RELATIONSHIPS BETWEEN THE NATIONAL TEACHER EXAMINATIONS, CERTAIN VARIABLES, AND SECONDARY TEACHER EDUCATION CURRICULA

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RELATIONSHIPS BETWEEN THE NATIONAL TEACHER EXAMINATIONS, CERTAIN VARIABLES, AND SECONDARY TEACHER EDUCATION CURRICULA

DISSERTATION

Presented to the Graduate Council of the North Texas State University in Partial Fulfillment of the Requirements

For the Degree of

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By

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# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>LIST OF TABLES</th>
<th>iv</th>
</tr>
</thead>
</table>

**Chapter**

<table>
<thead>
<tr>
<th>I. INTRODUCTION</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Statement of the Problem</td>
<td></td>
</tr>
<tr>
<td>Purpose of the Study</td>
<td></td>
</tr>
<tr>
<td>Hypotheses</td>
<td></td>
</tr>
<tr>
<td>Definition of Terms</td>
<td></td>
</tr>
<tr>
<td>Basic Assumptions</td>
<td></td>
</tr>
<tr>
<td>Limitations of the Study</td>
<td></td>
</tr>
<tr>
<td>Background and Significance of the Study</td>
<td></td>
</tr>
<tr>
<td>Procedures for Collecting Data</td>
<td></td>
</tr>
<tr>
<td>Procedures for Treating Data</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>II. SURVEY OF RELATED LITERATURE</th>
<th>20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nature of The National Teacher Examinations</td>
<td></td>
</tr>
<tr>
<td>Uses of The National Teacher Examinations</td>
<td></td>
</tr>
<tr>
<td>Criticisms of The National Teacher Examinations</td>
<td></td>
</tr>
<tr>
<td>Studies on The National Teacher Examinations</td>
<td></td>
</tr>
<tr>
<td>Summary</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>III. METHODS AND PROCEDURES</th>
<th>40</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subjects</td>
<td></td>
</tr>
<tr>
<td>Data Collection</td>
<td></td>
</tr>
<tr>
<td>Description of Instruments</td>
<td></td>
</tr>
<tr>
<td>Procedures for Treating Data</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>IV. PRESENTATION AND ANALYSIS OF DATA</th>
<th>54</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>V. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS</th>
<th>110</th>
</tr>
</thead>
<tbody>
<tr>
<td>Summary</td>
<td></td>
</tr>
<tr>
<td>Conclusions</td>
<td></td>
</tr>
<tr>
<td>Recommendations for Further Study</td>
<td></td>
</tr>
</tbody>
</table>

| BIBLIOGRAPHY | 122 |
### LIST OF TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>I.</td>
<td>Number of Graduates in Teaching Areas for 1966-67 Academic Year</td>
<td>41</td>
</tr>
<tr>
<td>II.</td>
<td>Size of High School from Which Students Graduated</td>
<td>41</td>
</tr>
<tr>
<td>III.</td>
<td>Courses and Number of Semester Hours Required of Secondary Teacher Education Majors and Related National Teacher Examinations</td>
<td>42</td>
</tr>
<tr>
<td>IV.</td>
<td>The Intercorrelation Among Scores on The National Teacher Examinations and Grade-point Averages of Secondary Teacher Education Majors (N = 249)</td>
<td>55</td>
</tr>
<tr>
<td>V.</td>
<td>The Intercorrelation of Scores on The National Teacher Examinations and Scores on the School and College Ability Tests (N = 249)</td>
<td>57</td>
</tr>
<tr>
<td>VI.</td>
<td>The Intercorrelations Among the Independent Variables and the Criterion Variable for Secondary Teacher Education Majors (N = 249)</td>
<td>61</td>
</tr>
<tr>
<td>VII.</td>
<td>Intercorrelation of Scores Made by Females on the Common Examinations and Certain Variables (N = 139)</td>
<td>65</td>
</tr>
<tr>
<td>VIII.</td>
<td>Intercorrelation of Scores Made by Males on the Common Examinations and Certain Variables (N = 110)</td>
<td>68</td>
</tr>
<tr>
<td>IX.</td>
<td>Intercorrelation of Scores Made by Students Graduating from Size A Schools on the Common Examinations and Certain Variables (N = 27)</td>
<td>71</td>
</tr>
<tr>
<td>X.</td>
<td>Intercorrelation of Scores Made by Students Graduating from Size AA Schools on the Common Examinations and Certain Variables (N = 108)</td>
<td>74</td>
</tr>
<tr>
<td>Table</td>
<td>Page</td>
<td></td>
</tr>
<tr>
<td>-------</td>
<td>------</td>
<td></td>
</tr>
<tr>
<td>XI. Intercorrelation of Scores Made by Students Graduating from Size AAA Schools on the Common Examinations and Certain Variables (N = 108)</td>
<td>76</td>
<td></td>
</tr>
<tr>
<td>XII. Intercorrelation of Scores on the Criterion Variable for Majors in Art Education and Grade-point Averages in Selected Areas (N = 15)</td>
<td>80</td>
<td></td>
</tr>
<tr>
<td>XIII. Intercorrelation of Scores on the Criterion Variable for Majors in Biology and General Science Education and Grade-point Averages in Selected Areas (N = 10)</td>
<td>82</td>
<td></td>
</tr>
<tr>
<td>XIV. Intercorrelation of Scores on the Criterion Variable for Majors in Business Education and Grade-point Averages in Selected Areas (N = 37)</td>
<td>84</td>
<td></td>
</tr>
<tr>
<td>XV. Intercorrelation of Scores on the Criterion Variable for Majors in English Education and Grade-point Averages in Selected Areas (N = 32)</td>
<td>87</td>
<td></td>
</tr>
<tr>
<td>XVI. Intercorrelation of Scores on the Criterion Variable for Majors in Home Economics Education and Grade-point Averages in Selected Areas (N = 17)</td>
<td>89</td>
<td></td>
</tr>
<tr>
<td>XVII. Intercorrelation of Scores on the Criterion Variable for Majors in Industrial Arts Education and Grade-point Averages in Selected Areas (N = 18)</td>
<td>92</td>
<td></td>
</tr>
<tr>
<td>XVIII. Intercorrelation of Scores on the Criterion Variable for Majors in Mathematics Education and Grade-point Averages in Selected Areas (N = 21)</td>
<td>94</td>
<td></td>
</tr>
<tr>
<td>XIX. Intercorrelation of Scores on the Criterion Variable for Majors in Music Education and Grade-point Averages in Selected Areas (N = 16)</td>
<td>97</td>
<td></td>
</tr>
</tbody>
</table>
Table

XX. Intercorrelation of Scores on the Criterion Variable for Majors in Physical Education and Grade-point Averages in Selected Areas (N = 32) .................. 99

XXI. Intercorrelation of Scores on the Criterion Variable for Majors in Social Science Education and Grade-point Averages in Selected Areas (N = 51) ............. 101

XXII. The Multiple Correlation of the Criterion and Predictor Variables; Number of Majors; Standard Error of the Multiple Correlation; and Coefficient of Determination by Major Teaching Area ... 105

XXIII. The Multiple Correlation of the Criterion and Predictor Variables; Number of Majors; Standard Error of the Multiple Correlation; and Coefficient of Determination by Group ................. 106

XXIV. Rank Order Multiple Correlation of Combinations of Criterion and Predictor Variables; Number of Majors; Standard Error of the Multiple Correlation and the Coefficient of Determination .... 108
CHAPTER I

INTRODUCTION

The times and pressures of our society make it mandatory for teacher education institutions to graduate persons who are highly competent. These institutions must produce teachers who compare favorably with other professionals, and an attempt to do this has been the concern of researchers for quite a long time. Gage (15) stated that

Research on teaching has been going on almost as long as research on learning. Some studies were made in the 1910's and 1920's, and quite a few were made during the 1930's. By the early 1950's, substantial reviews and bibliographies of research on teaching began to appear (15, p. 120).

A half century of research has failed to arrive at any definite statement of what constitutes effective teaching. Wilhelms (36) stated that "The act of teaching is so personal a thing that there literally cannot be one 'right' way of doing it--one set of methods that is best for all of the varied personalities involved" (36, p. 11). Still, the lay public, as well as professionals themselves, seem to agree that high standards of preparation are essential for better education.

Prediction of teaching effectiveness has been approached in numerous ways. It was noted in the Encyclopedia of Educational Research (20) that
The general approaches to the measurement of criterion of teacher effectiveness involve the evaluation of either (a) teacher behavior in process; (b) a product of teacher behavior, or (c) concomitants of teacher behavior. Measurement of ongoing behavior of the teacher is the most direct approach; measurement of products and of concomitants are more indirect and more subject to the effects of confounding conditions (20, p. 1487).

Ryans (29) has divided these approaches into ratings of teacher ability and measurement of pupil behavior. Of the two, it has been generally agreed that ratings of the teacher are the most frequently employed (1, 29, 32, 35).

Rabinowitz (28) stated that, in the study of teaching ability, extensive use has been made of strictly empirical procedures, such as questionnaires, inventories, schedules, ratings and tests. Despite this fact, he stated further that it must be recognized that the ultimate conception of the effective teacher is not entirely an empirical matter. There is no way to discover the characteristics which distinguish effective and ineffective teachers unless one has made or is prepared to make a value judgment. "The ultimate definition of the effective teacher does not involve discovery but decree" (28, p. 212).

The changing nature of the American scene, characterized by mushrooming enrollments, urbanization, and great population mobility, makes teacher selection increasingly difficult. Therefore, educational leaders have been forced to use those methods that are available in spite of their limitations (2). They are aware that criteria must be used
which are comprehensive, reliable, valid, and objective (4, 6, 7, 16, 25, 39). In an attempt to meet this challenge, an increasing number of institutions, school systems, and employing agencies have begun to use The National Teacher Examinations.

Statement of the Problem

The problem of this study was to determine the relationships between scores on The National Teacher Examinations, certain variables, and secondary teacher education curricula.

Purposes of the Study

The purposes of this study were, first, to determine the degree and direction of relationships between scores on The National Teacher Examinations and certain variables for the two hundred and forty-nine secondary teacher education majors included in this study. Specifically, it sought to determine if there were statistically significant correlations between scores on The National Teacher Examinations and each of the following variables: (a) grade-point averages in General Education, Professional Education, Student Teaching and Major Teaching Area, and (b) scores on the School and College Ability Tests according to each student's (1) sex, (2) major teaching area and (3) size of the high school from which he graduated. It sought also to determine
the best predictors, among the selected variables, of scores on The National Teacher Examinations.

Hypotheses

In order to accomplish the purposes of this study, the following hypotheses were tested:

1. There will be significant positive correlation between scores on The National Teacher Examinations and the grade-point averages of secondary teacher education majors in the following areas:
   a. General Education
   b. Professional Education
   c. Major Teaching Area
   d. Student Teaching

2. There will be significant positive correlation between scores on The National Teacher Examinations and scores on the School and College Ability Tests.

3. The multiple correlation of scores on The National Teacher Examinations, scores on the School and College Ability Tests and grade-point averages in General Education, Professional Education, Student Teaching and Major Teaching Areas of secondary teacher education majors will be significantly positive.

4. The prediction of scores on The National Teacher Examinations, through the use of grade-point averages in General Education, Professional Education, Student Teaching
and Major Teaching Area, and scores on the School and College Ability Tests, will yield the best predictive value when categorized by sex, Major Teaching Area, and size of high school.

Definition of Terms

**Professional Education:** the sequence of twenty-one semester hours of education courses required of all secondary teacher education majors (Table III, p. 42).

**General Education:** the sequence of forty-two hours of core courses required of all students enrolled in the College (Table III, p. 42).

**Weighted Total Score(s) of The National Teacher Examinations:** the three-digit scaled score of the Weighted Common Examinations or Teaching Area Examinations score (34, p. 10).

**Subtest Score(s) of The National Teacher Examinations:** the scaled scores that represent subtests of the Weighted Common Examinations (34, p. 10).

**Certain Variables:** the variables that were used in this study. These included

A. **sex (male or female),**
B. **scores on the School and College Ability Tests, (Verbal, Quantitative and Total),**
C. **teaching area or major:** the completion of prescribed curriculum in a secondary education field with certification to teach in grades seven through twelve,
D. size of high school from which students graduated, using this scale:

- A = 0–199 students
- AA = 200–499 students
- AAA = 500 and more students

E. grade-point averages: grades earned in each course were expressed in numerical values and averaged by the following formula:

- A = 4 points
- B = 3 points
- C = 2 points
- D = 1 point

Basic Assumptions

It was assumed that the instruments and data used were valid and reliable and could be used as stated in the purposes of this study.

Limitations of the Study

This study was limited to the two hundred and forty-nine students who completed requirements for graduation in secondary teacher education programs during the 1966-67 academic year at a predominantly Negro, state-supported, coeducational college in the South.

It was further limited to teaching areas that had Teaching Area Examinations on The National Teacher
Examinations and at least ten graduates during the 1966-67 academic year.

**Background and Significance of the Study**

This is an age that expects and demands achievement and proficiency in every field of endeavor. The education profession, along with other professions, is challenged, as never before, to up-grade the teaching profession. Educators seem to be in agreement that as part of the general improvement of teaching effectiveness a determined effort must be made to attract young people of superior qualifications into the ranks of the active practitioners and to discourage the obviously unfit (21, 22, 24, 35).

Lindsey stated that

Continuous improvement of teacher education programs and accreditation of these programs must be a direct concern of the profession. The profession must also have the courage and wisdom to see that the processes of selection and performance are constantly evaluated and improved and wisely and judiciously administered. This means the profession must refuse admission to whoever, in the judgment of those within the profession who are delegated responsibility for the decision is not qualified to enter the professional ranks. It also means the profession must see that judicious means are taken to eliminate from the profession whoever is not sufficiently competent through attitude and performance to assume and discharge his share of professional responsibility (22, p. 202).

Although recently there has been an increased interest in developing criteria for measuring teacher effectiveness, as early as 1915 Boyce (6) cited the need for such study. Since that time, annotated bibliographies and studies on
teacher competence have been overwhelming. Scientists such as Domas and Tiedeman (13), Mitzel (25), Ryans (29), and Gage (16) are among the researchers who have explored this topic. Biddle (4) was in agreement with these researchers when he concluded . . . "still no approved method of measuring competence has been accepted, and no methods of promoting teacher adequacy have been widely adopted" (4, p. 2).

Professional educators as well as the lay public have sensed the need to select carefully those who will teach. A review of the literature revealed that numerous and varied approaches have been used to meet this challenge (12, 18, 20, 29, 32, 35). One of the approaches which have become increasingly widespread has been the use of examinations (3, 18, 26, 31, 33). These examinations have been referred to by some educators as qualifying, or teacher-background examinations (3), and even as "fads" (37, p. 224), or pseudo-criteria of teacher effectiveness (25). In spite of the criticisms leveled at the use of examinations in assessing teacher competency, it is felt that the cognitive aspects of teaching are important. It has been generally agreed that "a teacher cannot know what to teach unless he has a mastery of subject matter . . ." (21, p. 23). However, the findings of studies of academic record as predictors of teaching success have been generally non-significant (28, 31, 38). Therefore, pressure, from state agencies and departments, local school systems, graduate schools, and
even from within the institutions themselves, has forced schools to search for some external evidence of their graduates' knowledge of effective teaching. The instrument most frequently used for this purpose has been The National Teacher Examinations (17, 31). It was developed in 1940 by the Educational Testing Service, of Princeton, New Jersey, as a service agency to school systems, colleges and universities, and state education departments (3, 8, 26, 31, 33). This test was used in the selection of teachers, in appraising teacher education programs, in the certification of teachers, in evaluating the professional growth of prospective teachers, and as one criterion for graduation (8, 9, 10, 13, 17, 19). The Educational Testing Service made no claim that The National Teacher Examinations predicted teaching effectiveness. Instead, Educational Testing Service stated that the test was designed to assess some of the knowledges in the professional, general and specialized education considered necessary for effective classroom teaching. "The chief purpose of The National Teacher Examinations was to provide an independent evaluation of the academic preparation of teacher education students" (34, p. 18).

