAIS scale with the highest correlation with PHR is Ach. P. with a single r. of .34. S. A. is a negative variable in the equation with a single r of .29.

The multiple regression correlation for this equation is .654. It is significant at the .01 level.
TABLE 19
PREDICTION OF PHR FOR TOTAL GROUP
FROM OAIS SCORES AND OSPE
(N = 130)

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>r with PHR</th>
<th>F to enter</th>
<th>$R^a$</th>
<th>$R^2$</th>
<th>S-Est.</th>
</tr>
</thead>
<tbody>
<tr>
<td>OSPE</td>
<td>.52</td>
<td>1</td>
<td>46.60b</td>
<td>.517</td>
<td>.267</td>
</tr>
<tr>
<td>AchP</td>
<td>.34</td>
<td>2</td>
<td>11.73b</td>
<td>.574</td>
<td>.329</td>
</tr>
<tr>
<td>S. A.</td>
<td>-.29</td>
<td>3</td>
<td>16.23b</td>
<td>.637</td>
<td>.405</td>
</tr>
<tr>
<td>Hum.</td>
<td>.22</td>
<td>4</td>
<td>1.19</td>
<td>.641</td>
<td>.411</td>
</tr>
<tr>
<td>Soc. U.</td>
<td>-.02</td>
<td>5</td>
<td>1.33</td>
<td>.646</td>
<td>.417</td>
</tr>
<tr>
<td>M. O.</td>
<td>-.17</td>
<td>6</td>
<td>0.99</td>
<td>.650</td>
<td>.422</td>
</tr>
<tr>
<td>Set T</td>
<td>-.04</td>
<td>7</td>
<td>0.62</td>
<td>.652</td>
<td>.425</td>
</tr>
<tr>
<td>Soc.</td>
<td>-.06</td>
<td>8</td>
<td>0.57</td>
<td>.654</td>
<td>.428</td>
</tr>
</tbody>
</table>

aThe R in each step involves the variable in that step combined with all previously selected variables.

bSignificant at .05 level.
TABLE 20

OPTIMUM PREDICTION EQUATION FOR TOTAL GROUP
FROM OAIS SCORES AND OSPE FOR PHR

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>Regression Coefficient</th>
<th>Standard Error</th>
<th>F to Remove</th>
</tr>
</thead>
<tbody>
<tr>
<td>OSPE . . . .</td>
<td>.0091</td>
<td>.0015</td>
<td>39.31&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>ACH. P. . . .</td>
<td>.0206</td>
<td>.0051</td>
<td>16.27&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>S. A. . . . .</td>
<td>-.0207</td>
<td>.0051</td>
<td>16.23&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

Standard Error of Estimate = .322

\[ R = .637 \quad R^2 = .405 \]
\[ d.f. = 1, 122 \quad F = 28.64 \]

<sup>a</sup><sub>F<sub>0.05</sub> = 3.94</sub>
Of the total variance of PHR, 42.8 per cent is attributed to the OSPE and the OAIS Scales. OSPE alone contributed 26.7 per cent of this variance, and 40.5 per cent of the variance was contributed by OSPE and the two most significant OAIS variables.

Table 20 shows OSPE combined with the two most significant OAIS variables. OSPE and Ach. P. are positive variables significant at the .01 level of confidence. S. A. makes a negative contribution to the equation and is significant at the .01 level.

Predictive Abilities of the OAIS Scales and the OSPE for the Elementary Group. A regression analysis for the elementary group using point-hour ratio as the criterion is presented in Tables 21 and 22. Table 21 shows that the variables with the highest single r's are OSPE, 53; Ach. P., .40; and Phy., .35. S. A. is a negative variable with a high single r, .32.

The multiple regression correlation for this group is .709. It is significant at the .01 level of confidence. The variance of PHR is accounted for as follows: 50.3 per cent of the variance is attributed to OSPE and the OAIS Scales; 27.8 per cent of this variance is attributed to OSPE alone; and all but 5.0 per cent of this variance is accounted for by OSPE and the two most significant OAIS variables.
TABLE 21
PREDICTION OF PHR FOR ELEMENTARY GROUP
FROM OAIS SCORES AND OSPE
(N = 91)

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>r with PHR</th>
<th>Steps</th>
<th>F to enter</th>
<th>R&lt;sup&gt;a&lt;/sup&gt;</th>
<th>R&lt;sup&gt;2&lt;/sup&gt;</th>
<th>S-Est.</th>
</tr>
</thead>
<tbody>
<tr>
<td>OSPE. . . . .</td>
<td>.53</td>
<td>1</td>
<td>34.19&lt;sup&gt;b&lt;/sup&gt;</td>
<td>.527</td>
<td>.278</td>
<td>.375</td>
</tr>
<tr>
<td>Ach. P. . . .</td>
<td>.40</td>
<td>2</td>
<td>10.40&lt;sup&gt;b&lt;/sup&gt;</td>
<td>.595</td>
<td>.354</td>
<td>.356</td>
</tr>
<tr>
<td>S. A. . . . .</td>
<td>-.32</td>
<td>3</td>
<td>15.81&lt;sup&gt;b&lt;/sup&gt;</td>
<td>.673</td>
<td>.453</td>
<td>.330</td>
</tr>
<tr>
<td>Bio. . . . .</td>
<td>.12</td>
<td>4</td>
<td>3.21</td>
<td>.688</td>
<td>.473</td>
<td>.326</td>
</tr>
<tr>
<td>Hum. . . . .</td>
<td>.12</td>
<td>5</td>
<td>.81</td>
<td>.691</td>
<td>.478</td>
<td>.326</td>
</tr>
<tr>
<td>Phy. . . . .</td>
<td>.35</td>
<td>6</td>
<td>1.46</td>
<td>.698</td>
<td>.487</td>
<td>.325</td>
</tr>
<tr>
<td>Soc. . . . .</td>
<td>-.13</td>
<td>7</td>
<td>1.39</td>
<td>.704</td>
<td>.495</td>
<td>.324</td>
</tr>
<tr>
<td>Set T . . .</td>
<td>-.06</td>
<td>8</td>
<td>1.22</td>
<td>.709</td>
<td>.503</td>
<td>.324</td>
</tr>
</tbody>
</table>

<sup>a</sup>The R in each step involves the variable in that step combined with all previously selected variables.

<sup>b</sup>Significant at .05 level.
<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Regression Coefficient</th>
<th>Standard Error</th>
<th>F to Remove</th>
</tr>
</thead>
<tbody>
<tr>
<td>OSPE</td>
<td>.0091</td>
<td>.0018</td>
<td>24.29&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Ach. P.</td>
<td>.0260</td>
<td>.0064</td>
<td>16.54&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>S. A.</td>
<td>-.0258</td>
<td>.0065</td>
<td>15.81&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

Standard Error of Estimate = .330

\[
R = .673 \\
R^2 = .453 \\
d.f. - 1, 84 \\
F = 24.04
\]

<sup>a</sup><sub>Fb (05) = 3.96</sub>
Table 22 shows OSPE combined with the two most significant OAIS variables. OSPE and Ach. P. are positive variables in the equation significant at the .01 level of confidence. S. A. is a negative variable which is significant at the .01 level.

