A STUDY OF CRITERIA FOR RETENTION AND ADVANCEMENT

IN A TEACHER EDUCATION PROGRAM

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PREFACE

This study has been concerned primarily with an assessment of the predictive value of certain admissions criteria being used at Oklahoma State University. Among other less statistically amenable criteria, standardized test (ACT) scores are used at the time of admission to the University, and grade-point averages and standardized test (STEP) scores are used at the time of admission to programs of teacher education in the several colleges. The object of this study was to determine the statistical relationships between these admissions criteria and grade-point eligibility for retention and advancement at later check-points in the programs.

Special gratitude is hereby expressed to my graduate Advisory Committee: Dr. W. Price Ewens, Dr. John D. Hampton, Dr. Sue Hawkins, Dr. William D. Frazier, and Dr. Julia McHale. Their helpful suggestions and their kind, constructive criticisms made this study a rich learning experience.

Particular indebtedness is acknowledged to Dr. W. Price Ewens, the Committee Chairman, for his always patient guidance in selecting the problem, securing the data, and interpreting the results. Appreciation is expressed also for the help given by Dr. William D. Frazier in the statistical treatment of the data and the analysis of the findings.

My thanks also need to be voiced for the contribution of Dr. Rheua Dale Fisher to this study. Her doctoral thesis initiated the series of which this study forms an additional part. My thanks are due also for

the data she has provided in addition to the material in her thesis. She has given further of her time, her advice, her hospitality, and her encouragement, especially during the planning and structuring phases.

The helpful cooperation of administrators and staffs of the College of Agriculture, the College of Arts and Sciences, the College of Business, the College of Education, the College of Home Economics, and the Registrar's office are also recorded with gratitude.

Mention should be made, too, of the encouragement given during times of doubt by my ecclesiastical superior, Bishop Chilton Powell. I am particularly grateful to him for his occasional financial assistance and for his securing a waiver of premiums from the Church Pension Fund of the Episcopal Church during my doctoral study time; and I am grateful to the executives of the Fund for my not having to suffer diminution of eventual benefits due to interruption of payments.

Finally, I must make note of my thankful appreciation for the support (both moral and financial) provided by my wife, Grace, who above all others made both this study and my doctoral program possible.

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CHAPTER I

THE PROBLEM

This study evaluated the criteria used at admission in the Teacher
Education programs at Oklahoma State University, Stillwater, Oklahoma
for their relationships to later performance of students in programs of
teacher education at the University.

Need for the Study

Every profession has the inherent duty at all times to maintain an
ongoing assessment both of its function and place in society and of the
effectiveness with which it fulfills its goals. That the teaching pro-
fession shares this obligation is an accepted truism often reiterated
by competent professional educators (e.g., Broudy, 1967; Hornbostel,
1968).

The American Association of Colleges for Teacher Education supports
a continuing committee that studies evaluative criteria in an effort to
develop acceptable standards for accreditation of teacher education
programs by its subsidiary National Council for Accreditation of Teacher
Education (NCATE). The committee recently issued a preliminary draft of
new standards in evaluative criteria for accrediting teacher education.
These new standards put strong emphasis upon the quality of the students
admitted into teacher education programs and upon the quality of the
faculty who will teach them, while placing less emphasis on educational

objectives as such. Also, the new standards set a very high premium on evaluation, singling it out as one of the major categories. Institutional evaluation of graduates and the importance of research is given new emphasis in these criteria (AACTE, 1967).

Specification of admission requirements and screening criteria for retention and advancement in teacher education programs is made in a broad, general attempt to select the best possible candidates for the teaching profession. The intention is to insure the maximum benefits for the children in the schools, for the schools as such, and for the whole of society; while, at the same time, maintaining the best interest of the student aspiring to the teaching profession. Florida State University (1968) has been engaged in a research project for the U. S. Office of Education, and their report provides a typical statement of the principle underlying screening practices, as follows:

> ... given our present state of knowledge in predicting
> success in teaching, some mistakes will be made. Doubtless,
> some will be admitted who should have been rejected, and some
> will be rejected who should have been admitted. The model
> program operated on the assumption that mistakenly denying
> a few that should be admitted may be justified if in so doing
> large numbers who should not be taken are routed into career
> paths other than teaching (1968), p. 4).