Although there is a scarcity of published research on The National Teacher Examinations and its relationship to academic achievement, some research has been done. Perhaps one of the most extensive studies on the topic was done by
Pitcher (27), a staff member of Educational Testing Service. She investigated the relationship between academic success in teacher preparatory curricula as measured by cumulative grade-point averages, and scores on The National Teacher Common Examinations. Data were collected from eleven colleges and universities selected to represent the various types of institutions and regions of the United States which used The National Teacher Examinations. The results of the study indicated that grades and test scores did have a reasonably high relationship. The correlation ranged from .38 to .74, with an average correlation of .57. However, the correlations were low enough to suggest that each might have a unique contribution to make in evaluating teacher preparation.

The upsurge in the use of The National Teacher Examinations for certification of teachers, selection of teachers, appraisal of teacher education programs, evaluation of the professional growth of prospective teachers, and graduation from teacher education programs (8, 9, 10, 17, 18) warranted a close scrutiny of its nature and use. Since some schools require a critical score on The National Teacher Examinations for graduation (17, p. 92), it seemed to be important to ascertain not only relationships between scores on The National Teacher Examinations and other variables, but also the predictability of levels of performance on this test. Statistical treatments that showed these
relationships and predictors were the concern of the present study.

Procedures for Collecting Data

The following approaches were used for the collection of data in this study:

The sample of this study consisted of students who had completed a secondary teacher education curriculum during the 1966-67 academic year in the following areas: science education—biology; English education; industrial arts education; mathematics education; social science education; health and physical education; business education, music education; home economics education; and art education. The students had also taken The National Teacher Examinations, Commons and Teaching Area, before completing the requirements for graduation.

In order to study the relationships between scores on The National Teacher Examinations and grade-point averages, the academic records of all students in the teaching areas were obtained from the Registrar's Office and categorized into the areas as shown in Table III, p. 42.

The grade-point averages were computed on a four-point scale, as follows:

\[\begin{align*}
A &= 4 \text{ points} \\
B &= 3 \text{ points} \\
C &= 2 \text{ points} \\
D &= 1 \text{ point}
\end{align*}\]
Grades of F were not included, since all grades below D were failing and had to be repeated.

Scores on the Common Examinations of The National Teacher Examinations were secured and broken down into the total and subtest scores, as shown in Table III, p. 42. The Teaching Area Examinations were also obtained for each student, and correlated with the grade-point averages in the Major Teaching Area.

Scores on the School and College Ability Tests were also secured from the Personnel Office for each student in the study. Data were collected on each student from his academic record to indicate sex, Major Teaching Area, and size of school from which he graduated.

The Instruments Used

The National Teacher Examinations. The National Teacher Examinations consists of two main divisions: The Common Examinations and the Teaching Area Examinations with subtests as shown below:

The Common Examinations:

1. Psychological Foundations of Education
2. Societal Foundations of Education
3. Teaching Principles and Practices
4. Social Studies, Literature and Fine Arts
5. Science and Mathematics
6. Written English Expression
The professional education tests (1, 2, and 3 above) are concerned with general principles and methods of teaching, educational psychology, child development, guidance, measurement and evaluation, principles of curriculum development, and important research findings in education. The tests (4, 5 and 6 above) in English Expression, Social Studies, Literature and Fine Arts and in Science and Mathematics contain questions designed to measure the general educational background of college graduates; they do not attempt to evaluate advanced preparation in these areas.

The Teaching Area Examinations:

1. Education in the Elementary School
2. Early Childhood Education
3. Biology and General Science
4. English, Language and Literature
5. Industrial Arts Education
6. Mathematics
7. Chemistry, Physics, and General Science
8. Social Studies
9. Physical Education
10. Business Education
11. Music Education
12. Home Economics Education
13. Art Education

Each test is designed to evaluate the candidate's understanding of subject matter and methods in his teaching field.
The raw scores made on The National Teacher Examinations are converted to scaled scores, with different weights assigned to subtests.

The reliability coefficients of the tests, which were computed by a special procedure devised by Angoff, range from .86 to .90. For the weighted total score, a coefficient of .96 was reported. The coefficients for the optional exams were .91 or higher (34, p. 17).

The validity of The National Teacher Examinations scores appears to be of two types—content validity and concurrent validity. Educational Testing Service reports that

The procedures by which the examinations are developed provide a certain amount of a priori evidence for the content validity of The National Teacher Examinations. Evidence for the concurrent validity of The National Teacher Examinations can be found in the relationship between scores on the examinations and the criterion of grade-point average (34, p. 18).

School and College Ability Tests (SCAT).—The School and College Ability Tests is a measure of academic aptitude specifically designed to predict success in school or college. It focuses on two abilities—verbal and quantitative—which are generally developed in school and which are directly related to academic success. Verbal ability refers to the student's understanding of words and his ability to comprehend written materials, whereas the quantitative ability refers to the student's ability to perform fundamental operations with
numbers and to use reasoning to solve number problems. These combined scores also yield a total score which has a reliability coefficient of .95 (30, p. 3).

Procedures for Treating Data

When all of the data were compiled on each of the two hundred and forty-nine students, they were coded and prepared for data processing in the IBM Center. The data collected were treated in the following manner:

1. To test hypotheses one and two, correlations and intercorrelations were done according to the raw score Pearson Product Moment formula given by McNemar (23, p. 112).

2. To test hypothesis three, the coefficient of multiple correlation was computed (23, p. 178).

3. To test hypothesis four multiple correlation regression analysis was used. The means, standard deviations, coefficients of multiple correlation, coefficients of determination, standard error of estimates, beta weights and F tests were computed on all variables and selected combination of variables included in the study (23, p. 177).

4. To test the level of significance, the .05 per cent level was used.
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A review of the literature pertaining to The National Teacher Examinations seemed to fall into four major categories. The first category dealt with the nature of The National Teacher Examinations; the second category with the uses of The National Teacher Examinations; the third with the criticisms, pro and con, of the test; and the fourth category with research studies on The National Teacher Examinations. Since the concern of this study was to determine the relationships and predictability between scores on The National Teacher Examinations, certain variables and secondary teacher education curricula, it seemed logical to review the literature in these four areas.

Nature of The National Teacher Examinations

The National Teacher Examinations Program was inaugurated in 1940 under the auspices of the American Council on Education. It was developed to coordinate the testing of teacher applicants for a number of cooperating, city school systems, but its services were soon extended to include individual candidates and institutions preparing teachers.
In 1950, when Educational Testing Service, a non-profit organization, began to prepare and administer The National Teacher Examinations it followed along the lines incorporated in the initial program, which had the following features:

A battery of tests designed to measure knowledge and abilities expected of every teacher

Specialized tests to aid in assessing the teacher's understanding of subject matter and methods in his field of specialization

Centralized scoring and analysis of test results

Results expressed in terms of standard score scales

Norms and test analysis data based on broad samples of prospective teachers

Reporting of scores to the candidate and, as directed by him, to school systems and teacher education institutions

Research and development activities to assure technical excellence and appropriate modifications in the examinations (20, p. 4).

Flanagan (11) analyzed the first edition of The National Teacher Examinations. He found marked differences in the qualifications of candidates who were applying for the same teaching positions. Differences were also found among the programs and curricular patterns of institutions. In summarizing the procedures used by Educational Testing Service, he stated that the tests were made in cooperation with authorities and experts in specific areas of education. He also stated that careful preparation
and editing were done on The National Teacher Examinations before they were administered to students in teacher training institutions. The items selected for the tentative final form were criticized by a large number of experts in teacher education and administrative positions in school systems. On the basis of the criticisms of the preliminary form, the final test was completed and administered to 3726 candidates in 23 examining centers. The completed examinations were returned to Educational Testing Service for scoring, additional study and revision.

The National Teacher Examinations consists of a battery of tests designed to evaluate the quality of academic preparation in three important curricular areas of pre-service teacher education: professional education, general education, and field-of-teaching specialization. The examination is designed specifically for college seniors who have completed bachelors degree programs of pre-service preparation for teaching in the cognitive areas (1, p. 13). Stoddard (32) stated that these tests attempted to measure the teacher's equipment from the standpoint of facts, knowledge and skills, and to some extent, his ability to use these functionally.

The two main divisions of the test, the Common Examinations and the Teaching Area Examinations have discrete purposes. The Common Examinations provides a general
appraisal of a prospective teacher's professional and
general academic attainment, whereas the individual Teaching
Area Examinations evaluate the candidate's preparation in
specific teaching fields or areas. There are thirteen of
these examinations (20).

Major changes were made in The National Teacher Exami-
nations in 1964. These changes included the length of the
testing day and the administration dates for the program.
The Common Examinations is offered in its entirety during
the morning session, and the Teaching Area Examinations,
which is offered in the afternoon sessions, was lengthened
to two hours. The administration dates of the tests were
changed to four nationwide annual test dates (20, 24). New
forms of the tests are developed and validated each year.

Derthick (9) in a review of The National Teacher Exami-
nations summed up what has generally been accepted as a
part of the nature of this test. It is a test of the candi-
date's understanding of educational theory and specified
subject material.

Uses of The National Teacher Examinations

The National Teacher Examinations program grew out of
the need of school systems for an instrument to aid them in
selecting teachers (20). Stoddard (32), Crissy (8), and
Ryans (25), who were among the first reviewers of The
National Teacher Examinations stated that the examination
results might aid in discouraging those who did not have the fundamental equipment for teaching from going into the field (25, 32); they might be used as a means of furnishing school officials with supplementary evidence of the academic and cultural background of their graduates (8), and as a means of selecting teachers, assigning teachers for specific responsibilities, promotion of teachers, and the removal of teachers from probationary status. It was also reported that they were used for inservice guidance, counseling, and as bases for individual study.

A review of more recent literature on the uses of \textit{The National Teacher Examinations} revealed an increase in the uses made of the test. It was being used by state school systems, local school systems, and by colleges and universities that prepared teachers. The fifth and sixth Central Measurements Yearbooks (4, 28) listed among its uses the selection of teachers, the appraisal of teacher education programs, the certification of teachers and the evaluation of the professional growth of teachers. The Prospectus for School and College Officials (20, p. 11) and Boozer (3, p. 211) listed these major uses of the Examinations. Local school systems use the scores in selecting new teachers, in evaluating the potential of probationary teachers for continued growth in service and in considering the qualifications of experienced teachers for professional opportunity. State school systems use the results in adding
teaching fields to certificates previously issued by the state, awarding grants-in-aid for summer school attendance, awarding regular certificates, determining grade of certificate to be issued, evaluating credentials of applicants with atypical patterns of education, in lieu of certain courses required for certification in some fields, obtaining objective data as a basis of research on the quality of teacher education, renewing provisional certificates and validating credits earned at unaccredited institutions and toward special certificates. Colleges and universities use the scores for program evaluation, for counseling and placing students, for screening students for study in graduate school and as a requirement for graduation (13, p. 92).

Although Educational Testing Service conducted the test, it had no authority as to what use would be made of the results. Gruber (14) stated that the use made of it is left to the local school system, state school system or college and/or university using it.

The variety of uses that have been made of the test results has made this a current issue in education. Since the results were used in such crucial areas as entry into the profession (31), retention and promotion in the profession (5, 27) and even as a requirement for graduation from a teacher education institution (13), the criticisms and comments that have been aimed at the examination were expected.
Criticisms of The National Teacher Examinations

Rivlin (21) stated in the Fourth Mental Measurements Yearbook that The National Teacher Examinations has been the center of great controversy since its inception. Over sixty articles were published within a ten-year period explaining, defending and attacking the program. Ryans (24, 25) established the rationale for the test early in 1948. He stated that prior to the beginning of The National Teacher Examinations there was no confidential battery of examinations for teachers; there was no test in the field of professional education that could be considered adequate; and there were no existing tests that had norms specifically for teaching. Boozer (3) gave additional support for this test by stating that:

Colleges differ significantly in their admission requirements, in their grading systems, and in their retention standards. Therefore, transcripts of college work do not necessarily tell you what you need and want to know. The National Teacher Examinations serve well as additional objective evidence concerning the teacher's general level of achievement, which, with other evidence and techniques of appraisal, can help provide the basis for a judgment (3, p. 212).

He concluded that "external teacher examinations, intelligently interpreted, provide a perspective otherwise unavailable" (3, p. 214).

Seashore (28) stated in the Sixth Mental Measurements Yearbook that:

The National Teacher Examinations aim "to provide objective examinations of measurable intellectual
competencies which are commonly considered basic to effective classroom teaching." The component tests assess preparation in the usual academic and vocational subjects and in professional education; they also include measures for separate appraisal of mental ability (28, p. 943).

He summarized the review by stating that

The National Teacher Examinations are a battery of secure tests which are well conceived for their purposes—that is to measure the substrata of professional and academic learning a prospective teacher brings to his or her employment. More specific validity studies are needed. More pre-testing of items is called for. The scoring and normative system is not simple, but workable. The NTE deserves use in evaluation of institutions and of individual seniors and graduate students. It should be helpful to school systems as a supplement to the other information used in selecting teachers (28, p. 943).

Reviews of tests in the Teaching Areas or Optional Examinations revealed different points of view. Roberts' (22) comment on the 1962 edition of the English Language and Literature test of The National Teacher Examinations was that it was a useful and unique tool for teachers of English. He further stated that

The testmakers have made an effort "to get at the quality of the test-taker's thinking and judgment--e.g., his ability to interpret, analyze, synthesize, evaluate," and to write items requiring "reasoning and application of principles rather than the recollection of specific facts." They have designed a systematic approach to the examination of theoretical preparation for the teaching of high school English as it is commonly practiced in the United States today, . . . (22, p. 943).

Bloomers (2), in a review of the Optional Examination in Mathematics stated, "On the whole the items are of good
quality, calling considerably more for insight than for memory of facts or manipulative skill. Statistically, the item characteristics are excellent" (2, p. 673).

Derthick (9) questioned the lack of information on the validity of the test. He felt however that the test was well constructed and was kept current by frequent revisions. It could be used with college records, supervised teaching recommendations, and faculty evaluations as a valuable aid in teacher training institutions, of school boards and administrators in appraising teaching ability.

Brownell (4), a reviewer of The National Teacher Examinations in the Fifth Mental Measurements Yearbook, asked how adequate was the sampling and what were the "correct" answers for several of the items? He described the Common Examinations as being based on the assumption that prospective teachers should be able to demonstrate reasonable competence in professional knowledge, general culture, English usage, and mental ability.

Some of the strongest criticisms of The National Teacher Examinations came out after its first administration. Rowland (23) predicted that a nationwide examination service would ultimately destroy the individuality of teacher training institutions. He believed that teacher education institutions would begin to teach for the passing of these tests.
Pilley (18) objected to the construction of the test items. He stated that those responsible for constructing the test items did so without obtaining evidence of the relatedness of the test to good teaching. He also criticized the language used in many of the questions; often it was meaningless.

Winetrout (37) was also a critic of the examination. He thought that more varied testing techniques should have been used instead of relying on multiple-choice items exclusively, whereas Collins (6) objected to the examination as a basis for teacher selection.

The inferred use of The National Teacher Examinations as a measure of teaching effectiveness was clarified by Ryans (27). He pointed out that the test measured only one phase of teaching ability and that it was valid in that it lived up to its initial purpose. It had always purported to be a test "to measure general knowledge and ability requisite to effective teaching" (4, p. 538).

Studies on The National Teacher Examinations

A statement by Walberg (36, p. 129) summed up the status of research on The National Teacher Examinations. He said "The literature on the second problem, the predictability of NTE scores on the basis of scholastic aptitude and grades in high school and college is limited."
The studies that have been done have generally been of a
correlational nature.

A study by Shea (29) was concerned with the predictive
value of various combinations of standardized tests and
subtests for prognosis of teaching efficiency. The
National Teacher Examinations and the American Council on
Education Psychological Examinations (along with other
tests) were administered to one hundred and ten graduates
of a teacher college program. "The correlations of
practice-teaching grades with the NTE Nonverbal Reasoning
and the ACEL and Q scores were .00 -.8, and -.17 respec-
tively." He concluded that teaching success, practice-
teaching grade, and academic average are not related to
what the tests measure (29, p. 36).

The major purpose of a study by Hebert (15) was to use
The National Teacher Examinations as a predictive variable
of quality-point averages in graduate education courses.
Out of thirteen variables used in the study, only seven were
found to be significant as predictors when subjected to
statistical analysis. Of these seven predictor variables
only the Nonverbal Reasoning (which is no longer included
in The National Teacher Examinations) and the Professional
Information scores on The National Teacher Examinations
were included.