Predictive Abilities of the OAIS Scales and the OSPE for the Social Studies Group. A regression analysis for the social studies group using point-hour ratio as the criterion is presented in Tables 23 and 24. The variables with highest single r's are OSPE, .52, and Hum., .49. The multiple regression correlation for this group is .752. It is significant at the .05 level.

The OAIS Scales and OSPE account for 56.5 per cent of the variance of PHR. All but 6.5 per cent is contributed by OSPE and three OAIS scales, and 27.5 per cent of this contribution is attributed to OSPE alone.

Table 24 shows the variables in the regression equation which contribute the most to the variance of PHR. Hum. and OSPE are the significant variables in the equation. They are significant at the .01 level.

Predictive Abilities of the OAIS Scales and the OSPE for the Social Studies Males. A regression analysis for the social studies male students using point-hour ratio as the criterion is presented in Tables 25 and 26. Table 25 shows that the variables with the highest single
TABLE 23
PREDICTION OF PHR FOR SOCIAL STUDIES GROUP
FROM OAIS SCORES AND OSPE
(N = 39)

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>r with STG</th>
<th>Steps</th>
<th>F to enter</th>
<th>$R^a$</th>
<th>$R^2$</th>
<th>S-Est.</th>
</tr>
</thead>
<tbody>
<tr>
<td>OSPE</td>
<td>.52</td>
<td>1</td>
<td>14.02$^b$</td>
<td>.524</td>
<td>.275</td>
<td>.303</td>
</tr>
<tr>
<td>Hum.</td>
<td>.49</td>
<td>2</td>
<td>9.32$^b$</td>
<td>.651</td>
<td>.424</td>
<td>.274</td>
</tr>
<tr>
<td>Soc.</td>
<td>.18</td>
<td>3</td>
<td>3.97</td>
<td>.695</td>
<td>.483</td>
<td>.263</td>
</tr>
<tr>
<td>Soc. U.</td>
<td>.06</td>
<td>4</td>
<td>1.37</td>
<td>.709</td>
<td>.503</td>
<td>.262</td>
</tr>
<tr>
<td>S. A.</td>
<td>.14</td>
<td>5</td>
<td>.96</td>
<td>.719</td>
<td>.517</td>
<td>.262</td>
</tr>
<tr>
<td>Phy.</td>
<td>-.22</td>
<td>6</td>
<td>1.34</td>
<td>.732</td>
<td>.536</td>
<td>.261</td>
</tr>
<tr>
<td>Ach. P.</td>
<td>.20</td>
<td>7</td>
<td>.99</td>
<td>.742</td>
<td>.551</td>
<td>.261</td>
</tr>
<tr>
<td>Bio.</td>
<td>-.30</td>
<td>8</td>
<td>1.00</td>
<td>.752</td>
<td>.565</td>
<td>.261</td>
</tr>
</tbody>
</table>

$^a$The R in each step involves the variable in that step combined with all previously selected variables.

$^b$Significant at .05 level.
**TABLE 24**

**OPTIMUM PREDICTION EQUATION FOR SOCIAL STUDIES GROUP FROM OAIM SCORES AND OSPE FOR PHR**

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>Regression Coefficient</th>
<th>Standard Error</th>
<th>F to Remove</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hum.</td>
<td>.0270</td>
<td>.0074</td>
<td>13.32(^{b})</td>
</tr>
<tr>
<td>OSPE</td>
<td>.0067</td>
<td>.0021</td>
<td>10.23(^{b})</td>
</tr>
<tr>
<td>Soc.</td>
<td>.0108</td>
<td>.0057</td>
<td>3.57</td>
</tr>
<tr>
<td>Soc. U.</td>
<td>.0073</td>
<td>.0062</td>
<td>1.37</td>
</tr>
</tbody>
</table>

Standard Error of Estimate = .262

\[ R = .709 \quad R^2 = .503 \]
\[ d.f. = 1, 30 \quad F = 8.59 \]

\(^{a}F_{0.05} = 4.17\)
### TABLE 25

PREDICTION OF PHR FOR SOCIAL STUDIES MALE GROUP
FROM OAIS SCORES AND OSPE

(N = 21)

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>r with PHR</th>
<th>Steps</th>
<th>F to enter</th>
<th>R^a</th>
<th>R^2</th>
<th>S-Est.</th>
</tr>
</thead>
<tbody>
<tr>
<td>OSPE ...</td>
<td>.53</td>
<td>1</td>
<td>7.27^b</td>
<td>.526</td>
<td>.277</td>
<td>.337</td>
</tr>
<tr>
<td>Hum. ...</td>
<td>.48</td>
<td>2</td>
<td>4.80^b</td>
<td>.655</td>
<td>.429</td>
<td>.307</td>
</tr>
<tr>
<td>Soc. ...</td>
<td>.39</td>
<td>3</td>
<td>5.70^b</td>
<td>.757</td>
<td>.572</td>
<td>.373</td>
</tr>
<tr>
<td>S. A. ...</td>
<td>-.20</td>
<td>4</td>
<td>1.48</td>
<td>.780</td>
<td>.608</td>
<td>.270</td>
</tr>
<tr>
<td>Soc. U. ...</td>
<td>-.08</td>
<td>5</td>
<td>1.27</td>
<td>.799</td>
<td>.639</td>
<td>.268</td>
</tr>
<tr>
<td>Bus. ...</td>
<td>.07</td>
<td>6</td>
<td>1.15</td>
<td>.816</td>
<td>.667</td>
<td>.266</td>
</tr>
<tr>
<td>Int. R ...</td>
<td>.003</td>
<td>7</td>
<td>0.89</td>
<td>.830</td>
<td>.688</td>
<td>.267</td>
</tr>
<tr>
<td>M. O. ...</td>
<td>-.07</td>
<td>8</td>
<td>0.78</td>
<td>.841</td>
<td>.707</td>
<td>.270</td>
</tr>
</tbody>
</table>

^a The R in each step involves the variable in that step combined with all previously selected variables.

^b Significant at .05 level.
<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>Regression Coefficient</th>
<th>Standard Error</th>
<th>F to Remove</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soc.</td>
<td>0.0228</td>
<td>0.0085</td>
<td>7.27(^a)</td>
</tr>
<tr>
<td>Hum.</td>
<td>0.0187</td>
<td>0.0090</td>
<td>4.29</td>
</tr>
<tr>
<td>OSPE</td>
<td>0.0061</td>
<td>0.0030</td>
<td>4.29</td>
</tr>
<tr>
<td>S. A.</td>
<td>-0.0135</td>
<td>0.01113</td>
<td>1.48</td>
</tr>
</tbody>
</table>

Standard Error of Estimate = 2.70

\[ R = 0.780 \]
\[ R^2 = 0.608 \]
\[ \text{d.f.} = 1, 11 \]
\[ F = 6.22 \]

\(^a_{Fb (05)} = 4.84\)
r's are OSPE, .53; Hum., .48; and Soc., 39. The multiple regression correlation for this group is .841. It is not statistically significant.