On this basis, a serious responsibility devolves upon institutions engaged in the education of teachers to advance the knowledges and to improve the skills needed for predicting success of teacher candidates in the various stages of their training programs. Opportunity for preparation in a person's chosen occupation should never be denied without applying all possible objective consideration. Consequently, any viable program of selection, retention, and advancement in the several steps in teacher education programs will have as its focus both

the development and continuing improvement of an educational base from which more academically justifiable screening decisions can be made.

As the initial step in a longitudinal study of the total program of selective admissions to teacher education at Oklahoma State University, Fisher (1968) examined the procedures used to measure knowledges and intellectual skills (considered necessary to understand, interpret, and communicate knowledge) of those who apply for admission to the programs at the University. Her thesis recommended that further studies be made. She suggested that problem areas be studied. She identified questions to be answered by later studies. These ask: What happens to those who are rejected or fail to complete their admission procedures? What are the relationships between admission-rejection experiences at the several checkpoints in the programs? and, How do the attained knowledges and skills relate to successful later experience?

In pursuit of answers pertaining to the last of the three questions listed above, this study assessed ACT scores and the grade-point averages and test scores used at admission to teacher education programs at Oklahoma State University for their relationships to later performance at the several checkpoints in the teacher candidate's academic career. This study was needed by the Council on Teacher Education at the University to provide additional data for evaluating the total program of selective admissions, retention, and advancement of students in the teacher education programs. The study was an additional step in a longitudinal study of procedures initiated by the Fisher (1968) study.

Area and Extent of the Study

Oklahoma State University co-ordinates its teacher education pro-
grams in the several colleges through a Council on Teacher Education,
composed of staff members from those colleges responsible for teacher
education. The Council has developed a set of procedures titled
Admission to Teacher Education (mimeographed). The procedures provide
screening for admission to a program, normally during the second semes-
ter of the sophomore year, and an additional screening at the time of
admission to student teaching. The requirements are detailed thus:

> The admission program involves screening procedures designed
> to guarantee that the potential teacher is proficient in
> speech, that he has achieved reasonable mastery of his work
> in general education as determined by grades and scores on
> the STEP (Sequential Test of Educational Progress) test, and
> that he has achieved sufficient maturity to exhibit normal
> personal adjustment (Council on Teacher Education, p. 2).

In practice, the student applies for admission to teacher education
during the second semester of his sophomore year, or subsequently as
soon thereafter as his career choice is made. The application is filed
in the office of the department head concerned with teacher education if
the student is enrolled in the College of Agriculture, the College of
Business, or the College of Home Economics. If the student is enrolled
in the College of Arts and Sciences or in the College of Education, the
application is filed in the office of the Director of Student Personnel
of his college. The degree of "mastery of his work in general educa-
tion" is assessed by performance scores on the several subtests of the
STEP, by an essay examination and a speech test, and by the total
grade-point average (GPA).

The following criteria were set by the Council as minimum admis-
sion standards: (1) a score at/or above the 15th percentile on the

STEP in writing, mathematics, science, and social studies (a lower per-centile score necessitates clearing the deficiency by making a grade of "C" or above in an appropriate course in the subject area); (2) a satisfactory rating on the speech test; (3) a satisfactory rating on the essay examination; (4) a total GPA of 2.0 or above on a 4.0 scale; and (5) the approval of the applicant's adviser.

Information resulting from these criteria is entered on an application form containing other pertinent data about the applicant, and is then filed in the office of the Director of Teacher Education. This office then notifies each applicant if he is approved or rejected for the program of teacher education.

The subjects of the study were drawn from the same population used in the Fisher (1968) study. Her sample consisted of all 428 students who took the STEP in February, 1966 as part of the screening procedures for admission to the teacher education program at Oklahoma State University. The sample for the study herein reported were those students from the original group who completed a teacher education program.

The measures used in the study were grade-point averages and standardized test scores. Other considerations were sex differentials, and whether or not differences existed between those who took employment as teachers and those who did not. Grade-point averages were calculated at the time of admission to teacher education, at the time of admission to student teaching, and at the time of graduation from the program. The grade earned in the student teaching experience was also a factor in the study. Standardized test scores were from the STEP and from the ACT tests.

Limitations of the Study

The study was limited to those students who were applicants for admission to a teacher education program at Oklahoma State University at Stillwater, Oklahoma, in February of 1966, and who took the STEP at that time. A further limitation concentrated the study on only those students who completed a program of teacher preparation by Spring, 1968.