Another relevant study was done by Walberg (36). One
of the hypotheses he tested was the predictability of
scores on The National Teacher Examinations on the basis of scholastic aptitude and achievement. He stated that

If this predictability is established, then high school grades and scholastic aptitude tests can be used as admission criteria for institutions to maintain a given caliber of graduates at least in part determined by a nationally standardized test of preparation, the NTE. Another use would be screening of college students for teacher training curricula who have a given probability of success on the NTE (36, p. 129).

The results substantiated the hypothesis that "Professional knowledge (The NTE Total score) was moderately correlated with scholastic aptitude and achievement" (36, p. 130).

Recently there has been an increase in the number of studies on the relationships between The National Teacher Examinations and other variables. In a study by Simpson (30) statistical analyses were made of the extent of the relationships existing between the several categories of the Common and/or Optional Examinations and the following characteristics of examinees: Non-academic variables included age, sex, race, years of teaching experience, teaching level (elementary versus high school), teaching personnel versus non-teaching personnel, test experience and marital status. Academic variables included academic level, grade-point averages in professional education, general education and teaching field, number of hours taken in professional education, general education and teaching field, number of institutions attended, number of degrees held, number of certificates held, type of masters degree
held, and institution from which examinee graduated. One significant finding of the study was that favorable scores on the different test categories were significantly correlated with favorable "marks" earned in the specified areas of "professional" courses, "general" education courses, and "teaching field" courses.

In another study, by Thacker (34) on the relationship between The National Teacher Examinations and principals' ratings of teaching efficiency, academic averages and supervisors' estimates, it was concluded that little weight could be given to scores on The National Teacher Examinations in assessing academic averages or performance in teaching.

A study, by Eissey (10) sought to determine the relationship between principals' ratings and scores on The National Teacher Examinations. It was found that there was no significant correlation between scores on The National Teacher Examinations and either the first or third-year principal's rating.

Perry (17) studied the relationships between The National Teacher Examinations, a measure of classroom emotional climate, and other variables in a group of interns. Grade-point average was found to hold a significant, positive relationship to both Professional Information and Total Scores on the Examinations in the group of elementary interns; no other significant relationships between The
National Teacher Examinations and the other variables were found.

Another study, by Capps and Decosta (5), investigated the extent to which scores on three examinations of the Graduate Record Examinations, scores on the Common Examinations of The National Teacher Examinations and undergraduate grade-point averages, were significantly related to graduate school success. A significant positive relationship was found between graduate school success and each of the predictor variables. The best single predictor of the Graduate Record Examinations was the Advanced Education Test, which had an r of .49, whereas the weighted total score on the Common Examinations of The National Teacher Examinations was the best single predictor of graduate school success, with an r of .44. The coefficient of correlation between grade-point average and graduate school success was .42. Significant relationship was also found between graduate school success and the combination of selected predictor variables.

Ryans (24, 25, 25) made a number of studies of The National Teacher Examinations. In his review of the 1941 administration, he found that the highest scores were earned by teachers of the subject matter areas. In the 1947 test he found that the student group scored higher than the experienced teacher group on the Common Examinations, with the exception of the Verbal Comprehension
subtest. He also found that, generally, men made higher scores than women and that secondary teachers made higher scores than elementary teachers. His findings on the 1948 test were about the same.

Although there were diverse criticisms of The National Teacher Examinations, there was evidence of an increase in its use for more varied purposes. As stated by Walbert (36), if scores on The National Teacher Examinations could be predicted from selected variables, they could be helpful in the screening and selection of students for teacher education curricula who have a given probability of success on this test. To establish the relationships and predictability of scores on The National Teacher Examinations was the focus of the present study.

Although no studies were found which correlated scores on The National Teacher Examinations and size of school, the trend toward larger schools seemed to warrant its inclusion as a variable in the present study. Conant (7), in his report on The Comprehensive High School, stated that the size of the school is an important but not a determining factor when a comparison of the adequacy of the course offerings is made. He stated that:

Whether a school has an enrollment of 750 or 2,000, size seems to make little difference except in two respects: the school's ability to offer a wide program in foreign languages, and its ability to offer students opportunities for advanced placement. These depend to some extent on the size of the school (7, p. 11).
He stated further that anyone would suspect a correlation between the quality of the school and the size of the staff, and that in fact, had been found to be the case. Also, the recommendations of The National Association of Secondary School Principals (35) seemed to imply that the larger school would contribute to an improved quality of education.

Gage (12) summarized the status of research on certain variables included in this study by stating that

Relatively little is known concerning the relationship between cognitive ability of teachers and general demographic variables such as subject matter taught, grade level taught, years of teaching experience, size of school and the like (12, p. 57).

Summary

Review of the related literature on The National Teacher Examinations indicates that research has been done on its nature, use, strengths, weaknesses, relationship to selected variables, and as a predictor of success in graduate schools. No study was found which established relationship between The National Teacher Examinations and certain variables, and also used correlational regression analysis to determine the best predictors of success on the examination itself. The upsurge in the use of The National Teacher Examinations for increasingly varied purposes seemed to indicate needed research in this area. This was the basis for the present study.
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CHAPTER III

METHODS AND PROCEDURES

Subjects

The base population of this study consisted of students who had completed a secondary teacher education curriculum during the 1966-67 academic year at a predominantly Negro, state-supported, coeducational college in the South. All of the data required for this study were available on these two hundred and forty-nine graduates. The data consisted of scores on The National Teacher Examinations, Common and Teaching Area; scores on the School and College Ability Tests, Verbal, Quantitative and Total; grade-point averages in General Education, Professional Education, Major Teaching Area and Student Teaching, according to sex, Major Teaching Area, and size of the high school from which each student graduated.

The distribution of the sample by Teaching Area is shown in Table I. The minimum number of graduates, ten, was in Biology Education, whereas the largest number was in Social Science Education.

Another grouping of students was by sex. Of the two hundred and forty-nine students, one hundred and ten, or 44
per cent were male, and one hundred and thirty-nine, or 56
per cent, were female.

TABLE I
NUMBER OF GRADUATES IN TEACHING AREAS
FOR 1966-67 ACADEMIC YEAR

<table>
<thead>
<tr>
<th>Teaching Areas</th>
<th>Number of Graduates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Art Education</td>
<td>15</td>
</tr>
<tr>
<td>Business Education</td>
<td>37</td>
</tr>
<tr>
<td>English Education</td>
<td>32</td>
</tr>
<tr>
<td>Health and Physical Education</td>
<td>32</td>
</tr>
<tr>
<td>Home Economics Education</td>
<td>17</td>
</tr>
<tr>
<td>Industrial Arts Education</td>
<td>18</td>
</tr>
<tr>
<td>Mathematics Education</td>
<td>21</td>
</tr>
<tr>
<td>Music Education</td>
<td>16</td>
</tr>
<tr>
<td>Science Education--Biology</td>
<td>10</td>
</tr>
<tr>
<td>Social Science Education</td>
<td>51</td>
</tr>
<tr>
<td>Total</td>
<td>249</td>
</tr>
</tbody>
</table>

The data in Table II indicate the distribution of the
sample by size of high school from which the students graduated. The largest number of students came from high schools
with enrollments of five hundred and above.

TABLE II
SIZE OF HIGH SCHOOL FROM WHICH STUDENTS GRADUATED

<table>
<thead>
<tr>
<th>Size of High School</th>
<th>Number of Graduates</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>A = 0-199 students</td>
<td>27</td>
<td>11</td>
</tr>
<tr>
<td>AA = 200-499 students</td>
<td>108</td>
<td>43</td>
</tr>
<tr>
<td>AAA = 500 and above students</td>
<td>114</td>
<td>46</td>
</tr>
<tr>
<td>Total</td>
<td>249</td>
<td>100</td>
</tr>
</tbody>
</table>
Data Collection

Each student's record was secured from the Office of the Registrar and duplicated, and grade-point averages were computed for each relevant area as shown in Table III.

**TABLE III**

COURSES AND NUMBER OF SEMESTER HOURS REQUIRED OF SECONDARY TEACHER EDUCATION MAJORS AND RELATED NATIONAL TEACHER EXAMINATIONS

<table>
<thead>
<tr>
<th>National Teacher Examinations</th>
<th>Courses Required of Secondary Education Majors</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Education</td>
<td>General Education</td>
<td></td>
</tr>
<tr>
<td>Written English Expression</td>
<td>English</td>
<td>12</td>
</tr>
<tr>
<td>Science and Mathematics</td>
<td>Science</td>
<td>12</td>
</tr>
<tr>
<td>Social Studies, Fine Arts and Literature</td>
<td>Mathematics</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Social Sciences</td>
<td>12</td>
</tr>
<tr>
<td><strong>Total Subtests</strong></td>
<td><strong>Total</strong></td>
<td>42</td>
</tr>
<tr>
<td>Professional Education</td>
<td>Professional Education</td>
<td></td>
</tr>
<tr>
<td>Psychological Foundations of Education</td>
<td>Adolescent Psychology</td>
<td>3</td>
</tr>
<tr>
<td>Societal Foundations of Education</td>
<td>Educational Psychology</td>
<td>3</td>
</tr>
<tr>
<td>Teaching Principles and Practices</td>
<td>Introduction to Education</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Philosophy of Education</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Secondary Methods</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total Subtests</strong></td>
<td><strong>Total</strong></td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Student Teaching</td>
<td>6</td>
</tr>
<tr>
<td><strong>Total Weighted Commons</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teaching Area</td>
<td>Major Teaching Area</td>
<td>24-62</td>
</tr>
</tbody>
</table>

Other information that was obtained from the record was the sex, Major Teaching Area, and the high school from which the student graduated. The Official School Directory (9) was
used to get the size of school and the classification of schools, as shown in Table II (3). This is a classification of predominantly Negro high schools by the Louisiana Interscholastic, Athletic, and Literary Organization (3).

Scores on The National Teacher Examinations and the School and College Ability Tests were obtained from the Student Personnel Office and categorized into total and subtest scores. All of the data were then coded and transferred to punch cards for the necessary statistical treatments by the IBM Center.

Description of Instruments

Two instruments were used in this study, The National Teacher Examinations and the School and College Ability Tests. The National Teacher Examinations Program was begun in 1940. Its primary purpose is to provide an independent evaluation of the academic preparation of senior students who are completing requirements for the baccalaureate degree in a teacher education curriculum (15). The battery of Common Examinations is designed to measure certain knowledge and abilities expected of every teacher, whereas the thirteen Teaching Area Examinations are designed to evaluate the students' preparation in specific teaching areas. The present study used scores on the Common Examinations, Total and Subtests, and Teaching Area Examinations in the following major areas: Art Education, Business Education, English
Education, Health and Physical Education, Home Economics Education, Industrial Arts Education, Mathematics Education, Music Education, Science (Biology) Education, and Social Science Education. All of these teaching areas focus on the secondary level and are designed to assess the candidate's knowledge of the content which is basic to that particular field, the skills needed by the teacher to communicate this content effectively in the classroom, and the body of professional information which is unique to that particular field (12).

All of the test items are of the objective type, requiring the candidate to select the best answer from five possible answers. The questions require reasoning and application of principles rather than mere memory of facts. Each edition of an examination contains varying proportions of newly written questions so that the test is kept current (2, 12, 15).

The raw scores made on the various tests of The National Teacher Examinations are converted to scaled scores by means of linear equations resulting in a distribution of scores similar to that of the raw score distribution. The Handbook of Educational Testing Service (15) stated that

For all practical purposes the two-digit scale can be considered to have a mean of 60 and a standard deviation of 10 for college seniors preparing to teach; it provides a distribution of scores which range approximately from 30 to 90 (15, p. 10).
This score scale makes possible the comparison of different test scores within the Common Examinations. The Weighted Common Examinations Total Score consists of two Weighted Subtotal Scores as shown in Table III, p. 42. As further stated in the Handbook (15),

The scale for this Total Score is defined as having a mean of 600 and a standard deviation of 100; it provides a distribution of scores which range approximately from 300 to 900. The scale for the Weighted Common Examinations Total Score is based on college seniors who took the Commons when the program was begun in 1940 (15, p. 11).

Each of the Teaching Area Examinations has a three-digit scaled score with a distribution ranging approximately from 300 to 900, having a mean of 600 and a standard deviation of 100. The scale is based on substantially all candidates who indicated that they took that administration of the test in the field in which they were best prepared to teach.

New editions of The National Teacher Examinations are equated statistically to previous editions of the examinations; thus, scores are comparable from administration to administration on the Weighted Common Examinations Total Scores and each of the Teaching Area Examinations. Although interpretation of test scores may be made from the scaled scores given in the Handbook (15), perhaps the best interpretation of a student's scores may be made by comparing a student's scores with those of a sub-group or teaching area to which he belongs.
As stated in Chapter I, two categories of validity are used to judge The National Teacher Examinations—content validity and concurrent validity. The content validity is assured, according to Educational Testing Service (15), by obtaining the cooperation of advisory committees in determining the content of the examinations and in reviewing the final forms of specific tests. The concurrent validity has been asserted on the basis of the relationship between scores on the examination and the criterion of grade-point average. The study cited by Educational Testing Service to substantiate this claim was done by one of its own staff members, Pitcher (11). The results of the study indicated that grades and test scores had a reasonably high relationship, tending to support the view that the test measures what it purports to measure.

The publisher stated further that because no claim is made that the NTE predicts "teaching effectiveness," there has been no attempt to present data relating NTE scores to this global criterion. At present, professional educators are unable to agree on the meaning of "teaching effectiveness." Until they are able to define and divide this criterion into components which can be validly and reliably measured, this method of substantiating or refuting the validity of the NTE will remain relatively unsuccessful (15, p. 19).

The National Teacher Examinations is given four times each academic year at testing centers approved by Educational Testing Service throughout the country. The procedures for the administration of the test, scoring, and reporting of
test scores are prescribed by Educational Testing Services and must be adhered to strictly (12).

The School and College Ability Tests (SCAT) was administered to all of the two hundred and forty-nine graduates during their freshman year in college. Educational Testing Service (13), the publisher, has described the School and College Ability Tests as measuring two kinds of school related abilities, quantitative and verbal. Samples of four kinds of abilities (verbal comprehension, manipulating numbers and applying number concepts, comprehending the sense of a sentence read and quantitative problems) are reduced to two subscores. These two subscores, quantitative and verbal, are combined into a single or total score which is referred to as a measure of general intelligence (2). These general scores are described as important elements in the measurement of scholastic aptitude.

The Sixth Mental Measurement Yearbook (2) reports that there is good evidence for the concurrent validity of the tests.

SCAT Total correlates with the Wechsler Adult Intelligence Scale Total at about .84 and with WAIS verbal at about .88 . . . In large samples tested in a junior college, the correlations of SCAT with the Otis Quick Scoring Mental Ability Tests were .77 and .81 (2, p. 452).

"The reliability coefficient of the total test is reported to be .95 for each level" (13, p. 3).
Interpretation of test scores is done by transforming raw scores into percentile bands. Although this seems to be a good device, since it is not too exact, difficulty arises as to the widths of bands and the proper use of bands (2). This may be due to overlapping of bands.

In spite of the limitations that have been noted about School and College Ability Tests, the Sixth Mental Measurements Yearbook (2) asserted, "if, however, one is primarily concerned with prediction of general overall levels of future performance, SCAT can clearly be recommended for use from grades 5 through 16" (2, p. 453).

Numerous studies have been made that used the School and College Ability Tests as a variable (6, 7, 8). In a study by Long (8), which sought to predict college success from a battery of tests and from high school achievement, the Cooperative School and College Ability Test (SCAT) was found to be a reasonably good predictor of college quality-point average. As a single predictor, $r = .47$ was found.

Another study by Kimbell (7) had as its purpose the investigation of interrelationships which exist between academic success and the general abilities, special abilities, interest patterns, and personality traits of the students at Oklahoma College for Women. One of the instruments used was School and College Ability Test, Form 1 A. Significant differences were found between freshmen and juniors on the School and College Ability Tests. The
general conclusion of the study, however, was that the battery was of little value in predicting academic success, but that partial correlations were needed in order to determine those tests which did not contribute to the prediction of academic success.