Table 26 presents the variables that make the greatest contribution to the variance of PHR. Soc. is the only statistically significant variable in the equation. Hum. and OSPE are other positive variables in the equation. S. A. is a negative variable in the equation. The multiple regression correlation for this equation is .780. It is significant at the .05 level.

Predictive Abilities of the OAIS Scales and OSPE for the Social Studies Females. A regression analysis for the social studies female students using point-hour ratio as the criterion is presented in Table 27. Variables with high single r's include Hum., .57; OSPE, .58; Crea. P., .45; and Soc. U., .42. Bus. is a negative variable in the equation with a high single r. Hum was the first variable selected in the equation and the only one with a significant F ratio. The multiple regression correlation for this equation is .880. It is significant at the .05 level.
TABLE 27
PREDICTION OF PHR FOR SOCIAL STUDIES FEMALES
FROM OAIS SCORES AND OSPE
(N = 18)

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>r with PHR</th>
<th>Steps</th>
<th>F to enter</th>
<th>R²</th>
<th>R²</th>
<th>S-Est.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hum.</td>
<td>.57</td>
<td>1</td>
<td>7.62</td>
<td>.568</td>
<td>.323</td>
<td>.259</td>
</tr>
<tr>
<td>OSPE</td>
<td>.50</td>
<td>2</td>
<td>2.84</td>
<td>.656</td>
<td>.431</td>
<td>.245</td>
</tr>
<tr>
<td>M. O.</td>
<td>-.09</td>
<td>3</td>
<td>2.51</td>
<td>.719</td>
<td>.517</td>
<td>.233</td>
</tr>
<tr>
<td>Crea. P.</td>
<td>.45</td>
<td>4</td>
<td>2.61</td>
<td>.773</td>
<td>.598</td>
<td>.221</td>
</tr>
<tr>
<td>Soc. U.</td>
<td>.42</td>
<td>5</td>
<td>1.56</td>
<td>.803</td>
<td>.644</td>
<td>.217</td>
</tr>
<tr>
<td>Ach. P.</td>
<td>.16</td>
<td>6</td>
<td>3.87</td>
<td>.858</td>
<td>.737</td>
<td>.195</td>
</tr>
<tr>
<td>Bus.</td>
<td>-.50</td>
<td>7</td>
<td>0.95</td>
<td>.872</td>
<td>.760</td>
<td>.195</td>
</tr>
<tr>
<td>Set T</td>
<td>-.06</td>
<td>8</td>
<td>1.30</td>
<td>.880</td>
<td>.790</td>
<td>.192</td>
</tr>
</tbody>
</table>

*The R in each step involves the variable in that step combined with all previously selected variables.*

*bSignificant at .05 level.*
The Validity of PHR, OAIS, and OSPE in Prediction of Student Teaching Grades for Senior Students in the College of Education.

Predictive Abilities of PHR, OAIS, and OSPE for the Total Group. A regression analysis for the total group using student teaching grades as the criterion is presented in Tables 28 and 29. The variables with the highest single r's include PHR, .24, and E. A., .18. The multiple regression correlation for this group is .406. It is not statistically significant.

Of the 16.5 per cent of the variance of STG attributed to the variables in this equation, PHR contributes 5.5 per cent. PHR and the OAIS variables, E. A. and Int. Q., contribute 11.0 per cent.

Table 29 presents PHR and the two OAIS variables which contribute the most to the variance of STG. PHR is significant at the .01 level of confidence. E. A. is significant at the .05 level. Int. Q. is a negative contributor to the equation and is not statistically significant.

Predictive Abilities of PHR, OAIS, and OSPE for the Elementary Group. A regression analysis for the elementary group using student teaching grades as the criterion is presented in Tables 30 and 31. The variables with the highest single r's are PHR, .39; Phy., .15;
TABLE 28

PREDICTION OF STUDENT TEACHING GRADES FOR TOTAL GROUP
FROM OAIS, OSPE, PHR

\( (N = 130) \)

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>r with PHR</th>
<th>Steps</th>
<th>R to enter</th>
<th>( R^a )</th>
<th>( R^2 )</th>
<th>S-Est.</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHR</td>
<td>.24</td>
<td>1</td>
<td>7.45(^b)</td>
<td>.235</td>
<td>.055</td>
<td>1.78</td>
</tr>
<tr>
<td>E. A.</td>
<td>.18</td>
<td>2</td>
<td>5.04(^b)</td>
<td>.302</td>
<td>.091</td>
<td>1.75</td>
</tr>
<tr>
<td>Int. Q.</td>
<td>-.08</td>
<td>3</td>
<td>2.64</td>
<td>.331</td>
<td>.110</td>
<td>1.74</td>
</tr>
<tr>
<td>Soc.</td>
<td>.16</td>
<td>4</td>
<td>1.98</td>
<td>.352</td>
<td>.124</td>
<td>1.74</td>
</tr>
<tr>
<td>Bus.</td>
<td>-.05</td>
<td>5</td>
<td>1.85</td>
<td>.369</td>
<td>.137</td>
<td>1.73</td>
</tr>
<tr>
<td>Soc. U.</td>
<td>-.07</td>
<td>6</td>
<td>1.47</td>
<td>.383</td>
<td>.147</td>
<td>1.73</td>
</tr>
<tr>
<td>OSPE</td>
<td>.02</td>
<td>7</td>
<td>1.30</td>
<td>.395</td>
<td>.156</td>
<td>1.73</td>
</tr>
<tr>
<td>M. O.</td>
<td>-.11</td>
<td>8</td>
<td>1.32</td>
<td>.406</td>
<td>.165</td>
<td>1.72</td>
</tr>
</tbody>
</table>

\(^a\)The R in each step involves the variable in that step combined with all previously selected variables.