Only those colleges that offer teacher education programs were included in the study. These were: the College of Agriculture, the College of Arts and Sciences, the College of Business, the College of Education, and the College of Home Economics.

The criteria that were studied were limited to those which could be reduced to mathematical values for purposes of statistical analysis.

Regression equations and analysis of variance were limited to those subjects for whom scores and GPAs were available.

The findings of the study were limited by the incidental variances that existed between the practices of the several colleges in implementing the procedures, and by the accuracy of all the records used.

Definition of Terms

GPA. GPA is the acronym for grade-point average. Grade-point average is calculated by assigning four points for each hour of "A" grades earned, three points for each hour of "B" grades, two points for each hour of "C" grades, one point for each hour of "D" grades, and zero points for each hour of "F" grades. The total points earned are summed and then divided by the total number of hours attempted. This study has carried the fractional derivations out to two decimal places.

STEP. STEP is the acronym for Sequential Test of Educational
Progress. The STEP is a test of educational development. The tests are
based on the assumption that the "... focus of education is upon devel-
opment of critical skills and understandings," and that the "success of
education is to be measured in terms of the individual student's ability
to apply his school learned skills in solving new problems," according
to the Sequential Test of Educational Progress Technical Report (1957,
p. 5). The Buros (1959, p. 62) yearbook reports that the subtests in-
clude writing, mathematics, social studies, and science. The writing
test is a test of English usage. The scores are reported in raw scores
and in percentile ranks. The Cooperative Test Division of Educational
Testing Service is the producer of the STEP.

ACT. ACT is the acronym for the American College Test. This is a
battery of four tests of educational development and academic potential.
The ACT Technical Report (1965, pp. 2-3) states that subtests are
English usage, mathematics usage, social studies reading, and natural
science reading. The test is not only a test of factual knowledge, but
also measures problem solving skills, critical thinking, and reasoning
ability, as well as understanding of basic concepts and the ability to
formulate and test hypotheses (1965, p. 3).

The test is administered at testing centers throughout the United
States and Canada five times each year. It is administered to those
students in their senior year in high school who plan to continue their
education at a college or university. The ACT Technical Report (1965,
p. 6) says that testing is under the supervision of the American College
Testing Program, Inc. It says further:

> Each year the professional staffs of three organizations
> collaborate in developing and scaling three new forms of
> the ACT battery. Under the direction of the American
> College Testing program's research staff, Science Research
> Associates of Chicago develops the new test forms and the
> Measurement Research Center of Iowa City performs the
> scaling and equating of new and old forms.

Reports of scores are made to as many as three colleges or universities named by the student, to his high school administrator, and to the student. The scores reported are in standard score form and in percentile ranks. Norms for college-bound high school seniors are used in determining the scores which are reported to the colleges.

Significance of the Study

This study was a second step in a longitudinal study initiated by Fisher (1968) that was designed to determine the effectiveness of the selective admission and retention procedures being used at Oklahoma State University, Stillwater, Oklahoma. The study should prove to be useful to the Council on Teacher Education at the University as one of the means of evaluating the total program of procedures in use by the colleges that offer teacher education programs there. Data for later projects developed in the longitudinal study should be provided by the findings reported herein.

Members of the faculty and staff at the University who are responsible for educational guidance in preparing future teachers should find the descriptive data and the statistical findings valuable in student advisement.

The study should be useful to those responsible for programs of Teacher Education at other institutions of higher education as resource

data as they study and develop their own procedures for admission and retention of teacher education candidates.

Statement of the Problem

The question that needed to be answered has direct relationship to the informed advisement of those students who aspire to be trained to become future teachers. Generally stated, the question asks: Do the data that are collected about students at the freshman and sophomore levels have relationships among the various measures and to later academic achievement such that they might become useful in assessing potential academic performance of teacher education candidates?

This study evaluated the ACT scores used at enrollment at Oklahoma State University and the STEP scores and grade-point averages that are utilized at admission to teacher education programs in the several colleges of the University. These were assessed for their value as predictors of future grade-point averages at admission to student teaching, of ratings as student teachers, and of grade-point averages at graduation from the programs. The research problem was to determine the relationships of ACT scores, GPAs at admission to teacher education, and STEP scores, singly and in combination, as indicators of: (a) successful GPA level at admission to student teaching, (b) successful grade rating for student teaching, and (c) successful GPA level at graduation from the programs. Additional consideration was given to the question whether the GPAs and test scores predict more efficiently for males or for females, and to the question whether the GPAs and test scores significantly differentiate between students who take employment as teachers after graduation and those who do not.