Jones (6) did a study to determine the pattern(s) of responses which differentiated the performance of selected Negro and white college freshmen on the School and College Ability Tests, Form 1. The strength of positive relationship found between sentence understandings and word meaning differentiated upper and lower level test performance regardless of race, and Negro and white test performance within the upper and lower levels.

The Sixth Mental Measurements Yearbook summarized the findings on the School and College Ability Tests. They were reported as being a set of very good scholastic aptitude tests.

Procedures for Treating Data

The following procedures were used to test the four hypotheses of this study:

Hypothesis one stated that there was a significant positive correlation between scores on The National Teacher Examinations and grade-point averages of secondary teacher education majors. This hypothesis was tested by computing
the grade-point averages for each student on the relevant areas of his academic record as shown in Table III, p. 42.

The next step was to secure each person's scores on The National Teacher Examinations and to categorize them into total and subtest scores as shown in Table III, p. 42. Each area of the examination was correlated with the grade-point average in its related area. For example, the Professional Education Subtest score on the Common Examinations was correlated with the grade-point average in Professional Education. Each derived correlation was tested for significance at the .05 per cent level.

Hypothesis two stated that there was a significant positive correlation between scores on The National Teacher Examinations and scores on the School and College Ability Tests. To test the tenability of this hypothesis, scores on the two tests were correlated by the Pearson Product Moment formula (10, p. 112). Each of these correlations was tested for significance at the .05 per cent level.

Hypothesis three stated that the multiple correlation of scores on The National Teacher Examinations, scores on the School and College Ability Tests and grade-point averages in General Education, Professional Education, Student Teaching and Major Teaching Areas of secondary teacher education majors was significantly positive. This hypothesis was tested by computing coefficients of multiple correlation.
that, through multiple correlation, if the coefficients are fairly high, estimates or predictions can be made on one or two correlated variables from known scores on the other (4, 5, 10, 14). This correlation was tested for significance at the .05 per cent level. Hypothesis four stated that the prediction of scores on the National Teacher Examinations through the use of grade-point averages in General Education, Professional Education, Student Teaching and Major Teaching Area, and scores on the School and College Ability Tests would yield the best predictive value when categorized by sex, Major Teaching Area, and size of high school.

This hypothesis was tested through the use of multiple correlation regression analysis. The means, standard deviations, coefficients of determination, standard error of estimates, beta weights, and F tests were computed on all variables and the selected combinations of criterion and predictor variables included in this study. Each multiple correlation was tested for significance at the .05 per cent level. When these statistical treatments were completed, the data were then prepared in tabular form for analysis and interpretation.
CHAPTER BIBLIOGRAPHY


CHAPTER IV

PRESENTATION AND ANALYSIS OF DATA

The data for this study, collected and treated as indicated in Chapter III, will be presented in this Chapter.

Four basic hypotheses were tested in this study. Hypothesis one stated that there would be significant positive correlation between scores on The National Teacher Examinations and the grade-point averages of secondary teacher education majors in the following areas: General Education, Professional Education, Major Teaching Area, and Student Teaching. To test this hypothesis Pearson Product Moment Correlations were computed by the formula given by McNemar (3, p. 112). These correlation coefficients are shown in Table IV.

\[
r = \frac{N\bar{xy} - \bar{x}\bar{y}}{N\bar{x}^2 - (\bar{x})^2 - N\bar{y}^2 - (\bar{y})^2}
\]

- \( r \) = correlation between variables
- \( N \) = number of cases/scores
- \( X \) = score for criterion variable
- \( Y \) = score for predictor variable

An analysis of the data in Table IV revealed that positive relationships existed among all variables. Moreover, significant relationships existed between all test scores.
### Table IV

**THE INTERCORRELATIONS AMONG SCORES ON THE NATIONAL TEACHER EXAMINATIONS AND THE GRADE-POINT AVERAGES OF SECONDARY TEACHER EDUCATION MAJORS (N = 249)**

<table>
<thead>
<tr>
<th></th>
<th>$X_1$</th>
<th>$X_2$</th>
<th>$X_3$</th>
<th>$X_4$</th>
<th>$X_5$</th>
<th>$X_6$</th>
<th>$X_7$</th>
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</thead>
<tbody>
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<td>.227</td>
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</table>

*Not significant at the .05 level.

$x_1$ = **Common Examinations** score  
$x_2$ = Grade-point average in General Education  
$x_3$ = Grade-point average in Professional Education  
$x_4$ = Grade-point average in Student Teaching  
$x_5$ = Grade-point average in the Major Field  
$x_6$ = Professional Education Subtest score  
$x_7$ = **General Education** Subtest score

and grade-point averages except the Teaching Area grade-point average and the Professional Education subtest score of The National Teacher Examinations. However, four of the correlations were barely significant at the .05 per cent level of confidence; these were the Major Field grade-point
average and General Education (.176), the Major Field grade-point average and the Common Examinations (.143); the Student Teaching grade-point average and Professional Education (.129) and the Student Teaching grade-point average and the Common Examinations (.190).

The Common Examinations, the criterion variable, had a correlation coefficient of at least .50 with all predictor variables except the grade-point averages in the Major Teaching Area and Student Teaching. It is noted also that the General Education and Professional Education grade-point averages correlated above .50 with their related areas on The National Teacher Examinations. In only one instance was the intercorrelation of the grade-point averages of the predictor variables as high as .40, and in that instance, the correlation between the General Education grade-point average and the Professional Education grade-point average was .59. The lowest intercorrelations among the predictor variables tended to include Student Teaching.

Hypothesis one was accepted with one exception. The correlation coefficient between Professional Education, a subtest of the Common Examinations, and the Major Field grade-point average did not reach the .05 per cent level of significance, and therefore this portion of the hypothesis was not accepted.

Hypothesis two stated that there would be significant positive correlation between scores on The National Teacher
Examinations and scores on the School and College Ability Tests. To test this hypothesis, Pearson Product Moment correlations were computed by the formula by McNemar (3, p. 112).

In Table V, the Common Examinations correlated highest with the School and College Ability Tests Total score,

**TABLE V**

THE INTERCORRELATION OF SCORES ON THE NATIONAL TEACHER EXAMINATIONS AND SCORES ON THE SCHOOL AND COLLEGE ABILITY TESTS (N = 249)

<table>
<thead>
<tr>
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<th>$X_4$</th>
<th>$X_5$</th>
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<td>0.580</td>
<td>0.786</td>
<td>0.411</td>
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</tr>
</tbody>
</table>

$X_1$ = Common Examinations score  
$X_2$ = General Education Subtest score  
$X_3$ = Professional Education Subtest score  
$X_4$ = School and College Ability Tests Total score  
$X_5$ = School and College Ability Tests Verbal score  
$X_6$ = School and College Ability Quantitative score
although it reached the .05 per cent level of significance with all of the variables. The highest intercorrelation was between the Common Examinations score and The National Teacher Examinations Subtest score on General Education. The Verbal and Quantitative scores on the School and College Ability Tests correlated higher with the Common Examinations score than with either of the subtest scores on The National Teacher Examinations. Although the School and College Ability Tests Total score correlated higher than the Quantitative score with all scores on The National Teacher Examinations, the Verbal score had a higher correlation with one subtest, Professional Education. The data in Table V substantiated hypothesis two, and therefore it was accepted.

Hypothesis three stated that the multiple correlation of scores on The National Teacher Examinations, scores on the School and College Ability Tests and grade-point averages in General Education, Professional Education, Student Teaching, and the Major Teaching Area of secondary teacher education majors would be significantly positive.

The tenability of this hypothesis was tested by using the formula by McNemar (3, p. 178) for computing the coefficient of multiple correlation.

The coefficient of multiple correlation indicates the strength of relationship between one variable and other variables taken together in a study. It is also related to
the intercorrelations of independent variables as well as to their correlation with the dependent variable.

The degree of relationship between scores on The National Teacher Examinations and the combined action of each of the predictor variables, was obtained by selecting the statistical procedure which would provide coefficients of multiple correlation in terms of beta coefficients ($R^2$). The coefficients of correlation ($R$) were then derived by extracting the square root of $R^2$. This formula as given by McNemar (3, p. 178) follows:

$$1.23...n = \sqrt{\beta_1^2 r_{12} + \beta_2^2 r_{13} + \ldots + \beta_n^2 r_{1n}}$$

By substituting the known values of the variables used in this study into the above basic formula, the coefficients of multiple correlation were determined for each of the combinations discussed in subsequent sections of this chapter.

The computation of the standard error of a multiple correlation coefficient was accomplished by using the formula, (2, p. 434);

$$\sigma_R = \frac{1 - R^2}{\sqrt{N - M}}$$

where

$\sigma_R$ = standard error of a multiple correlation coefficient

1 = constant always used in formula

$R^2$ = square of the multiple correlation coefficient

$N$ = number of cases

$M$ = number of variables
Once the coefficient of multiple correlation had been determined, its significance was established by the use of an F test. The equation, taken from McNemar, for this procedure was (3, p. 284),

\[ F = \frac{R^2/m}{(1 - R^2)/(N - m - 1)}. \]

In this equation \( R^2 \) represented the square of the coefficient of multiple correlation, \( m \) the number of independent variables, and \( N \) the number of students. The computed value of \( F \) was converted to a probability value by reference to an \( F \) table.

The correlations necessary to derive the multiple correlation coefficient implied in hypothesis three are shown in Table VI. It is noted that all of the correlations are positive and significant. It is noted also that they vary in size, from a low of .128 between the Major Field grade-point average and the School and College Ability Tests Total score to the highest (.666), between the Common Examinations. The coefficient of multiple correlation between scores on the criterion variable \( (X_1) \) and the combined action of the five predictor variables was .745, which was statistically significant; therefore, the hypothesis was accepted.

The total variance accounted for in the coefficient of multiple correlation was 55.57 per cent. Of this amount
TABLE VI
THE INTERCORRELATIONS AMONG THE INDEPENDENT VARIABLES
AND THE CRITERION VARIABLE FOR SECONDARY
TEACHER EDUCATION MAJORS
(N = 249)

<table>
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<th>$X_4$</th>
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<td>$X_6$</td>
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<td>.561</td>
<td>.437</td>
<td>.146</td>
<td>.128</td>
<td></td>
</tr>
</tbody>
</table>

$X_1 = $ Common Examinations score
$X_2 = $ Grade-point average in General Education
$X_3 = $ Grade-point average in Professional Education
$X_4 = $ Grade-point average in Student Teaching
$X_5 = $ Grade-point average in the Major Field
$X_6 = $ School and College Ability Tests Total score

the contribution of each predictor variable was 28.77 per cent by School and College Ability Tests Total score ($X_2$); 14.24 per cent by General Education grade-point average ($X_3$); 13.53 per cent by Professional Education grade-point average ($X_4$); .07 per cent by Student Teaching grade-point average ($X_5$), and 01.31 per cent by Major Field grade-point average ($X_6$). The remaining 44.43 per cent was
attributed to other variables not included in this study. The standard error of the multiple correlation was .028.

Prediction of Scores on the Common Examinations for Secondary Teacher Education Majors

The application of the basic formula (3, p. 177) in determining score weights of School and College Ability Tests Total score \( (X_2) \), grade-point average in General Education \( (X_3) \), grade-point average in Professional Education \( (X_4) \), grade-point average in Student Teaching \( (X_5) \), and grade-point average in the Major Field \( (X_6) \), in predicting scores on the Common Examinations of The National Teacher Examinations results in the following equation:

\[
X_1 = 2.54X_2 + 30.38X_3 + 29.69X_4 + .74X_5 - 11.74X_6 - 359.86
\]

The weights of 2.54, 30.38, 29.69, .74 and 11.74 indicate the amount by which the scores in variables \( X_2, X_3, X_4, X_5 \) and \( X_6 \) must be multiplied and added to 359.86 in order to give the prediction of \( X_1 \). This means that prediction of a Common Examinations score may be made by substituting in the regression equation the known values of the constant and \( X_2, X_3, X_4, X_5 \) and \( X_6 \). The standard error of estimate of any Common Examinations score predicted from the above formula is 38.18.

Hypothesis four stated that the prediction of scores on The National Teacher Examinations through the use of grade-point averages in General Education, Professional Education, Student
Teaching and Major Teaching Area and scores on the School and College Ability Tests would yield the best predictive value when categorized by sex, Major Teaching Area and size of high school.

In order to test this hypothesis it was necessary to categorize the data (1) by sex, (2) by size of high school from which each student graduated, and (3) by Teaching Area. Also, the data were computed using the multiple correlation regression analysis. This yielded the means and standard deviations of all the variables, the intercorrelations among the independent variables and the criterion variable, the coefficient of multiple determination and the multiple coefficient of correlation.

The procedures involved in the computation of multiple coefficients of correlation serve to maximize the predictive power of independent variables by the assignment of optimal weights to those variables. The formula by McNemar (3, p. 177) follows:

\[ X'_1 = B_2X_2 + B_3X_3 + B_4X_4 + B_5X_5 + A \]

The procedures used in determining the standard error of estimate employed this general formula (3, p. 175):

\[ S_{1.23} = S_1 \sqrt{1 - r^2_{1.23}} \]

where

\[ S_{1.23} = \text{standard error of multiple estimate} \]
$S_1 = \text{standard deviation of scores for the criterion variable.}$

$l = \text{a constant always employed in the formula}$

$r^2_{1.23} = \text{square of the multiple correlation coefficient}$

The multiple regression equation produced a score for the criterion measure. A range of values could be created by adding or subtracting the standard error of multiple estimate to this predicted score which would, according to the laws of probability, include the actual score of a student 68 per cent of the time.

The computation of the coefficient of multiple determination was accomplished by squaring the multiple correlation coefficient. When this product is derived and expressed as a percentage, it may be used to indicate the variance in the criterion variable accounted for by the independent variables taken together (2, p. 432).

**Sex**

It was hypothesized that the prediction of scores through the use of grade-point averages in General Education, Professional Education, Student Teaching and Major Teaching Area, and scores on the *School and College Ability Tests* would yield the best predictive value when categorized by sex. These data are shown for females and males in Tables VII and VIII.
The intercorrelations of scores made by females on the Common Examinations with the selected predictive variables are shown in Table VII. Significant intercorrelations were found between the criterion variable \((X_1)\) and each of the other variables as well as among all other variables. The correlations between the Major Field and...
Student Teaching grade-point averages and the Common Examinations were low, though significant. Of particular note is the high correlation between the Common Examinations and the School and College Ability Total score.

The coefficient of multiple correlation between scores on the criterion variable, the Common Examinations score ($X_1$) and the combined action of the five predictor variables was .821, which was significant. The total variance accounted for in the multiple correlation was 67.45 per cent. Of this amount, the contribution of each predictor variable was 25.91 per cent by School and College Ability Tests Total score ($X_2$); 32.70 per cent by General Education grade-point average ($X_3$); 12.46 per cent by Professional Education grade-point average ($X_4$); 1.62 per cent by Student Teaching grade-point average ($X_5$) and 1.99 per cent by Major Field grade-point average ($X_6$). The remaining 32.55 per cent was attributed to other variables not included in this study. The standard error of the multiple correlation was .028.

Prediction of Scores on the Common Examinations for Females

The application of the basic formula (3, p. 177), in determining score weights of School and College Ability Tests Total score ($X_2$), grade-point average in General
Education \( (X_3) \), grade-point average in Professional Education \( (X_4) \), grade-point average in Student Teaching \( (X_5) \), and grade-point average in the Major Field \( (X_6) \), in predicting scores on the **Common Examinations of The National Teacher Examinations** results in the following equation:

\[
x_1 = 2.14x_2 + 60.06x_3 + 27.61x_4 - 8.56x_5 - 13.91x_6 - 280.72
\]

The weights of 2.14, 60.06, 27.61, 8.56 and 13.91 indicate the amount by which the scores in variables \( X_2, X_3, X_4, X_5 \) and \( X_6 \) must be multiplied and added to 280.72 in order to give the prediction of \( X_1 \). This means that prediction of a **Common Examinations** score may be made by substituting in the regression equation the known values of the constant and \( X_2, X_3, X_4, X_5 \) and \( X_6 \). The standard error of estimate of any **Common Examinations** score predicted from the above formula is 33.16.