\(^b\)Significant at .05 level.
TABLE 29

OPTIMUM PREDICTION EQUATION FOR TOTAL GROUP
FOR STUDENT TEACHING GRADES FROM OSPE, PHR, AND QAIS

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>Regression Coefficient</th>
<th>Standard Error</th>
<th>F to Remove</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHR</td>
<td>1.2073</td>
<td>.3810</td>
<td>10.04^a</td>
</tr>
<tr>
<td>E. A.</td>
<td>0.0414</td>
<td>.0175</td>
<td>5.62^a</td>
</tr>
<tr>
<td>Int. Q.</td>
<td>-0.0402</td>
<td>.0248</td>
<td>2.64</td>
</tr>
</tbody>
</table>

Standard Error of Estimate = 1.74

\[ R = .331 \]
\[ R^2 = .110 \]
\[ d.f. = 1, 123 \]
\[ F = 3.06 \]

^a \[ F_{05} = 3.94 \]
TABLE 30

PREDICTION OF STUDENT TEACHING GRADES
FOR ELEMENTARY GROUP
FROM OAIS, OSFE, PHR FOR STUDENT TEACHING GRADES
(N = 91)

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>r with STG</th>
<th>Steps</th>
<th>F to enter</th>
<th>R^2</th>
<th>R^4</th>
<th>S-Est.</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHR</td>
<td>.39</td>
<td>1</td>
<td>15.46</td>
<td>.385</td>
<td>.148</td>
<td>1.82</td>
</tr>
<tr>
<td>Phy.</td>
<td>.15</td>
<td>2</td>
<td>8.68</td>
<td>.474</td>
<td>.225</td>
<td>1.74</td>
</tr>
<tr>
<td>E. A.</td>
<td>.21</td>
<td>3</td>
<td>3.11</td>
<td>.501</td>
<td>.251</td>
<td>1.72</td>
</tr>
<tr>
<td>M. O.</td>
<td>-.27</td>
<td>4</td>
<td>1.95</td>
<td>.518</td>
<td>.268</td>
<td>1.71</td>
</tr>
<tr>
<td>OSPE</td>
<td>.09</td>
<td>5</td>
<td>3.35</td>
<td>.544</td>
<td>.296</td>
<td>1.69</td>
</tr>
<tr>
<td>Soc. U.</td>
<td>-.04</td>
<td>6</td>
<td>1.12</td>
<td>.552</td>
<td>.305</td>
<td>1.68</td>
</tr>
<tr>
<td>Ach. P.</td>
<td>.26</td>
<td>7</td>
<td>1.81</td>
<td>.565</td>
<td>.320</td>
<td>1.68</td>
</tr>
<tr>
<td>Set T</td>
<td>-.14</td>
<td>8</td>
<td>.65</td>
<td>.570</td>
<td>.325</td>
<td>1.68</td>
</tr>
</tbody>
</table>

*aThe R in each step involves the variable in that step combined with all previously selected variables.

bSignificant at .05 level.
### Table 31

**Optimum Prediction Equation for Elementary Group for Student Teaching Grades from OSPE, PHR, and OAI**

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>Regression Coefficient</th>
<th>Standard Error</th>
<th>$F$ to Remove</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHR</td>
<td>2.3509</td>
<td>.5008</td>
<td>22.04&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>E. A.</td>
<td>.0384</td>
<td>.0202</td>
<td>3.61</td>
</tr>
<tr>
<td>M. G.</td>
<td>-.0605</td>
<td>.0326</td>
<td>3.45</td>
</tr>
<tr>
<td>Phy.</td>
<td>.0587</td>
<td>.0318</td>
<td>3.41</td>
</tr>
<tr>
<td>OSPE</td>
<td>-.0203</td>
<td>.0111</td>
<td>3.35</td>
</tr>
</tbody>
</table>

**Standard Error of Estimate** = 1.69

- $R = .544$
- $R^2 = .296$
- $d.f. = 1, 80$
- $F = 7.135$
- $F_{0.05} = 3.96$
E. A., .21; and Ach. P., .26. M. O. is a negative variable with comparatively high single r.

The multiple regression correlation of this regression equation is .570. It is significant at the .05 level of confidence. The variables in this regression equation attribute 32.5 per cent of the variance of STG. Of the 32.5 per cent contributed, PHR attributes 14.8 per cent.

Table 31 shows the variables which make the greatest contribution to the variance of STG. PHR is the only statistically significant variable in the equation. It is significant at the .01 level. E. A. and Phy. are other positive variables. M. O. and OSPE are the negative factors in the equation.

Predictive Abilities of PHR, OAIS, and OSPE for the Social Studies Group. A regression analysis for the social studies group is presented in Table 32. The multiple regression correlation for this group is .441. It is not statistically significant. None of the variables in this regression equation has a statistically significant F ratio.

Predictive Abilities of the PHR, OAIS, and OSPE for the Social Studies Males. A regression analysis of the social studies male students is presented in Table 33.
The multiple regression correlation for this group is .670. It is not statistically significant. None of the variables in this regression equation has a statistically significant F ratio.

Predictive Abilities of PHR, OAIS, and OSPE for the Social Studies Females. A regression analysis of the social studies female students is presented in Table 34 and Table 35. The multiple regression correlation for this group is .922. It is significant at the .05 level of confidence.

Table 34 shows the variables that contribute the most to the variance of STG. Soc. and Hum. are positive variables that are significant at the .01 level of confidence. Soc. U. is a positive variable that is significant at the .05 level. PHR, Set T., and Phy. are negative variables in the equation that are statistically significant. In interpreting this data, it is important to remember that the group has an N of 18.
### TABLE 32

PREDICTION OF STUDENT TEACHING GRADES FOR SOCIAL STUDIES GROUP FROM OAEIS SCORES, OSPE, AND PHR

(N = 39)

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>r with STG</th>
<th>Steps</th>
<th>F to enter</th>
<th>$R^a$</th>
<th>$R^2$</th>
<th>S-Est.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Int. Q.</td>
<td>-.29</td>
<td>1</td>
<td>3.33</td>
<td>.287</td>
<td>.083</td>
<td>1.433</td>
</tr>
<tr>
<td>OSPE</td>
<td>-.23</td>
<td>2</td>
<td>1.02</td>
<td>.328</td>
<td>.108</td>
<td>1.432</td>
</tr>
<tr>
<td>Crea. P.</td>
<td>.04</td>
<td>3</td>
<td>1.14</td>
<td>.368</td>
<td>.136</td>
<td>1.430</td>
</tr>
<tr>
<td>Bio.</td>
<td>-.23</td>
<td>4</td>
<td>.95</td>
<td>.400</td>
<td>.159</td>
<td>1.431</td>
</tr>
<tr>
<td>Ach. P.</td>
<td>.02</td>
<td>5</td>
<td>.30</td>
<td>.409</td>
<td>.167</td>
<td>1.446</td>
</tr>
<tr>
<td>Bus.</td>
<td>-.09</td>
<td>6</td>
<td>.54</td>
<td>.425</td>
<td>.181</td>
<td>1.456</td>
</tr>
<tr>
<td>Int. R.</td>
<td>.17</td>
<td>7</td>
<td>.26</td>
<td>.433</td>
<td>.188</td>
<td>1.473</td>
</tr>
<tr>
<td>Soc.</td>
<td>-.03</td>
<td>8</td>
<td>.27</td>
<td>.441</td>
<td>.195</td>
<td>1.491</td>
</tr>
</tbody>
</table>

---

a The $R$ in each step involves the variable in that step combined with all previously selected variables.

b Significant at .05 level.
TABLE 33

PREDICTION OF STUDENT TEACHING GRADES
FOR SOCIAL STUDIES MALE GROUP
FROM OAIS, OSPE, PHR

(N = 21)

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>r with STG</th>
<th>Steps</th>
<th>F to enter</th>
<th>R^a</th>
<th>R^2</th>
<th>S-Est.</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHR</td>
<td>-.422</td>
<td>1</td>
<td>4.11</td>
<td>.422</td>
<td>.178</td>
<td>1.570</td>
</tr>
<tr>
<td>Soc. U.</td>
<td>-.369</td>
<td>2</td>
<td>4.50</td>
<td>.585</td>
<td>.342</td>
<td>1.442</td>
</tr>
<tr>
<td>Crea. P.</td>
<td>.164</td>
<td>3</td>
<td>1.74</td>
<td>.635</td>
<td>.403</td>
<td>1.414</td>
</tr>
<tr>
<td>Ach. P.</td>
<td>-.052</td>
<td>4</td>
<td>.48</td>
<td>.648</td>
<td>.421</td>
<td>1.436</td>
</tr>
<tr>
<td>OSPE</td>
<td>-.284</td>
<td>5</td>
<td>.20</td>
<td>.654</td>
<td>.428</td>
<td>1.473</td>
</tr>
<tr>
<td>Bus.</td>
<td>-.111</td>
<td>6</td>
<td>.25</td>
<td>.662</td>
<td>.438</td>
<td>1.512</td>
</tr>
<tr>
<td>Int. Q.</td>
<td>-.331</td>
<td>7</td>
<td>.16</td>
<td>.667</td>
<td>.445</td>
<td>1.560</td>
</tr>
<tr>
<td>Phy.</td>
<td>.203</td>
<td>8</td>
<td>.11</td>
<td>.670</td>
<td>.450</td>
<td>1.616</td>
</tr>
</tbody>
</table>

^aThe R in each step involves the variable in that step combined with all previously selected variables.

^bSignificant at .05 level.
### TABLE 34

**PREDICTION OF STUDENT TEACHING GRADES FOR SOCIAL STUDIES FEMALE GROUP FROM OAIS, OSPE, PHR**

*(N = 18)*

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>r with STG</th>
<th>Steps</th>
<th>F to enter</th>
<th>R²</th>
<th>R ²</th>
<th>S-Est.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hum.</td>
<td>.30</td>
<td>1</td>
<td>1.61</td>
<td>.302</td>
<td>.091</td>
<td>1.19</td>
</tr>
<tr>
<td>PHR</td>
<td>-.21</td>
<td>2</td>
<td>4.60</td>
<td>.552</td>
<td>.304</td>
<td>1.079</td>
</tr>
<tr>
<td>Bio.</td>
<td>.24</td>
<td>3</td>
<td>2.26</td>
<td>.633</td>
<td>.401</td>
<td>1.037</td>
</tr>
<tr>
<td>Set T</td>
<td>.25</td>
<td>4</td>
<td>1.82</td>
<td>.690</td>
<td>.474</td>
<td>1.001</td>
</tr>
<tr>
<td>Phy.</td>
<td>-.28</td>
<td>5</td>
<td>5.64</td>
<td>.802</td>
<td>.643</td>
<td>.865</td>
</tr>
<tr>
<td>Soc. U.</td>
<td>.12</td>
<td>6</td>
<td>6.63</td>
<td>.881</td>
<td>.777</td>
<td>.714</td>
</tr>
<tr>
<td>Bus.</td>
<td>.05</td>
<td>7</td>
<td>1.61</td>
<td>.899</td>
<td>.808</td>
<td>.695</td>
</tr>
<tr>
<td>Crea. P.</td>
<td>-.16</td>
<td>8</td>
<td>2.60</td>
<td>.922</td>
<td>.851</td>
<td>.645</td>
</tr>
</tbody>
</table>

*The R in each step involves the variable in that step combined with all previously selected variables.*

*Significant at .05 level.*
TABLE 35
OPTIMUM PREDICTION EQUATION FOR SOCIAL STUDIES FEMALE GROUP FOR STUDENT TEACHING GRADES FROM O A I S, O S P E, AND PHR

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>Regression Coefficient</th>
<th>Standard Error</th>
<th>F to Remove</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHR</td>
<td>-3.8790</td>
<td>.8149</td>
<td>22.66(^a)</td>
</tr>
<tr>
<td>Soc.</td>
<td>0.2310</td>
<td>.0552</td>
<td>20.40(^a)</td>
</tr>
<tr>
<td>Hum.</td>
<td>0.2196</td>
<td>.0551</td>
<td>15.86</td>
</tr>
<tr>
<td>Set T</td>
<td>-0.1486</td>
<td>.0388</td>
<td>14.68</td>
</tr>
<tr>
<td>Phy.</td>
<td>-0.1208</td>
<td>.0378</td>
<td>10.23</td>
</tr>
<tr>
<td>Soc. U.</td>
<td>0.1185</td>
<td>.0460</td>
<td>6.63</td>
</tr>
</tbody>
</table>

Standard Error of Estimate = 0.714

\[ R = .881 \]

\[ R^2 = .777 \]

\[ d.f. = 1, 5 \]

\[ F = 6.38 \]

\[^a_Fb\ (05) = 6.61\]
Summary

This chapter reported on the findings of the study. In the first two sections, the predictive ability of the OAIS in terms of prediction of point-hour ratio and grades in student teaching for seniors in the College of Education was explored. Findings were presented for the total group, and the elementary and social studies groups separately. Since the social studies group was composed of both male and female students, the group data was analyzed to determine whether, when sex was considered, there was any significant difference in the predictive ability of the OAIS. The Achiever Personality scale was the most significant factor in predicting grade-point hour ratio for the total group and for the elementary group. The Ach. P. scale was also the most important factor in predicting student teaching grades for the total group and for the elementary group. Because of the small sample size, results with the social studies group was not as favorable.

In the third section of this chapter, the predictive ability of the OAIS scales in combination with the OSPE was explored in terms of prediction of point-hour ratio. Findings were presented for the total group and the various subgroups. OSPE was a significantly better predictor of PHR for the total group and the elementary
group than any of the OAIS Scales. Ach. P. made a significant contribution when combined with OSPE in the prediction equation for the total group and the elementary group. OSPE was a significant variable, along with Hum. for the social studies group as a whole but was not a significant factor in the prediction equations of the male and female social studies subgroups.