Table VIII revealed the intercorrelation of scores made by males on the **Common Examinations** with certain variables. The criterion variable \( (X_1) \) correlated significantly with all variables except the Student Teaching and Major Field grade-point averages. The **School and College Ability Tests Total** score did not correlate significantly with either the Student Teaching or Major Field grade-point averages. The highest correlation was between the **Common Examinations** and the **School and College Ability Tests Total** score.
TABLE VIII
INTERCORRELATION OF SCORES MADE BY MALES ON THE COMMON EXAMINATIONS AND CERTAIN VARIABLES (N = 110)

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<td>.406</td>
<td>.277</td>
<td>.216</td>
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</tr>
</tbody>
</table>

*Not significant at the .05 level.

$X_1$ = Common Examinations score
$X_2$ = School and College Ability Tests Total score
$X_3$ = Grade-point average in General Education
$X_4$ = Grade-point average in Professional Education
$X_5$ = Grade-point average in Student Teaching
$X_6$ = Grade-point average in the Major Field

The coefficient of multiple correlation between scores on the criterion variable, the Common Examinations Total score ($X_1$) and the combined action of the five predictor variables was .682 which was significant. The total variance accounted for in the multiple correlation was 46.60 per cent. Of this amount, the contribution of each predictor
variable was 26.60 per cent by School and College Ability Tests Total score \((X_2)\); 2.17 per cent by General Education grade-point average \((X_3)\); 15.51 per cent by Professional Education grade-point average \((X_4)\); .69 per cent by Student Teaching grade-point average \((X_5)\), and .37 per cent by Major Field grade-point average \((X_6)\). The remaining 53.40 per cent was attributed to other variables not included in this study. The standard error of the multiple correlation was .052.

Prediction of Scores on the Common Examinations for Males

The application of the basic formula (3, p. 177 in determining score weights of School and College Ability Tests Total score \((X_2)\), grade-point average in General Education \((X_3)\), grade-point average in Professional Education \((X_4)\), grade-point average in Student Teaching \((X_5)\) and grade-point average in the Major Field \((X_6)\), in predicting scores on the Common Examinations of The National Teacher Examinations results in the following equation:

\[
X_1 = 2.74X_2 + 5.98X_3 + 36.96X_4 \\
+ 5.36X_5 - 5.61X_6 - 405.37
\]

The weights of 2.75, 5.98, 36.96, 5.36, and 5.61 indicate the amount by which the scores in variables \(X_2, X_3, X_4, X_5 \) and \(X_6\) must be multiplied and added to 404.37 in order to give the prediction of \(X_1\). This means that prediction
of a Common Examinations score may be made by substituting in the regression equation the known values of the constant and \( X_2, X_3, X_4, X_5 \) and \( X_6 \). The standard error of estimate of any Common Examinations score predicted from the above formula is 31.04. The multiple correlation coefficients for males and females were significant; therefore the hypothesis was accepted.

Size of School

It was hypothesized that the prediction of scores on The National Teacher Examinations through the use of grade-point averages in General Education, Professional Education, Student Teaching and Major Teaching Area and scores on the School and College Ability Tests would yield the best predictive value when categorized by size of high school from which each student graduated. These data on the three sizes of school follow.

The intercorrelations of scores on the Common Examinations and certain variables for students graduating from size A schools are shown in Table IX. The highest correlation (.883) was between the criterion variable \( (X_1) \) and the Professional Education grade-point average, while the lowest correlation (.230) was between the Major Field Grade-point average and the School and College Ability Tests Total score. Perhaps most notable in these data were the high correlations between the General Education and
Professional Education grade-point averages and the criterion variable ($X_1$).

### TABLE IX

**INTERCORRELATION OF SCORES MADE BY STUDENTS GRADUATING FROM SIZE A SCHOOLS ON THE COMMON EXAMINATIONS AND CERTAIN VARIABLES (N = 27)**

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</tr>
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</table>

*Not significant at the .05 level.

$X_1$ = **Common Examinations** score

$X_2$ = **School and College Ability Tests Total** score

$X_3$ = Grade-point average in General Education

$X_4$ = Grade-point average in Professional Education

$X_5$ = Grade-point average in Student Teaching

$X_6$ = Grade-point average in the Major Field

The Student Teaching grade-point average failed to correlate significantly with any variable other than the Major Field grade-point average, while the Major Field grade-point
average correlated significantly only with the Student Teaching and General Education grade-point averages.

The coefficient of multiple correlation between scores on the criterion variable, the **Common Examinations Total score** ($X_1$) and the combined action of the five predictor variables was .917. The total variance accounted for in the multiple correlation was 84.24 per cent. Of this amount, the contribution of each predictor variable was 28.69 per cent by **School and College Ability Total score** ($X_2$); 17.03 per cent by General Education grade-point average ($X_3$); 41.14 per cent by Professional Education grade-point average ($X_4$); 11.07 per cent by Student Teaching grade-point average ($X_5$); and 1.91 per cent by Major Field grade-point average ($X_6$). The remaining 15.76 per cent was attributed to other variables not included in this study. The standard error of the multiple correlation was .031.

**Prediction of Scores on the Common Examinations For Size A Schools**

The application of the basic formula (3, p. 177) in determining score weights of **School and College Ability Tests Total score** ($X_2$), grade-point average in General Education ($X_3$), grade-point average in Professional Education ($X_4$), grade-point average in Student Teaching ($X_5$) and grade-point average in the Major Field ($X_6$) in predicting scores on the **Common Examinations** of The National Teacher Examinations results in the following equation:
\[ x_1 = 2.27x_2 + 35.12x_3 + 63.87x_4 - 4.34x_5 - 9.35x_6 - 368.64 \]

The weights of 2.27, 35.12, 63.87, 4.34 and 9.35 indicate the amount by which the scores in variables \( x_2, x_3, x_4, x_5 \), and \( x_6 \) must be multiplied and added to 368.64 in order to give the prediction of \( x_1 \). This means that prediction of a Common Examinations score may be made by substituting in the regression equation the known values of the constant and \( x_2, x_3, x_4, x_5 \), and \( x_6 \). The standard error of estimate of any Common Examinations score predicted from the above formula is 26.10.

The intercorrelations of scores on the Common Examinations and certain variables for students graduating from size AA schools are indicated in Table X. The highest correlation (.652) was between the criterion variable \( (x_1) \) and the School and College Ability Tests Total score while the lowest correlation was between the Student Teaching grade-point average and the School and College Ability Tests Total score.

The coefficient of multiple correlation between scores on the criterion variable, the Common Examinations score \( (x_1) \) and the combined action of the five predictor variables was .783. The total variance accounted for in the multiple correlation was 61.35 per cent which was significant. Of this amount, the contribution of each predictor variable
TABLE X

INTERCORRELATION OF SCORES MADE BY STUDENTS
GRADUATING FROM SIZE AA SCHOOLS ON
THE COMMON EXAMINATIONS AND
CERTAIN VARIABLES
(N = 108)

<table>
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<th>$X_3$</th>
<th>$X_4$</th>
<th>$X_5$</th>
<th>$X_6$</th>
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<td>.108*</td>
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<td>.595</td>
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<td>.222</td>
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<tr>
<td>$X_6$</td>
<td>.079*</td>
<td>.108*</td>
<td>.450</td>
<td>.383</td>
<td>.219</td>
<td></td>
</tr>
</tbody>
</table>

*Not significant at the .05 level.

$X_1$ = Common Examinations score  
$X_2$ = School and College Ability Tests Total score  
$X_3$ = Grade-point average in General Education  
$X_4$ = Grade-point average in Professional Education  
$X_5$ = Grade-point average in Student Teaching  
$X_6$ = Grade-point average in the Major Field

was 29.01 per cent by School and College Ability Tests Total score ($X_2$); 17.58 per cent by General Education grade-point average ($X_3$); 13.24 per cent by Professional Education grade-point average ($X_4$); .08 per cent by Student Teaching grade-point average ($X_5$) and 1.60 per cent by Major Field grade-point average ($X_6$).
average ($X_6$). The remaining 38.65 per cent was attributed to other variables not included in this study. The standard error of the multiple correlation was .038.

Prediction of Scores on the Common Examinations
For Size AA Schools

The application of the basic formula (3, p. 177) in determining score weights of School and College Ability Tests Total score ($X_2$), grade-point average in General Education ($X_3$), grade-point average in Professional Education ($X_4$), grade-point average in Student Teaching ($X_5$), and grade-point average in the Major Field ($X_6$) in predicting scores on the Common Examinations of The National Teacher Examinations results in the following equation:

\[
X_1 = 2.88X_2 + 42.37X_3 + 1.25X_4 - 33.85X_5 - 28.32X_6 - 261.00
\]

The weights of 2.88, 42.37, 1.25, 33.85 and 28.32 indicate the amount by which the scores in variables $X_2$, $X_3$, $X_4$, $X_5$ and $X_6$ must be multiplied and added to 261.00 in order to give the prediction of $X_1$. This means that prediction of a Common Examinations score may be made by substituting in the regression equation the known values of the constant and $X_2$, $X_3$, $X_4$, $X_5$ and $X_6$. The standard error of estimate of any Common Examinations score predicted from the above formula is 38.81.
Examination of Table XI indicates the intercorrelation of scores on the Common Examinations and certain variables for students graduating from size AAA schools.

TABLE XI

INTERCORRELATION OF SCORES MADE BY STUDENTS GRADUATING FROM SIZE AAA SCHOOLS ON THE COMMON EXAMINATIONS, AND CERTAIN VARIABLES (N = 114)

<table>
<thead>
<tr>
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<th>$X_3$</th>
<th>$X_4$</th>
<th>$X_5$</th>
<th>$X_6$</th>
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<td>.573</td>
<td>.542</td>
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<td>.481</td>
<td>.204</td>
<td>.120*</td>
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<tr>
<td>$X_3$</td>
<td>.573</td>
<td>.591</td>
<td></td>
<td>.383</td>
<td>.417</td>
<td>.337</td>
</tr>
<tr>
<td>$X_4$</td>
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<td>.481</td>
<td>.383</td>
<td></td>
<td>.327</td>
<td>.272</td>
</tr>
<tr>
<td>$X_5$</td>
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<td>.204</td>
<td>.417</td>
<td>.327</td>
<td></td>
<td>.283</td>
</tr>
<tr>
<td>$X_6$</td>
<td>.187</td>
<td>.120*</td>
<td>.337</td>
<td>.272</td>
<td>.283</td>
<td></td>
</tr>
</tbody>
</table>

*Not significant at the .05 level.

$X_1$ = Common Examinations score
$X_2$ = School and College Ability Tests Total score
$X_3$ = Grade-point average in General Education
$X_4$ = Grade-point average in Professional Education
$X_5$ = Grade-point average in Student Teaching
$X_6$ = Grade-point average in the Major Field

Significant correlations were found among all variables except the Major Field grade-point average, which did not
reach the .05 per cent level of significance with the School and College Ability Tests Total score. The criterion variable \(X_1\) correlated significantly with all predictor variables, but the correlations were low with the Major Field grade-point average (.187) and the Student Teaching grade-point average (.305). It correlated highest (.640) with the School and College Ability Tests Total score.

The coefficient of multiple correlation between scores on the criterion variable, the Common Examinations score \(X_1\) and the combined action of the five predictor variables was .724 which was significant. The total variance accounted for in the multiple correlation was 52.56 per cent. Of this amount, the contribution of each predictor variable was 23.14 per cent by School and College Ability Tests Total score \(X_2\); 14.03 per cent by General Education grade-point average \(X_3\); 14.41 per cent by Professional Education grade-point average \(X_4\); 1.49 per cent by Student Teaching grade-point average \(X_5\) and 0.43 per cent by Major Field grade-point average \(X_6\). The remaining 47.44 per cent was attributed to other variables not included in this study. The standard error of the multiple correlation was .045.

**Prediction of Scores on the Common Examinations For Size AAA Schools**

The application of the basic formula (3, p. 177) in determining score weights of School and College Ability
Ability Tests Total score ($X_2$), grade-point average in General Education ($X_3$), grade-point average in Professional Education ($X_4$), grade-point average in Student Teaching ($X_5$), and grade-point average in the Major Field ($X_6$) in predicting scores on the Common Examinations of The National Teacher Examinations results in the following equation:

$$X_1 = 1.78X_2 + 25.54X_3 + 27.44X_4 + 4.99X_5 - 2.37X_6 - 165.20$$

The weights of 1.78, 25.54, 27.44, 4.99 and 2.37 indicate the amount by which the scores in variables $X_2$, $X_3$, $X_4$, $X_5$ and $X_6$ must be multiplied and added to 165.20 in order to give the prediction of $X_1$. This means that prediction of a Common Examinations score may be made by substituting in the regression equation the known values of the constant and $X_2$, $X_3$, $X_4$, $X_5$ and $X_6$. The standard error of estimate of any Common Examinations score predicted from the above formula is 33.57. The multiple correlations were significant for schools according to size; therefore, the hypothesis was accepted.

Teaching Areas

It was hypothesized that the prediction of scores on The National Teacher Examinations through the use of grade-point averages in General Education, Professional Education, Student Teaching and Major Teaching Area would yield the
best predictive value when categorized by Major Teaching Area. Data for the ten areas included in this study follow.

Examination of Table XII reveals the intercorrelation of scores on the Teaching Area Examination and grade-point averages in certain areas for secondary majors in Art Education. Of the various correlation coefficients, only the one between the Teaching Area Examination and the Professional Education grade-point average was significant at the .05 per cent level of confidence. It may be noted also that a negative correlation was found between the General Education and Professional Education grade-point averages; however, it did not reach the .05 per cent level of confidence.

The coefficient of multiple correlation between scores on the Teaching Area Examination in Art Education ($X_1$) and the combined action of the four predictor variables was .656, which was not significant. The total variance accounted for in the multiple correlation was 43.06 per cent. Of this amount, the contribution of each predictor variable was 38.28 per cent by Professional Education grade-point average ($X_2$); 1.01 per cent by Student Teaching grade-point average ($X_3$); 2.16 per cent by Major Field grade-point average ($X_4$) and 7.95 per cent by General Education grade-point average ($X_5$). The remaining 56.94 per cent was attributed
TABLE XII
INTERCORRELATION OF SCORES ON THE CRITERION VARIABLE FOR MAJORS IN ART EDUCATION AND GRADE-POINT AVERAGES IN SELECTED AREAS (N = 15)

<table>
<thead>
<tr>
<th></th>
<th>X₁</th>
<th>X₂</th>
<th>X₃</th>
<th>X₄</th>
<th>X₅</th>
</tr>
</thead>
<tbody>
<tr>
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<td>.540</td>
<td>.066*</td>
<td>.074*</td>
<td>.185*</td>
</tr>
<tr>
<td>X₂</td>
<td>.540</td>
<td></td>
<td>.297*</td>
<td>.308*</td>
<td>-.079*</td>
</tr>
<tr>
<td>X₃</td>
<td>.066*</td>
<td>.297*</td>
<td></td>
<td>.395*</td>
<td>.293*</td>
</tr>
<tr>
<td>X₄</td>
<td>.074*</td>
<td>.308*</td>
<td>.395*</td>
<td></td>
<td>.498*</td>
</tr>
<tr>
<td>X₅</td>
<td>.185*</td>
<td>-.079</td>
<td>.293*</td>
<td>.498*</td>
<td></td>
</tr>
</tbody>
</table>

*Not significant at the .05 level.

X₁ = Teaching Area Examination
X₂ = Grade-point average in Professional Education
X₃ = Grade-point average in Student Teaching
X₄ = Grade-point average in the Major Field
X₅ = Grade-point average in General Education

to other variables not included in this study. The standard error of the multiple correlation was .180.

Prediction of Scores on the Teaching Area Examination for Majors in Art Education

The application of the basic formula (3, p. 177) in determining score weights of grade-point average in Professional Education (X₂), grade-point average in Student
Teaching \( (X_3) \), grade-point average in the Major Field \( (X_4) \) and grade-point average in General Education \( (X_5) \) in predicting scores on the Teaching Area Examination results in the following equation:

\[
x_1 = 293.92 + 89.59x_2 - 27.46x_3 - 31.45x_4 + 45.70x_5
\]

The weights of 89.59, -27.46, -31.45 and 45.70 indicate the amount by which the scores in variables \( x_2, x_3, x_4 \) and \( x_5 \) must be multiplied and added to 293.92 in order to give the prediction of \( x_1 \). This means that prediction of a Teaching Area Examination score may be made by substituting in the regression equation the known values of the constant and of \( x_2, x_3, x_4 \) and \( x_5 \). The standard error of estimate of any Teaching Area Examination score predicted from the above formula is 24.41.

The intercorrelations of scores on the Teaching Area Examination and grade-point averages in certain areas for secondary majors in Biology and General Science Education are indicated in Table XIII. There were no significant intercorrelations among any of the variables, although the criterion variable had two correlation coefficients over .50. The small number in this group might have accounted for these low correlations.

The coefficient of multiple correlation between scores on the Teaching Area Examination in Biology and General
### TABLE XIII
INTERCORRELATION OF SCORES ON CRITERION VARIABLE FOR MAJORS IN BIOLOGY AND GENERAL SCIENCE EDUCATION AND GRADE-POINT AVERAGES IN SELECTED AREAS (N = 10)

<table>
<thead>
<tr>
<th></th>
<th>$X_1$</th>
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<tbody>
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<td>.605*</td>
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<td>$X_2$</td>
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<td>.508*</td>
<td>.201*</td>
<td>.383*</td>
</tr>
<tr>
<td>$X_3$</td>
<td>.605*</td>
<td>.508*</td>
<td></td>
<td>.120*</td>
<td>.340*</td>
</tr>
<tr>
<td>$X_4$</td>
<td>.461*</td>
<td>.201*</td>
<td>.120*</td>
<td></td>
<td>.367*</td>
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<td>$X_5$</td>
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<td>.383*</td>
<td>.340*</td>
<td>.367*</td>
<td></td>
</tr>
</tbody>
</table>

*Not significant at the .05 level.

$X_1$ = Teaching Area Examination

$X_2$ = Grade-point average in Professional Education

$X_3$ = Grade-point average in Student Teaching

$X_4$ = Grade-point average in the Major Field

$X_5$ = Grade-point average in General Education.

Science ($X_1$) and the combined action of the four predictor variables was .783 which was not significant. The total variance accounted for in the multiple correlation was 62.40 per cent. Of this amount, the contribution of each predictor variable was 19.73 per cent by Professional Education grade-point average ($X_2$); 27.90 per cent by Student Teaching grade-point average ($X_3$); 19.68 per cent by Major Field
grade-point average \( (X_4) \) and 4.90 per cent by General Education grade-point average \( (X_5) \). The remaining 37.60 per cent was attributed to other variables not included in this study. The standard error of the multiple correlation was \( .168 \).

Prediction of Scores on the Teaching Area Examination for Majors in Biology and General Science Education

The application of the basic formula (3, p. 177) in determining score weights of grade-point average in Professional Education \( (X_2) \), grade-point average in Student Teaching \( (X_3) \), grade-point average in the Major Field \( (X_4) \), and grade-point average in General Education \( (X_5) \) in predicting scores on the Teaching Area Examination results in the following equation:

\[
X_1 = 308.09 + 48.68X_2 + 35.34X_3 \\
+ 62.09X_4 - 28.72X_5
\]

The weights of 48.68, 35.34, 62.09 and 28.72 indicate the amount by which the scores in variables \( X_2, X_3, X_4 \) and \( X_5 \) must be multiplied and added to 308.09 in order to give the prediction of \( X_1 \). This means that prediction of a Teaching Area Examination score may be made by substituting in the regression equation the known values of the constant and \( X_2, X_3, X_4 \) and \( X_5 \). The standard error of estimate of any Teaching Area Examination score predicted from the above formula is 29.32.
In Table XIV, the intercorrelations of scores on the Teaching Area Examination and grade-point averages in certain areas for secondary majors in Business Education are shown.

<table>
<thead>
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<th>$X_3$</th>
<th>$X_4$</th>
<th>$X_5$</th>
</tr>
</thead>
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<td>.446</td>
<td>.761</td>
</tr>
<tr>
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<td>.484</td>
<td>.608</td>
<td>.530</td>
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<tr>
<td>$X_3$</td>
<td>.177*</td>
<td>.484</td>
<td></td>
<td>.568</td>
<td>.359</td>
</tr>
<tr>
<td>$X_4$</td>
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<td>.608</td>
<td>.568</td>
<td></td>
<td>.535</td>
</tr>
<tr>
<td>$X_5$</td>
<td>.761</td>
<td>.530</td>
<td>.359</td>
<td>.535</td>
<td></td>
</tr>
</tbody>
</table>

*Not significant at the .05 level.

$X_1$ = Teaching Area Examination

$X_2$ = Grade-point average in Professional Education

$X_3$ = Grade-point average in Student Teaching

$X_4$ = Grade-point average in the Major Field

$X_5$ = Grade-point average in General Education

Significant correlations were found between all variables except the Teaching Area Examination and the grade-point average in Student Teaching. The highest correlation (.761) was between the Teaching Area Examination and the General
Education grade-point average while the second highest (0.584) was with the Professional Education grade-point average and the third highest (0.446) was with the Major Field grade-point average.

The coefficient of multiple correlation between scores on the Teaching Area Examination in Business Education ($X_1$) and the combined action of the four predictor variables was 0.836, which was significant. The total variance accounted for in the multiple correlation was 69.99 per cent. Of this amount the contribution of each predictor variable was 13.08 per cent by Professional Education grade-point average ($X_2$); 27.90 per cent by Student Teaching grade-point average ($X_3$); 19.68 per cent by Major Field grade-point average ($X_4$) and 4.90 per cent by General Education grade-point average ($X_5$). The remaining 37.60 per cent was attributed to other variables not included in this study. The standard error of the multiple correlation was 0.168.

Prediction of Scores on the Teaching Area Examination for Majors in Business Education

The application of the basic formula (3, p. 177) in determining score weights of grade-point average in Professional Education ($X_2$), grade-point average in Student Teaching ($X_3$), grade-point average in the Major Field ($X_4$) and grade-point average in General Education ($X_5$) in
predicting scores on the **Teaching Area Examination** results in the following equation:

\[ X_1 = 321.83 + 28.68X_2 - 52.69X_3 \\
+ 31.33X_4 + 90.93X_5 \]

The weights of 48.68, 35.34, 62.09 and 28.72 indicate the amount by which the score in variables \( X_2, X_3, X_4 \) and \( X_5 \) must be multiplied and added to 308.09 in order to give the prediction of \( X_1 \). This means that prediction of a **Teaching Area Examination** score may be made by substituting in the regression equation the known values of the constant and \( X_2, X_3, X_4 \) and \( X_5 \). The standard error of estimate of any **Teaching Area Examination** score from the above formula is 29.32.

The intercorrelations of scores on the **Teaching Area Examination** and grade-point averages in certain areas for secondary majors in English Education are revealed in Table XV. Significant correlation was found between the criterion variable and all predictor variables except Student Teaching grade-point average. Of particular note was the high correlation (0.713) between the General Education grade-point average and the **Teaching Area Examination** score. Moreover, the General Education grade-point average was the only predictor variable that correlated significantly with all the other predictor variables.

The coefficient of multiple correlation between scores on the **Teaching Area Examination** in English Education (\( X_1 \))
TABLE XV

INTERCORRELATION OF SCORES ON THE CRITERION VARIABLE FOR MAJORS IN ENGLISH EDUCATION AND GRADE-POINT AVERAGES IN SELECTED AREAS (N = 32)

<table>
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<tr>
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<th>X₃</th>
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<th>X₅</th>
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<td>.528</td>
</tr>
<tr>
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<td>.340*</td>
<td></td>
<td>.634</td>
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<tr>
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<td>.713</td>
<td>.695</td>
<td>.528</td>
<td>.634</td>
<td></td>
</tr>
</tbody>
</table>

*Not significant at the .05 level.

X₁ = Teaching Area Examination  
X₂ = Grade-point average in Professional Education  
X₃ = Grade-point average in Student Teaching  
X₄ = Grade-point average in the Major Field  
X₅ = Grade-point average in General Education

and the combined action of the four predictor variables was .750, which was significant. The total variance accounted for in the multiple correlation was 56.30 per cent. Of this amount, the contribution of each predictor variable was 12.27 per cent by Professional Education grade-point average (X₂); 1.39 per cent by Student Teaching grade-point average (X₃); 6.11 per cent by Major Field grade-point average (X₄) and 51.54 per cent by General Education...
grade-point average ($X_5$). The remaining 43.70 per cent was attributed to other variables not included in this study. The standard error of multiple correlation was .081.

**Prediction of Scores on the Teaching Area Examination for Majors in English Education**

The application of the basic formula (3, p. 177) in determining score weights of grade-point average in Professional Education ($X_2$), grade-point average in Student Teaching ($X_3$), grade-point average in the Major Field ($X_4$) and grade-point average in General Education ($X_5$) in predicting scores on the Teaching Area Examination results in the following equation:

$$X_1 = 289.87 + 21.65X_2 - 4.44X_3 - 20.85X_4 + 79.69X_5$$

The weights of 21.65, 4.44, 20.85 and 79.69 indicate the amount by which the score in variables $X_2$, $X_3$, $X_4$ and $X_5$ must be multiplied and added to 289.87 in order to give the prediction of $X_1$. This means that prediction of a Teaching Area Examination score may be made by substituting in the regression equation the known values of the constant and of $X_2$, $X_3$, $X_4$ and $X_5$. The standard error of estimate of any Teaching Area Examination score from the above formula is 34.29.

In Table XVI the intercorrelations of scores on the Teaching Area Examination and grade-point average in certain
areas for secondary majors in Home Economics Education are shown. There was significant correlation between the criterion variable \(X_1\) and only one of the predictor variables, the Major Field grade-point average. The criterion variable \(X_1\) correlated lowest (.019) with the Student Teaching grade-point average. Significant correlations were found between the Major Field grade-point average and the Professional Education and General Education grade-point averages.

**TABLE XVI**

INTERCORRELATION OF SCORES ON THE CRITERION VARIABLE FOR MAJORS IN HOME ECONOMICS EDUCATION AND GRADE-POINT AVERAGES IN SELECTED AREAS (N = 17)

<table>
<thead>
<tr>
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<th>(X_3)</th>
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<th>(X_5)</th>
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<tr>
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<td>.671</td>
<td>.220*</td>
</tr>
<tr>
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<td>.171*</td>
<td></td>
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<td>.025*</td>
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<tr>
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<td>.008</td>
<td></td>
<td>.608</td>
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<tr>
<td>(X_5)</td>
<td>.282*</td>
<td>.220*</td>
<td>.025*</td>
<td>.608</td>
<td></td>
</tr>
</tbody>
</table>

*Not significant at the .05 level.

\(X_1\) = Teaching Area Examination

\(X_2\) = Grade-point average in Professional Education

\(X_3\) = Grade-point average in Student Teaching

\(X_4\) = Grade-point average in the Major Field

\(X_5\) = Grade-point average in General Education
The coefficient of multiple correlation between scores on the Teaching Area Examination in Home Economics Education \( (X_1) \) and the combined action of the four predictor variables was .626, which was not significant. The total variance accounted for in the multiple correlation was 39.29 per cent. Of this amount, the contribution of each predictor variable was 6.69 per cent by Professional Education grade-point average \( (X_2) \); .09 per cent by Student Teaching grade-point average \( (X_3) \); 51.31 per cent by Major Field grade-point average \( (X_4) \) and 5.55 per cent by General Education grade-point average \( (X_5) \). The remaining 60.71 per cent was attributed to other variables not included in this study. The standard error of the multiple correlation was .175.

**Prediction of Scores on the Teaching Area Examination for Majors in Home Economics Education**

The application of the basic formula (3, p. 177) in determining score weights of grade-point average in Professional Education \( (X_2) \), grade-point average in Student Teaching \( (X_3) \), grade-point average in the Major Field \( (X_4) \) and grade-point average in General Education \( (X_5) \) in predicting scores on the Teaching Area Examination results in the following equation:

\[
X_1 = 191.14 - 34.78X_2 + 6.05X_3 + 158.31X_4 - 53.98X_5
\]
The weights of 34.78, 6.05, 158.31 and 53.98 indicate the amount by which the score in variables $X_2$, $X_3$, $X_4$ and $X_5$ must be multiplied and added to 19.14 in order to give the prediction of $X_1$. This means that prediction of a Teaching Area Examination score may be made by substituting in the regression equation the known values of $X_2$, $X_3$, $X_4$ and $X_5$. The standard error of estimate of any Teaching Area Examination score from the above formula is 51.44.

Examination of Table XVII reveals the intercorrelation of scores on the Teaching Area Examination and grade-point average in certain areas for secondary majors in Industrial Arts Education. The criterion variable ($X_1$) did not correlate significantly with any of the predictor variables. However, significant intercorrelations were found among some of the predictor variables. Significant intercorrelations were found between the General Education grade-point average and Professional Education and Major Field grade-point averages. Also, the Major Field grade-point average correlated significantly with the Professional Education grade-point average, whereas the Student Teaching grade-point average did not correlate significantly with any of the predictor variables.

The coefficient of multiple correlation between scores on the Teaching Area Examination in Industrial Arts Education
and the combined action of the four predictor variables was .476, which was not significant. The total variance accounted for in the multiple correlation was 22.72 per cent. Of this amount, the contribution of each predictor variable was 4.15 per cent by Professional Education grade-point average ($X_2$); 2.71 per cent by Student Teaching grade-point average ($X_3$); 6.03 per cent by Major Field grade-point average ($X_4$) and 31.86 per cent by General Education grade-point average ($X_5$).

TABLE XVII

INTERCORRELATION OF SCORES ON THE CRITERION VARIABLE FOR MAJORS IN INDUSTRIAL ARTS EDUCATION AND GRADE-POINT AVERAGES IN SELECTED AREAS ($N = 18$)

<table>
<thead>
<tr>
<th></th>
<th>$X_1$</th>
<th>$X_2$</th>
<th>$X_3$</th>
<th>$X_4$</th>
<th>$X_5$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$X_1$</td>
<td></td>
<td>.141*</td>
<td>.367*</td>
<td>.217*</td>
<td>.392*</td>
</tr>
<tr>
<td>$X_2$</td>
<td>.141*</td>
<td></td>
<td>.121*</td>
<td>.625</td>
<td>.740</td>
</tr>
<tr>
<td>$X_3$</td>
<td>.367*</td>
<td>.121*</td>
<td></td>
<td>.200*</td>
<td>.349*</td>
</tr>
<tr>
<td>$X_4$</td>
<td>.217*</td>
<td>.625</td>
<td>.200*</td>
<td></td>
<td>.818</td>
</tr>
<tr>
<td>$X_5$</td>
<td>.392*</td>
<td>.740</td>
<td>.349*</td>
<td>.814</td>
<td></td>
</tr>
</tbody>
</table>

*Not significant at the .05 level.

$X_1$ = Teaching Area Examination

$X_2$ = Grade-point average in Professional Education

$X_3$ = Grade-point average in Student Teaching

$X_4$ = Grade-point average in the Major Field

$X_5$ = Grade-point average in General Education
The remaining 77.28 per cent was attributed to other variables not included in this study. The standard error of the multiple correlation was .214.

Prediction of Scores on The Teaching Area Examination for Majors in Industrial Arts Education

The application of the basic formula (3, p. 177) in determining score weights of grade-point average in Professional Education ($X^2$), grade-point average in Student Teaching ($X^3$), grade-point average in the Major Field ($X^4$) and grade-point average in General Education ($X^5$) in predicting scores on the Teaching Area Examination results in the following equation:

$$X_1 = 489.30 - 32.91X_2 + 5.88X_3 - 45.58X_4 + 91.69X_5$$

The weights of 32.91, 5.88, 45.58 and 91.69 indicate the amount by which the score in variables $X_2$, $X_3$, $X_4$ and $X_5$ must be multiplied and added to 489.30 in order to give the prediction of $X_1$. This means that prediction of a Teaching Area Examination score may be made by substituting in the regression equation the known values of the constant $X_2$, $X_3$, $X_4$ and $X_5$. The standard error of estimate of any Teaching Area Examination score from the above formula is 45.40.