In the last section of this chapter, the predictive ability of the OAIS Scales, OSPE, and point-hour ratio was explored in terms of prediction of student teaching grades. Findings were presented for the total group and the various subgroups. PHR was by far the best predictor of student teaching grades for the total group and the elementary group. Because of the small sample size, results from the social studies group did not provide any information of sufficient value to warrant any conclusions being made.
CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

The purpose of this study was to investigate the problem of developing a means of predicting more accurately than in the past the academic achievement of professional students enrolled in the College of Education. More specifically, The Opinion, Attitude, and Interest Survey, a new instrument designed to make an accurate appraisal of potential of students enrolled in colleges and universities, was used to test certain null hypotheses in an effort to provide information concerning the feasibility of using it to assess the academic potential of students enrolled in the College of Education.

The null hypotheses were:

(1) There is no relationship between college grade-point averages of seniors in the College of Education and their performances on the OAIS.

(2) There is no relationship between grades in student teaching and students' performances on the OAIS.
The subjects used in this study included 152 senior students enrolled in the College of Education at The Ohio State University. There were 107 students enrolled in elementary student teaching and 45 students enrolled in social studies student teaching participating in the study. The elementary group was a homogenous group of 106 women and one man. The social studies group was comprised of 25 men and 20 women.

Multiple regression analysis was performed for the total group, for the elementary group, the social studies group, the social studies males, and the social studies females. Differential prediction was determined for these groups. The statistical analysis was performed on the IBM 7094 computer at the Numerical Computation Laboratory of the Ohio State University Research Foundation. A stepwise regression analysis was employed. The fourteen OAIS Scales, the OSPE, and point-hour ratio were the independent variables, and point-hour ratio and grades in student teaching were the dependent variables.

**Summary of Review of Literature**

The review of the literature included studies dealing with predicting success in college, studies investigating the prediction of teacher effectiveness, and studies investigating the validity of the OAIS as a predictive
There was an extensive amount of studies dealing with the first two topics, but only a limited number of studies which concerned themselves with the last topic. A study of the literature in these three areas revealed the need for a considerable amount of research since the studies done in these areas have left a lot of unanswered questions.

High school grades have been found in the majority of studies to be the best predictor of academic achievement in college. In general, correlations between high school grades and academic achievement have averaged around .50, leaving much to be desired in terms of precision of prediction. Using two or more predictors has increased the precision of prediction but not significantly. Recently, attention has been given to the effectiveness of non-intellectual factors in predicting academic performance. Results have been generally disappointing; however, it is felt that non-intellectual factors do influence academic performance. Therefore, considerable use has been made of non-intellectual variables in predicting academic performance.

Investigators of the prediction of teacher effectiveness have not only employed different devices as predictors, but have used different criteria of teacher effectiveness. Furthermore, it is apparent from the studies that there is not a consistent relationship between degrees of
intelligence as measured by the ability tests used in the studies and corresponding success in teaching. The Minnesota Teacher Attitude Inventory and the Minnesota Multiphasic Personality Inventory have been the most widely used predictors of teaching success. Although grade-point average and grade in student teaching have been used extensively as criteria of teaching effectiveness, ratings by skilled observers, by supervising teachers, and by supervisors and principals have been considered more desirable as ultimate criterion of teaching effectiveness.

The Opinion, Attitude, and Interest Survey has only recently been made available for research purposes. The few studies already completed have produced some encouraging results. The Achiever Personality Scale of the OAIS has proved of value in predicting academic achievement in college because it appears to measure something different from what is measured by ability tests and, at the same time, does just as good a job of predicting. The test was designed to predict success in college for college-bound twelfth graders and for entering college freshmen, but it has been used with medical students, trade and industrial education teachers, and other similar groups with some success.
Prediction of PHR from OAIS Scales

Ach. P. had the highest correlation with PHK for the total group and for the elementary group. Hum. had the highest correlation with PHK for the social studies group. Soc. U. had the highest correlation for PHR for the social studies female students. Int. Q. had the highest correlation with PHR for social studies males, .42, and correlated relatively well with PHR in the other four groups. Phy. correlated well with PHR for the elementary group and the total group. Hum. correlated well with PHR for the social studies group as a whole and for the social studies male group and the social studies female group. Crea. P. correlated well with PHR for the social studies group as a whole.

The total group and the elementary group were the only groups in which the same variables were significant at the .05 level of significance. Ach. P. appeared to make the greatest contribution to the regression equation in both groups. Its contribution appeared to be greatest to the regression equation for the elementary group. Int. Q. was another factor that made a statistically significant contribution in these two groups.

Hum. was a significant variable in the regression equation for the social studies group when included in a regression equation consisting of two other OAIS variables. Soc. U. and Crea. P. were significant positive variables.
in the regression equation for the Social Studies female group, and M. O. was a significant negative variable in the same equation.

Table 36 presents a summary of multiple regression correlations. The OAIS scales yielded multiple r's from .509 to .886. The greatest amount of variance of the PHR attributed to the OAIS is with the Social Studies males, .747, and Social Studies females, .886. The small numbers in these two samples may have contributed to the high coefficients of multiple correlation for these two groups.

Analysis of the separate regression equations for Social Studies males and females indicates that the multiple coefficient of correlation for females is .135 higher than for Social Studies males. This difference is not significant at the .05 level of confidence. Because of the small number of students in each sample, it is difficult to evaluate the importance of this information.
<table>
<thead>
<tr>
<th>Group</th>
<th>Sample</th>
<th>r</th>
<th>$r^2$</th>
<th>S-Est.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>152</td>
<td>.509</td>
<td>.259</td>
<td>.380</td>
</tr>
<tr>
<td>Elementary</td>
<td>107</td>
<td>.643</td>
<td>.413</td>
<td>.368</td>
</tr>
<tr>
<td>Social Studies</td>
<td>45</td>
<td>.565</td>
<td>.319</td>
<td>.311</td>
</tr>
<tr>
<td>Social Studies Males</td>
<td>25</td>
<td>.747</td>
<td>.557</td>
<td>.299</td>
</tr>
<tr>
<td>Social Studies Females</td>
<td>20</td>
<td>.886</td>
<td>.786</td>
<td>.188</td>
</tr>
</tbody>
</table>
Prediction of Student Teaching Grades from OAIS Scales

Ach. P. had the highest correlation with student teaching grades for the elementary group, .28. Ach. P., .21, and E. A., .21, had the highest correlation with student teaching grades for the total group. Bio., .17, had the highest correlation with student teaching grades for the social studies group. Crea. P., .20, had the highest correlation with student teaching grades for the social studies male student group. Hum., .38, had the highest correlation with student teaching grades for the social studies female student group. E. A., .25, and Bio., .20, are two factors which have a relatively high correlation with student teaching grades for the elementary group. Bio., .34, is another variable which had a relatively high correlation with student teaching grades for the social studies female student group.

Ach. P. and E. A. were statistically significant variables in the regression equations of both the total group and the elementary group. None of the variables in the social studies group as a whole or the male social studies group were significant. Bio., Hum. and Soc. were all statistically significant positive variables in the female social studies group. Ach. P. was a significant negative variable in the same equation. The small sample size (N = 20) may account for the significant results obtained for the female social studies group.
Table 37 presents a summary of multiple regression correlations. The OAIS scales yielded multiple r's from .338 to .912. The greatest amount of variance of the PHR attributed to the OAIS is with the social studies males, .598, and the social studies females, .912. The small numbers in these two samples may have contributed to the high coefficients of multiple correlation for these two groups.