The intercorrelations of scores on the Teaching Area Examination and grade-point averages in certain areas for secondary majors in Mathematics Education are indicated in
Table XVIII. The **Teaching Area Examination** did not reach the .05 per cent level of significance with any of the predictor variables. However, significant correlations were found between the General Education grade-point average and the Professional Education and Student Teaching grade-point averages.

**TABLE XVIII**

**INTERCORRELATION OF SCORES ON THE CRITERION VARIABLE FOR MAJORS IN MATHEMATICS EDUCATION AND GRADE-POINT AVERAGES IN SELECTED AREAS (N = 21)**

<table>
<thead>
<tr>
<th></th>
<th>$X_1$</th>
<th>$X_2$</th>
<th>$X_3$</th>
<th>$X_4$</th>
<th>$X_5$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$X_1$</td>
<td></td>
<td>.347*</td>
<td>.278*</td>
<td>.077*</td>
<td>.143*</td>
</tr>
<tr>
<td>$X_2$</td>
<td>.347*</td>
<td></td>
<td>.235*</td>
<td>.257*</td>
<td>.604</td>
</tr>
<tr>
<td>$X_3$</td>
<td>.278*</td>
<td>.245*</td>
<td></td>
<td>.190*</td>
<td>.461</td>
</tr>
<tr>
<td>$X_4$</td>
<td>.077*</td>
<td>.257*</td>
<td>.190*</td>
<td></td>
<td>.332*</td>
</tr>
<tr>
<td>$X_5$</td>
<td>.143*</td>
<td>.604</td>
<td>.461</td>
<td>.332*</td>
<td></td>
</tr>
</tbody>
</table>

*Not significant at the .05 level.

$X_1$ = **Teaching Area Examination**

$X_2$ = Grade-point average in Professional Education

$X_3$ = Grade-point average in Student Teaching

$X_4$ = Grade-point average in the Major Field

$X_5$ = Grade-point average in General Education
The coefficient of multiple correlation between scores on the Teaching Area Examination in Mathematics Education \(X_1\) and the combined action of the four predictor variables was .440, which was not significant. The total variance accounted for in the multiple correlation was 19.43 per cent. Of this amount, the contribution of each predictor variable was 14.92 per cent by Professional Education grade-point average \(X_2\); 8.11 per cent by Student Teaching grade-point average \(X_3\); .03 per cent by Major Field grade-point average \(X_4\) and 3.56 per cent by General Education grade-point average \(X_5\). The remaining 80.57 per cent was attributed to other variables not included in this study. The standard error of the multiple correlation was .210.

**Prediction of Scores on the Teaching Area Examination for Majors in Mathematics Education**

The application of the basic formula (3, p. 177) in determining score weights of grade-point average in Professional Education \(X_2\), grade-point average in Student Teaching \(X_3\), grade-point average in the Major Field \(X_4\) and grade-point average in General Education \(X_5\) in predicting scores on the Teaching Area Examination results in the following equation:

\[
X_1 = 368.84 + 3157X_2 + 24.74X_3 - 0.49X_4 - 18.50X_5
\]
The weights of 31.57, 24.74, 0.49 and 18.50 indicate the amount by which the scores in variables $X_2$, $X_3$, $X_4$ and $X_5$ must be multiplied and added to 368.84 in order to give the prediction of $X_1$. This means that prediction of a Teaching Area Examination score may be made by substituting in the regression equation the known values of $X_2$, $X_3$, $X_4$ and $X_5$. The standard error of estimate of any Teaching Area Examination score from the above formula is 27.66.

In Table XIX, the intercorrelations of scores on the Teaching Area Examination and grade-point averages in certain areas for secondary majors in Music Education are indicated. Significant correlations were found between the criterion variable ($X_1$) and two of the four predictor variables; namely, the grade-point averages in Professional Education and the Major Field. The criterion variable ($X_1$) correlated highest (.673) with the Major Field grade-point average and lowest (.360) with the General Education grade-point average. Professional Education and Major Field grade-point averages correlated significantly with the other two variables.

The coefficient of multiple correlation between scores on the Teaching Area Examination in Music Education ($X_1$) and the combined action of the four predictor variables was .685, which was not significant. The total variance accounted for in the multiple correlation was 46.93 per cent. Of this amount, the contribution of each predictor variable was
9.93 per cent by Professional Education grade-point average \((X_2)\); .97 per cent by Student Teaching grade-point average \((X_3)\); 41.25 per cent by Major Field grade-point average \((X_4)\) and 5.22 per cent by General Education grade-point average \((X_5)\). The remaining 53.07 per cent was attributed to other variables not included in this study. The standard error of the multiple correlation was .160.

**TABLE XIX**

INTERCORRELATION OF SCORES ON THE CRITERION VARIABLE FOR MAJORS IN MUSIC EDUCATION AND GRADE-POINT AVERAGES IN SELECTED AREAS \((N = 16)\)

<table>
<thead>
<tr>
<th></th>
<th>(X_1)</th>
<th>(X_2)</th>
<th>(X_3)</th>
<th>(X_4)</th>
<th>(X_5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(X_1)</td>
<td></td>
<td>.499</td>
<td>.442*</td>
<td>.673</td>
<td>.360*</td>
</tr>
<tr>
<td>(X_2)</td>
<td>.499</td>
<td></td>
<td>.584</td>
<td>.649</td>
<td>.768</td>
</tr>
<tr>
<td>(X_3)</td>
<td>.442*</td>
<td>.586</td>
<td></td>
<td>.586</td>
<td>.387*</td>
</tr>
<tr>
<td>(X_4)</td>
<td>.673</td>
<td>.649</td>
<td>.586</td>
<td></td>
<td>.361*</td>
</tr>
<tr>
<td>(X_5)</td>
<td>.360*</td>
<td>.768</td>
<td>.387*</td>
<td>.561</td>
<td></td>
</tr>
</tbody>
</table>

*Not significant at the .05 level.

\(X_1 = \) Teaching Area Examination  
\(X_2 = \) Grade-point average in Professional Education  
\(X_3 = \) Grade-point average in Student Teaching  
\(X_4 = \) Grade-point average in the Major Field  
\(X_5 = \) Grade-point average in General Education
Prediction of Scores on the Teaching Area Examination for Majors in Music Education

The application of the basic formula (3, p. 177) in determining score weights of grade-point average in Professional Education \( (X_2) \), grade-point average in Student Teaching \( (X_3) \), grade-point average in the Major Field \( (X_4) \) and grade-point average in General Education \( (X_5) \) in predicting scores on the Teaching Area Examination results in the following equation:

\[
X_1 = 448.70 - 31.89X_2 + 2.64X_3 + 12.32X_4 - 30.49X_5
\]

The weights of 31.89, 2.64, 12.32 and 30.49 indicate the amount by which the scores in variables \( X_2, X_3, X_4 \) and \( X_5 \) must be multiplied and added to 448.70 in order to give the prediction of \( X_1 \). This means that prediction of a Teaching Area Examination score may be made by substituting in the regression equation the known values of the constant \( X_2, X_3, X_4 \) and \( X_5 \). The standard error of estimate of any Teaching Area Examination score from the above formula is 59.85.

Table XX indicates the Teaching Area Examination and grade-point averages in certain areas for secondary majors in Physical Education. The criterion variable \( (X_1) \) did not reach the .05 per cent level of significance with any of the predictor variables. However, significant correlations
<table>
<thead>
<tr>
<th></th>
<th>$X_1$</th>
<th>$X_2$</th>
<th>$X_3$</th>
<th>$X_4$</th>
<th>$X_5$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$X_1$</td>
<td></td>
<td>.147*</td>
<td>.238*</td>
<td>.035*</td>
<td>.301*</td>
</tr>
<tr>
<td>$X_2$</td>
<td>.147*</td>
<td></td>
<td>.271*</td>
<td>.318*</td>
<td>.670</td>
</tr>
<tr>
<td>$X_3$</td>
<td>.238*</td>
<td>.271</td>
<td></td>
<td>.448</td>
<td>.319*</td>
</tr>
<tr>
<td>$X_4$</td>
<td>.035*</td>
<td>.318*</td>
<td>.448</td>
<td></td>
<td>.563</td>
</tr>
<tr>
<td>$X_5$</td>
<td>.301*</td>
<td>.670</td>
<td>.319*</td>
<td>.563</td>
<td></td>
</tr>
</tbody>
</table>

*Not significant at the .05 level.

$X_1$ = Teaching Area Examination

$X_2$ = Grade-point average in Professional Education

$X_3$ = Grade-point average in Student Teaching

$X_4$ = Grade-point average in the Major Field

$X_5$ = Grade-point average in General Education

were found between the General Education grade-point average and the Professional Education, Student Teaching and Major Field grade-point averages.

The coefficient of multiple correlation between scores on the Teaching Area Examination in Physical Education ($X_1$) and the combined action of the four predictor variables was .422, which was not significant. The total variance accounted for in the multiple correlation was 17.86 per cent. Of this
amount, the contribution of each predictor variable was 2.36 per cent by Professional Education grade-point average ($X_2$); 6.21 per cent by Student Teaching grade-point average ($X_3$); 1.09 per cent by Major Field grade-point average ($X_4$) and 15.11 per cent by General Education grade-point average ($X_5$). The remaining 82.14 per cent was attributed to other variables not included in this study. The standard error of the multiple correlation was .158.

Prediction of Scores on the Teaching Area Examination for Majors in Physical Education

The application of the basic formula (3, p. 177) in determining score weights of grade-point average in Professional Education ($X_2$), grade-point average in Student Teaching ($X_3$), grade-point average in the Major Field ($X_4$) and grade-point average in General Education ($X_5$) in predicting scores on the Teaching Area Examination results in the following equation:

$$X_1 = 355.93 - 23.14X_2 - 34.22X_3$$
$$- 48.13X_4 + 93.50X_5$$

The weights of 23.14, 34.22, 48.13 and 93.50 indicate the amount by which the scores in variables $X_2$, $X_3$, $X_4$ and $X_5$ must be multiplied and added to 355.93 in order to give the prediction of $X_1$. This means that prediction of a Teaching Area Examination score may be made by substituting in the regression equation the known values of the constant
and $X_2$, $X_3$, $X_4$ and $X_5$. The standard error of estimate of any Teaching Area Examination score predicted from the above formula is 59.39.

In Table XXI, the intercorrelations of scores on the Teaching Area Examination and grade-point averages in certain areas for secondary majors in Social Science Education are indicated.

**TABLE XXI**

**INTERCORRELATION OF SCORES ON THE CRITERION VARIABLE FOR MAJORS IN SOCIAL SCIENCE EDUCATION AND GRADE-POINT AVERAGES IN SELECTED AREAS (N = 51)**

<table>
<thead>
<tr>
<th></th>
<th>$X_1$</th>
<th>$X_2$</th>
<th>$X_3$</th>
<th>$X_4$</th>
<th>$X_5$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$X_1$</td>
<td></td>
<td>.630</td>
<td>.43*</td>
<td>.437</td>
<td>.541</td>
</tr>
<tr>
<td>$X_2$</td>
<td>.630</td>
<td></td>
<td>.320</td>
<td>.506</td>
<td>.403</td>
</tr>
<tr>
<td>$X_3$</td>
<td>.143*</td>
<td>.320</td>
<td></td>
<td>.107*</td>
<td>.193*</td>
</tr>
<tr>
<td>$X_4$</td>
<td>.437</td>
<td>.506</td>
<td>.107</td>
<td></td>
<td>.629</td>
</tr>
<tr>
<td>$X_5$</td>
<td>.541</td>
<td>.403</td>
<td>.193</td>
<td>.629</td>
<td></td>
</tr>
</tbody>
</table>

*Not significant at the .05 level.

$X_1$ = **Teaching Area Examination**

$X_2$ = Grade-point average in Professional Education

$X_3$ = Grade-point average in Student Teaching

$X_4$ = Grade-point average in the Major Field

$X_5$ = Grade-point average in General Education
The Teaching Area Examination reached the .05 per cent level of significance with all of the predictor variables except the Student Teaching grade-point average. It correlated highest (.630) with the Professional Education grade-point average. There were significant intercorrelations among all variables except the Student Teaching and Major Field and General Education grade-point averages. The Professional Education grade-point average correlated significantly with all variables while the Major Field and General Education grade-point averages correlated significantly with all variables except the Student Teaching grade-point average.

The coefficient of multiple correlation between scores on the Teaching Area Examination in Social Science Education ($X_1$) and the combined action of the four predictor variables was .710, which was significant. The total variance accounted for in the multiple correlation was 50.41 per cent. Of this amount, the contribution of each predictor variable was 33.89 per cent by Professional Education grade-point average ($X_2$); 1.35 per cent by Student Teaching grade-point average ($X_3$); 2.84 per cent by Major Field grade-point average ($X_4$) and 20.72 per cent by General Education grade-point average ($X_5$). The remaining 49.59 per cent was attributed to other variables not included in the study. The standard error of the multiple correlation was .073.
Prediction of Scores on the Teaching Area Examination for Majors in Social Science Education

The application of the basic formula (3, p. 177) in determining score weights of grade-point average in Professional Education ($X_2$), grade-point average in Student Teaching ($X_3$), grade-point average in the Major Field ($X_4$) and grade-point average in General Education ($X_5$) in predicting scores on the Teaching Area Examination results in the following equation:

$$X_1 = 217.07 + 70.09X_2 - 13.81X_3$$
$$- 8.46X_4 + 75.30X_5$$

The weights of 70.09, 13.81, 8.46 and 75.30 indicate the amount by which the scores in variables $X_2$, $X_3$, $X_4$ and $X_5$ must be multiplied and added to 217.07 in order to give the prediction of $X_1$. This means that prediction of a Teaching Area Examination score may be made by substituting in the regression equation the known values of the constant and $X_2$, $X_3$, $X_4$ and $X_5$. The standard error of estimate of any Teaching Area Examination score predicted from the above formula is 39.71.

The multiple correlations were significant for only three of the Major Teaching Areas. Therefore, the hypothesis was accepted for majors in Business Education, English Education and Social Science Education. The multiple correlations were not significant for majors in Art Education,
Biology and General Science Education, Health and Physical Education, Home Economics Education, Industrial Arts Education, Mathematics Education and Music Education. The hypothesis was rejected for these fields.

Table XXII indicates that, of the ten Major Teaching Areas, the multiple correlation coefficient was highest for Business Education (.836), which was significant at the .05 per cent level. The amount of variance accounted for between the criterion and predictor variables for Business Education majors was 69.99 per cent, leaving only 31.01 per cent of the variance to be accounted by other factors not included in this study. Two other major fields had significant multiple correlation coefficients, English Education and Social Science Education. The other seven fields had multiple correlation coefficients which failed to reach the .05 per cent level of significance. One factor that might have contributed to these low correlations was the small number in some groups.

Table XXIII summarizes the data on the multiple correlations between the criterion variable and the predictor variables for the total group and according to sex and size of high school from which the students graduated. The multiple correlation coefficient for Size A schools (0-199 students), was highest (.917) among the criterion and predictor variables. The amount of variance accounted for in
TABLE XXII
THE MULTIPLE CORRELATION OF THE CRITERION AND PREDICTOR VARIABLES; NUMBER OF MAJORS; STANDARD ERROR OF THE MULTIPLE CORRELATION; AND COEFFICIENT OF DETERMINATION
BY MAJOR TEACHING AREA

<table>
<thead>
<tr>
<th>Teaching Area</th>
<th>N</th>
<th>R</th>
<th>S.E.</th>
<th>F Level</th>
<th>100R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Art Education</td>
<td>15</td>
<td>.656</td>
<td>.180</td>
<td>1.88</td>
<td>43.06</td>
</tr>
<tr>
<td>Biology and General Science</td>
<td>10</td>
<td>.783</td>
<td>.168</td>
<td>0.77</td>
<td>62.40</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Business Education</td>
<td>37</td>
<td>.836</td>
<td>.168</td>
<td>18.56*</td>
<td>69.99</td>
</tr>
<tr>
<td>English Education</td>
<td>32</td>
<td>.750</td>
<td>.081</td>
<td>8.68</td>
<td>56.30</td>
</tr>
<tr>
<td>Home Economics Education</td>
<td>17</td>
<td>.626</td>
<td>.175</td>
<td>1.93</td>
<td>39.29</td>
</tr>
<tr>
<td>Industrial Arts Education</td>
<td>18</td>
<td>.476</td>
<td>.214</td>
<td>0.95</td>
<td>22.72</td>
</tr>
<tr>
<td>Mathematics Education</td>
<td>21</td>
<td>.440</td>
<td>.210</td>
<td>0.96</td>
<td>19.43</td>
</tr>
<tr>
<td>Music Education</td>
<td>16</td>
<td>.685</td>
<td>.160</td>
<td>2.75</td>
<td>46.39</td>
</tr>
<tr>
<td>Physical Education</td>
<td>32</td>
<td>.422</td>
<td>.158</td>
<td>1.46</td>
<td>17.86</td>
</tr>
<tr>
<td>Social Science Education</td>
<td>51</td>
<td>.710</td>
<td>.073</td>
<td>11.43*</td>
<td>50.41</td>
</tr>
</tbody>
</table>

*Significant at the .05 level.

\[ X_1 = \text{Teaching Area Examination score} \]
\[ X_2 = \text{Grade-point average in Professional Education} \]
\[ X_3 = \text{Grade-point average in Student Teaching} \]
\[ X_4 = \text{Grade-point average in the Major Field} \]
\[ X_5 = \text{Grade-point average in General Education} \]
TABLE XXIII
THE MULTIPLE CORRELATION OF THE CRITERION AND PREDICTOR VARIABLES; NUMBER OF MAJORS; STANDARD ERROR OF THE MULTIPLE CORRELATION; AND COEFFICIENT OF DETERMINATION BY CATEGORY

<table>
<thead>
<tr>
<th>Category</th>
<th>N</th>
<th>R</th>
<th>S.E.</th>
<th>F Level</th>
<th>100R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Group</td>
<td>249</td>
<td>.745</td>
<td>.028</td>
<td>60.62*</td>
<td>55.57</td>
</tr>
<tr>
<td>Sex:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Females</td>
<td>139</td>
<td>.821</td>
<td>.028</td>
<td>55.02*</td>
<td>67.45</td>
</tr>
<tr>
<td>Males</td>
<td>110</td>
<td>.682</td>
<td>.052</td>
<td>18.08*</td>
<td></td>
</tr>
<tr>
<td>Graduates of:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Size A Schools</td>
<td>27</td>
<td>.917</td>
<td>.031</td>
<td>22.19*</td>
<td>84.24</td>
</tr>
<tr>
<td>Size AA Schools</td>
<td>108</td>
<td>.783</td>
<td>.038</td>
<td>32.32*</td>
<td>61.35</td>
</tr>
<tr>
<td>Size AAA Schools</td>
<td>114</td>
<td>.724</td>
<td>.045</td>
<td>23.45*</td>
<td>52.56</td>
</tr>
</tbody>
</table>

*Significant at .05 level.

\[ X_1 = \text{Common Examinations score} \]
\[ X_2 = \text{School and College Ability Total score} \]
\[ X_3 = \text{Grade-point average in General Education} \]
\[ X_4 = \text{Grade-point average in Professional Education} \]
\[ X_5 = \text{Grade-point average in Student Teaching} \]
\[ X_6 = \text{Grade-point average in the Major Field} \]

This multiple correlation was 84.24 per cent, leaving only 15.75 per cent of the variance to be accounted for by factors not included in this study. The standard error of this multiple correlation was .031.
All of the groupings of the criterion and predictor variables had multiple correlation coefficients which were positive and significant at the five per cent level of confidence.

Examination of Table XXIV shows the combination of selected predictors of scores on the Common Examinations ($X_1$). Of the variables selected, the School and College Ability Tests Total score ($X_2$) and the grade-point average in Professional Education ($X_4$) had the highest coefficient. These variables had a multiple correlation of .725, which was significant at the .05 level. They accounted for 52.64 per cent of the variance of the criterion variable with a standard error of .030.

The lowest multiple correlation, although it was significant at the .05 level, was the combination of variables ($X_5$), the grade-point average in Student Teaching, and ($X_6$), the grade-point average in the Major Teaching Field. This multiple correlation coefficient was .211, which accounted for only 4.46 per cent of the variance, leaving 95.54 per cent of the variance to be accounted for by other factors not included in this study.
TABLE XXIV
RANK ORDER MULTIPLE CORRELATION OF SELECTED COMBINATIONS
OF THE CRITERION AND PREDICTOR VARIABLES; NUMBER
OF MAJORS; STANDARD ERROR OF MULTIPLE
CORRELATION; AND COEFFICIENT
OF DETERMINATION

<table>
<thead>
<tr>
<th>Variables</th>
<th>R</th>
<th>S.E.</th>
<th>F Level</th>
<th>100R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>X₁, X₄, X₁</td>
<td>.725*</td>
<td>.030</td>
<td>36.74*</td>
<td>52.64</td>
</tr>
<tr>
<td>X₂, X₃, X₁</td>
<td>.718*</td>
<td>.030</td>
<td>131.03*</td>
<td>51.57</td>
</tr>
<tr>
<td>X₂, X₅, X₁</td>
<td>.672*</td>
<td>.034</td>
<td>101.61*</td>
<td>45.23</td>
</tr>
<tr>
<td>X₂, X₆, X₁</td>
<td>.668*</td>
<td>.035</td>
<td>99.40*</td>
<td>44.69</td>
</tr>
<tr>
<td>X₃, X₄, X₁</td>
<td>.643*</td>
<td>.037</td>
<td>80.67*</td>
<td>41.35</td>
</tr>
<tr>
<td>X₃, X₆, X₁</td>
<td>.604*</td>
<td>.040</td>
<td>70.68*</td>
<td>36.49</td>
</tr>
<tr>
<td>X₃, X₅, X₁</td>
<td>.596*</td>
<td>.040</td>
<td>68.00*</td>
<td>35.60</td>
</tr>
<tr>
<td>X₄, X₆, X₁</td>
<td>.551*</td>
<td>.044</td>
<td>53.74*</td>
<td>30.40</td>
</tr>
<tr>
<td>X₄, X₅, X₁</td>
<td>.550*</td>
<td>.044</td>
<td>53.60*</td>
<td>30.35</td>
</tr>
<tr>
<td>X₅, X₆, X₁</td>
<td>.211*</td>
<td>.060</td>
<td>5.74*</td>
<td>4.46</td>
</tr>
</tbody>
</table>

*Significant at .05 level.

X₁ = Common Examinations score
X₂ = School and College Ability Tests Total score
X₃ = Grade-point average in General Education
X₄ = Grade-point average in Professional Education
X₅ = Grade-point average in Student Teaching
X₆ = Grade-point average in Major Teaching Field
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CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

The purposes of this study were, first, to determine the degree and direction of relationships between scores on The National Teacher Examinations and certain variables. Specifically, it sought to determine if there would be statistically significant correlations between scores on The National Teacher Examinations and each of the following variables: (a) grade-point averages in General Education, Professional Education, Student Teaching and Major Teaching Area, and (b) scores on the School and College Ability Tests according to the sex of the graduate, Major Teaching Area and size of the high school from which each person graduated. It sought also to ascertain the best predictors, among the selected variables included in this study, of scores on The National Teacher Examinations.

Subjects for this study consisted of two hundred and forty-nine students who completed requirements for graduation in secondary teacher education programs during the 1966-67 academic year at a predominantly Negro, state-supported coeducational college in the South.
Two instruments were used, The National Teacher Examinations and the School and College Ability Tests. Other data for the study were compiled from the students' records which were obtained from the offices of the Registrar and Student Personnel.

To achieve the basic purposes of this study, four hypotheses were developed and tested statistically. Through the use of data processing equipment, correlations and intercorrelations were derived through the raw score Pearson Product Moment Formula, to test hypotheses one and two. The coefficient of multiple correlation was computed to test hypothesis three, and hypothesis four was tested by using multiple correlation regression analysis. The .05 per cent level of significance was used for accepting the hypotheses. These data, with the necessary interpretations, were presented in tabular form.

Findings

In testing hypothesis one, it was found that there was a significant positive correlation between scores on the Common Examinations of The National Teacher Examinations and grade-point averages of secondary teacher education majors in General Education, Professional Education, Major Teaching Area and Student Teaching. The highest correlation was between the Common Examinations and the General Education grade-point average, while the lowest correlation was
between the Professional Education subtest score and the Major Field grade-point average. The highest intercorrelation on The National Teacher Examinations was between the Common Examinations score and the General Education subtest score, whereas the highest intercorrelations were between the General Education and Professional Education grade-point averages. On the basis of these results, hypothesis one was accepted.

In testing hypothesis two, significant positive correlations were found between scores on the Common Examinations of The National Teacher Examinations and scores on the School and College Ability Tests. The highest correlation was between the Common Examinations score and the School and College Ability Tests Total score while the lowest correlation was between the Quantitative subtest score and the Professional Education subtest score on The National Teacher Examinations. All of the correlations reached the .05 per cent level of significance; therefore, hypothesis two was accepted.

In testing hypothesis three, it was found that there was a significant positive multiple correlation between scores on the Common Examinations of The National Teacher Examinations, scores on the School and College Ability Tests and grade-point averages in General Education, Professional Education, Major Teaching Area, and Student Teaching. The coefficient of multiple correlation between
scores on the criterion variable and the five predictor variables was .745, with 55.57 per cent of the variance accounted for with a standard error of estimate of 38.18. This meant that 44.43 per cent of the variance had to be accounted for by factors not included in this study. Of the 55.57 per cent of variance accounted for, 28.77 per cent was the independent contribution of the School and College Ability Tests total score. On the basis of these findings, hypothesis three was accepted.

In testing hypothesis four, multiple correlation coefficients were derived between scores on the Common Examinations of The National Teacher Examinations and grade-point averages in General Education, Professional Education and Student Teaching, and scores on the School and College Ability Tests. These multiple correlations were categorized by sex and size of the high school from which each student graduated.

Significant positive multiple correlations were found between scores on the Common Examinations of The National Teacher Examinations and the five predictor variables for males and females. The multiple correlation for females was .821, with 77.45 per cent of the variance accounted for, with a standard error of estimate of 33.16. The multiple correlation for males was .682 with 46.60 per cent of the variance accounted for, with a standard error of 41.04.
For females, the highest simple correlation (.730) was between the Common Examinations and the General Education grade-point average. For males, the highest simple correlation (.606), was between the Common Examinations and the School and College Ability Tests Total score.

In ascertaining the predictive efficiency of the variables when categorized by sex, the beta weight of \( X_3 \), the grade-point average in General Education, was greatest (60.06), while for males the greatest beta weight was \( X_4 \), the grade-point average in Professional Education (36.96).

Significant positive multiple correlations were found between scores on the Common Examinations of The National Teacher Examinations and the five predictor variables by size of the high school from which each student graduated. The multiple correlation coefficient for Size A schools was .917 with 84.24 per cent of the variance accounted for, with a standard error of estimate of 26.10. Size AA schools had a multiple correlation coefficient of .783 with 61.35 per cent of the variance accounted for, with a standard error of estimate of 38.81, whereas Size AAA schools had a multiple correlation coefficient of .724 with 52.56 per cent of the variance accounted for with a standard error of estimate of 33.57. Although the multiple correlations were significant for all three sizes of schools, the Size A school accounted for the greatest amount of variance with less error of estimate.
In the regression equations, the greatest beta weight for Size A schools was \( X_4 \), the grade-point average in Professional Education (63.87); for Size AA schools, \( X_3 \), the grade-point average in General Education (42.37), and for Size AAA schools, \( X_4 \), the grade-point average in Professional Education (27.44).

Testing hypothesis four also required determining the relationship between scores on the Teaching Area Examinations and grade-point averages in General Education, Professional Education, Student Teaching and Major Field for each of the Major Teaching Areas.

Significant positive multiple correlations were found between scores on the Teaching Area Examinations of The National Teacher Examinations and the four predictor variables for three of the ten Major Teaching Areas. These were Business Education, English Education and Social Science Education. The multiple correlation coefficient for Business Education majors was .836 with 69.99 per cent of the variance accounted for, with a standard error of estimate of 29.32. For English Education majors, there was a multiple correlation coefficient of .750 with 56.30 per cent of the variance accounted for with a standard error of estimate of 34.29. The multiple correlation coefficient for Social Science majors was .710 with 50.41 per cent of the variance accounted for with a standard error of estimate of 39.71. Although the multiple correlation coefficients were
significant for all of these three fields, the greatest amount of variance with less error of estimate, was accounted for by Business Education majors.

In the regression equations, the greatest beta weight for Business Education majors was \((X_4)\), the major field grade-point average (62.09); for English Education Majors \((X_5)\), the General Education grade-point average (79.69), and for Social Science Education Majors, \((X_6)\), the General Education grade-point average (75.30).

Significant multiple correlation coefficients were not reached for Major Teaching Areas in Art Education, Biology and General Science Education, Health and Physical Education, Home Economics Education, Industrial Arts Education, Mathematics Education and Music Education.

In the regression equations for the seven Major Teaching Areas which failed to reach the required level of significance, the greatest beta weights for Biology Education, Home Economics Education and Health and Physical Education was \((X_4)\), the Major Field grade-point average; for majors in Art Education, Mathematics Education and Music Education, \((X_2)\), the Professional Education grade-point average, and for majors in Industrial Arts Education \((X_5)\), the General Education grade-point average.

Testing hypothesis four also required ascertaining the best combination of predictors, among the selected variables, of scores on The National Teacher Examinations. The
best combination of the selected variables, as predictors of scores on the Common Examinations was \( (X_2) \), the School and College Ability Tests Total score and \( (X_4) \), the grade-point average in Professional Education. Out of the ten combinations computed in this study, the combination of \( X_5 \), the grade-point average in Student Teaching and \( X_6 \), the grade-point average in the Major Field, ranked tenth.

Conclusions

Based on the findings, limitations, and scope of this investigation, the following conclusions were drawn:

1. When a general test of knowledge of principles of teaching is needed, it seems that The National Teacher Examinations is a valid test.

2. Scores on The National Teacher Examinations are not good predictors of success in Student Teaching when the criterion of success in Student Teaching is grade-point average.

3. The predictive value of scores on The National Teacher Examinations can be increased by categorizing the data by sex and size of school from which each student graduated.

4. Students who have higher grade-point averages in General Education and Professional Education (excluding Student Teaching) tend to make higher scores on The National Teacher Examinations.
5. Prediction of scores on the Common Examinations, through the use of grade-point averages in General Education, Professional Education, Student Teaching and Major Teaching Area and scores on the School and College Ability Tests, can be made with greater accuracy than scores on the Teaching Area Examination of The National Teacher Examinations.

6. Grade-point averages in Student Teaching and the Major Teaching Area are the least effective of the variables included in this study in predicting scores on The National Teacher Examinations.

7. It is probable that the low correlations for some Major Teaching Areas might have been due to the limited number in the sample.

8. Scores on the School and College Ability Tests can be used as predictors of grade-point averages in General Education and Professional Education as well as predictors of scores on the Common Examinations of The National Teacher Examinations.

9. If only a single predictor of scores on the Common Examinations is to be used, the School and College Ability Tests seems to be the best predictor.

Recommendations

Within the scope and limitations of this study, the following recommendations are made:
1. If scores on The National Teacher Examinations are used in evaluating related areas of secondary teacher education curricula, other data should also be used.

2. The curricula in General Education and Professional Education should be evaluated and improved if better performance is expected on The National Teacher Examinations.

3. The use made of scores on The National Teacher Examinations should be limited to the purpose for which they were designed—assessment of knowledge and understandings of teaching principles.

4. The value of scores on The National Teacher Examinations should be validated by the local school or agency using them.

5. In order to ascertain whether the findings of this study are limited by geographical region and population, perhaps this study should be replicated using a different population and geographical location.

6. This study should be replicated using elementary and early childhood education majors.

7. In order to ascertain whether the size of the groups might have been a factor in some Major Teaching Areas not attaining coefficients of correlation high enough for acceptance (.05 per cent), perhaps this study should be replicated with larger samples in each Major Teaching Area.
8. Additional research should be done on the meaning and relevance of grades in Student Teaching to scores on 

The National Teacher Examinations.
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