Analysis of the separate regression equations for social studies males and females indicates that the multiple regression coefficient for social studies females is .314 higher than for the social studies males. This difference is significant at the .05 level of confidence. Interpretations of what this means is difficult because the sample sizes are so small; however, it appears that male and female students in the social studies group are in some way different in how they respond to the criterion.

**Prediction of Point-Hour Ratio from OAIS Scales and OSPE**

OSPE was a significantly better predictor of point-hour ratio for the total group and the elementary group than any of the OAIS Scales. The best regression equation was obtained with these two groups when OSPE was included with Ach. P. and S. A. In these equations, OSPE and Ach. P. were positive variables, significant at the .01 level of confidence. S. A. was a negative variable
and also was significant at the .01 level. OSPE was not as effective a predictor for the social studies groups but was a significant variable in the regression equation for the social studies group as a whole.

**Prediction of Student Teaching Grades from OAIS Scales, OSPE, and Point-Hour Ratio.**

PHR was the most significant variable in predicting student teaching grades for the total group and the elementary group. E. A. is also a statistically significant variable in the regression equation for the total group. PHR is the only statistically significant variable in the regression equation for the elementary group. PHR was not an effective predictor of student teaching grades for the social studies group as a whole or for the social studies subgroups.
### Table 37

**Summary of Multiple Correlations Using OAIS Scales as Predictor Variables and Grade in Student Teaching as the Criterion**

<table>
<thead>
<tr>
<th>Group</th>
<th>Sample</th>
<th>$r$</th>
<th>$r^2$</th>
<th>S-Est.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total</strong></td>
<td>152</td>
<td>.338</td>
<td>.114</td>
<td>1.75</td>
</tr>
<tr>
<td><strong>Elementary</strong></td>
<td>107</td>
<td>.439</td>
<td>.193</td>
<td>1.806</td>
</tr>
<tr>
<td><strong>Social Studies</strong></td>
<td>45</td>
<td>.395</td>
<td>.156</td>
<td>1.471</td>
</tr>
<tr>
<td><strong>Social Studies Males</strong></td>
<td>25</td>
<td>.598</td>
<td>.358</td>
<td>1.825</td>
</tr>
<tr>
<td><strong>Social Studies Females</strong></td>
<td>20</td>
<td>.912</td>
<td>.831</td>
<td>.658</td>
</tr>
</tbody>
</table>
Possible Negative Effects on the Results

Although findings indicate that several of the scales of the OAIS, particularly the Ach. P. Scale, could be helpful in predicting success in the College of Education, the results did not support the hypotheses made to the extent it had been hoped they would. One possible explanation may have been the small sample size, particularly since results were negative in the groups which were composed of small samples. Secondly, the students may have faked the results in order to make a favorable impression. Since the subjects were told very clearly that the information was to be kept confidential and would not be a factor in their grades, the motivation to fake the inventory should not have been very strong.

A third factor is: How effective are student teaching grades as a criterion measure? Since student teacher grades are the subjective evaluation of one individual who sees only a small sample of each student's behavior, there is some question about how valid his rating is. Secondly, since one individual can evaluate only a certain number of students, the evaluating is done by different individuals who may use slightly different criteria in rating students.
Conclusions

A consideration of the findings which resulted from an analysis of the data resulted in the following conclusions:

1. Of those factors studied, point-hour ratio appears to be the best predictor of performance in student teaching for elementary education students at Ohio State University. The ability of PHR to predict performance in student teaching was not significantly improved by the inclusion of OSPE or any of the OAINS scales in a regression equation. This information should be valuable in selecting students for admission to the professional teaching curriculum.

2. OSPE was found to be the best predictor of point-hour ratio for elementary education students enrolled at Ohio State University. Ach. P. makes a significant contribution to a prediction equation when combined with OSPE. This information should be valuable in counseling entering freshmen interested in
elementary education and in the selection process when selection takes place before entrance to college.

3. The sample of social studies students used in this study was too small to determine if any of the variables contribute significantly to the prediction of academic performance of secondary education students enrolled at Ohio State University.

4. Three of the fourteen OAIS scales made a significant contribution to the prediction of academic performance for the 107 elementary education students. Ach. P. had the highest r and contributed the most to the regression equation. Apparently academic motivation, as measured by the Achiever Personality Scale is positively related to the academic performance of students in this group. Bio. and Int. Q. are the other two factors which are positively related to the academic performance of students in this group.

5. The Achiever Personality Scale and the Emotional Adjustment Scale of the OAIS made a significant contribution to the prediction of performance in student teaching for the
107 elementary education students. The Social Studies sample was too small to determine if the OAIS Scales contribute significantly to the prediction of performance in student teaching for secondary education students enrolled at Ohio State University.

6. The difference between the multiple regression correlations for male and female social studies students is statistically significant. Apparently there are differences between these groups which would affect the way they would respond to the OAIS and necessitate using separate regression equations if the OAIS were used to predict student teaching grades for secondary education students. This information should be used with caution because of the small size of the samples investigated in this study.

Recommendations

This investigation did not reveal enough information about the relationship of OAIS and academic achievement of professional students enrolled in the College of Education to warrant its use in selecting students for teacher education programs or for counseling students concerning
their choice of teaching as a career. Further investigation of the OAIS as a tool in prediction of academic achievement of students in the College of Education would be worthwhile. In future investigations, it would be desirable to include separate regression equations for male and female students and Secondary and Elementary Education students. Sample size should be larger, with no single group containing fewer than 100 subjects. Furthermore, investigations should include a cross section of students from a number of universities to determine if any differences exist in the results obtained at different universities from different sections of the country.

In the future, it is hoped that investigations can be conducted using the OAIS scales as predictors of teaching effectiveness using a suitable ultimate criterion. Longitudinal studies of teaching effectiveness should be made following up students after they leave school and using ratings by skilled observers and supervisors and principals as ultimate criterion of teaching effectiveness.

The Achiever Personality Scale and the Emotional Adjustment Scales appear to have some value in the prediction of teaching effectiveness of elementary teachers. Future investigations should be conducted to determine their value either singularly or in combination with other factors in prediction of success in elementary teaching.
The high correlation, .36, between the Achiever Personality Scale and the total group of 152 Education students suggests that it is a good measure of academic motivation and should be given consideration for inclusion in any test battery designed to predict the academic success of graduate and professional students such as those enrolled in the College of Law, the College of Medicine, the College of Veterinary Medicine, etc. Investigation of the Ach. P.'s value is especially important because academic motivation is an important factor in the academic success of relatively homogenous groups.
BMD02R - STEPWISE REGRESSION

GENERAL DESCRIPTION

a. This program computes a sequence of multiple linear regression equations in a stepwise manner. At each step, one variable is added to the regression equation. The variable added is the one which makes the greatest reduction in the error sum of squares. Equivalently it is the variable which has highest partial correlation with the dependent variable partialled on the variables which have already been added; and equivalently it is the variable which, if it were added, would have the highest F value. In addition, variables can be forced into the regression equation. Non-forced variables are automatically removed when their F values become too low. Regression equations with or without the regression intercept may be selected.

b. Output from this program includes:

(1) At each step:
(a) Multiple R
(b) Standard Error of Estimate
(c) Analysis-of-variance Table
   1. Regression coefficient
   2. Standard error
   3. F to enter
(2) Optional output prior to performing regression:
   (f) Means and standard deviations
   (g) Covariance matrix
   (h) Correlation matrix

(3) Optional output after performing regression:
   (i) List of residuals
   (j) Plots of residuals versus input variables
   (k) Summary table

c. Limitations per problem:
   (1) \( p \), number of original variables \((2 \leq p \leq 80)\)
   (2) \( 2 \), number of variables added by trans-generation \((-9 \leq q \leq 78)\)
   (3) \( p \) and \( q \), total number of variables \((2 \leq p+q \leq 80)\)
   (4) \( s \), number of sub-problem cards \((1 \leq s \leq 10)\)
   (5) \( k \), number of Variable Format Cards \((1 \leq k \leq 10)\)
   (6) \( i \), number of variables to be plotted \((0 \leq i \leq 30)\)
   (7) \( n \), number of cases \((1 \leq m \leq 9999)\)
   (8) \( m \), number of Transgeneration Cards \((0 \leq m \leq 99)\)
COMPUTATIONAL PROCEDURE

Step 1. The data are read and transgenerated (see Introduction, Section III-B). Let \( p \) denote the number of variables after transgeneration, \( n \) the number of cases and \( x_{ij} \) the value of the \( j \)th variable, after transgeneration, for the \( i \)th case. The means

\[
\bar{x}_i = \frac{1}{m} \sum_{k=1}^{n} x_{ki} \quad i = 1, \ldots, p
\]

are computed and, if called for, printed. If a zero regression intercept is not requested on the Problem Card, the matrix \( \alpha \)

\[
as_{ij} = \sum_{k=1}^{n} (x_{ki} - \bar{x}_i)(x_{kj} - \bar{x}_j) \quad i, j = 1, \ldots, p
\]

is computed. If a zero regression intercept is requested, the matrix \( \alpha \)

\[
as_{ij} = \sum_{k=1}^{n} x_{ki}x_{kj} \quad i, j = 1, \ldots, p
\]

is computed instead.

Step 2. The covariances, standard deviations, and correlations

\[
s_{ij} = \frac{s_{ij}}{(n-1)} \quad i, j = 1, \ldots, p
\]

\[
s_i = \sqrt{s_{ii}} \quad i = 1, \ldots, p
\]

\[
r_{ij} = \frac{s_{ij}}{s_is_j} \quad i, j = 1, \ldots, p
\]
are computed and, if called for, printed. It should be noted that if the zero regression intercept option is chosen, these statistics will not be centered about the mean. A similar statement applies to all the computations which follow.

**Step 3.** At each step in the Stepwise regression procedure, the variables \( x_1, \ldots, x_p \) are divided into two disjoint sets:

- \( x_{j_1}, \ldots, x_{j_q} \): The independent variables in the regression equation.
- \( x_{j_{q+1}}, \ldots, x_{j_r} \): The remaining variables including the dependent variable \( y - x_d \).

For purposes of exposition, assume that \( x_{j_1}, \ldots, x_{j_q} \) are the first \( q \) variables \( x_1, \ldots, x_q \). The regression equation at a typical step then has the form

\[
y = \alpha + \beta_1 x_1 + \ldots + \beta_p x_p + \epsilon
\]

Let

\[
A = \begin{bmatrix}
A_{11} & A_{12} \\
A_{21} & A_{22}
\end{bmatrix}
\]

where \( A_{11} \) is \( q \times q \) be a partition of the matrix \( A \) from Step 1; let

\[
B = \begin{bmatrix}
A_{11} & -1 & A_{11} & A_{12} & -1 \\
-1 & A_{11} & A_{12} & -1 \\
A_{21} & A_{11} & A_{22} & -A_{21} & A_{11} & A_{12}
\end{bmatrix}
\]

let \( n = n-1 \) if a zero regression intercept is not requested; and let \( m = n \) if it is requested.
For each step in the stepwise procedure the following are computed and printed:

The residual degrees of freedom, sum of squares, and mean square.

\[ \text{df} = m-q, \quad \text{SS} = b_{dd'}, \quad \text{MS} = \text{SS}/\text{df} \]

The regression degrees of freedom, sum of squares, mean square, and F value.

\[ \text{rdf} = q, \quad \text{RSS} = a_{dd} - b_{dd} \]
\[ \text{RMS} = \text{RSS}/\text{rdf}, \quad F = \text{RMS}/\text{MS} \]

The standard error of estimate and multiple correlation coefficient.

\[ S = \sqrt{\text{MS}}, \quad R = \sqrt{\text{RSS}/a_{dd}} \]

For each independent variable \( x_i \) in the regression equation, the following are computed and printed:

The regression coefficient, its standard error, and F value.

\[ B_i = b_{id}, \quad s_i = b_{i1} s, \quad F_i = (B_i/s_i)^2 \]

If a zero regression intercept is not requested, the intercept \( \alpha \) is computed.

\[ \alpha' = \sum_{i=1}^{q} B_i x_i \]

For each independent variable \( x_i \) not in the regression equation, the following are computed and printed:

The tolerance level, partial correlation coefficient, and F value.

\[ T_i = b_{i1}/s_{11}, \quad R_i = \frac{b_{id}}{\sqrt{b_{ii} b_{dd}}}, \quad F_i = \frac{b^2 (m-q-1)}{b_{i1} b_{dd} - b_{i1}^2} \]
Step 4. To move from one step to the next, an independent variable is added to or removed from the regression equation according to the following three rules:

(1) If there are one or more independent variables in the regression equation whose control value, as specified by the Control-Delete Card, is 2 (i.e., a free variable) and whose F value is less than the "F-to-remove" value specified on the Sub-problem Card, the one with the smallest F value will be removed.

(2) If no variable is removed by (1) and there are one or more independent variables not in the regression equation which pass the tolerance test and have control values of 3 or more (i.e., forced variables), the one which has the highest control value and the highest F value among all with the same control value will be added.

An independent variable $x_1$ not in the regression equation is said to pass the tolerance value $T_1$ if its tolerance value $T_1$ is greater than or equal to the "minimum tolerance value" specified on the Sub-problem Card.
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