CHAPTER II

REVIEW OF THE LITERATURE

The review of literature relative to this study can be conveniently classified into three categories: (1) studies of selective admissions practices which have been used by Colleges of Education, (2) research on teaching effectiveness, and (3) studies concerned with the prediction of success both of teacher candidates and of beginning teachers.

Studies of Selective Admissions Programs

This section of the review surveys the role that intellectual skills and academic achievement have played in the admission and retention, or in rejection, of candidates for teacher education programs since any belief in the value of a democratic society depends in a great measure upon the concurrent belief that man is educable. To make a government of the people, by the people, and for the people work, teachers are essential.

De Young (1960, p. 2) pointed out that Thomas Jefferson believed "... if the condition of man is to be progressively ameliorated ... education is the chief instrument for affecting it." And he said Jefferson also warned that "... if a nation expects to be free and ignorant, it expects that which never was and never will be" (1960, p. 3). To teachers, in the main, fall the tasks not only of helping

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develop an enlightened critizenry with informed leaders, but also a sufficiently trained manpower pool to supply the occupations and professions essential to such a culture.

Pitzer (1958) held that it is the task of the educational process to hand on all of value, which earlier generations of a society have learned or created, to each succeeding generation. To the teachers of the society devolve both the obligation and the duty continually to organize and interpret this heritage of knowledge, and to see to its transmission (1958, p. 58). He said also that another "... function of education is to train the student to think" (1958, p. 57). Teachers must help students develop intellectual skills that will enable them to use effectively and efficiently the facts and knowledges that they acquire. Implicit in the discussion is the assumption that the teachers themselves possess (or have the capacity to acquire) the knowledges and skills that they will transmit. Selective admission procedures have as their aim some assessment of the extent of a teacher candidate's prior achievement, and of his capacity for further acquisition of the knowledges and skills he will need as a teacher.

Some teacher educators firmly believe that the essential mission of the schools is to educate each person to the limit of his capacity. If taken literally, of course, such a goal is impossible. Nevertheless, on this approximate basis some educators advocate an open-door policy to anyone who wants to enter upon a program of teacher preparation. Ebel (1966, p. 16) says that these advocates "... have serious doubts about denying to anyone who wants to teach the opportunity to try." However, as Stripling and Horton (1954, p. 74) point out, "others contend that

the best way to attract superior people into the teaching profession in greater numbers is to eliminate weak candidates."

Learned and Wood (1954, p. 38) offer this rationale for selection:

It is a defensible philosophy that an institution for liberal education should accept an individual where he stands intellectually and do for him everything in its power. A candidate for an important public service (e.g., a teacher) presents a different problem; his obligations as a subsidized social officer far outweigh any claim he may have as an individual. Every citizen has a right, therefore, to scrutinize with particular care the relative attainments of persons expecting to teach. They become the responsible agents for the education of his children and constitute the chief systematic means for realizing whatever social ideas he may possess.

The literature is quite clear that many institutions do, indeed, select students for admission to teacher education programs. From her survey in 1953, in which 785 of the 865 generally accredited four-year institutions that train teachers in the United States furnished data, Stout (1957) found that about sixty per cent of them did exclude some applicants, although in the majority of cases the proportion of students who were denied admission was not high. Her study was concerned with the significance of policies and practices in selective admission and retention of students in teacher education programs. Her purpose was to explore the implications for further action and research. She expressed the basic assumptions in these words:

The logic supporting selective admissions and retention practices -- and thus also higher accreditation standards for institutions and higher certification requirements for teachers -- is based on the reasonable assumption that, on the whole, well educated people do a better job than the uneducated do. That there is some knowledge of how to select potential teachers is also assumed (1957, p. 300).

Historically, precedent for admission requirements in programs of teacher education go back to the first state normal school in the United States, which opened at Lexington, Massachusetts, in 1839. Brown and

Truster (1934) indicate that the entrance requirements included examinations in English, grammar, letter formation and spelling (orthography), reading, arithmetic, and geography.

In many small teachers colleges, admission to the college is tantamount to admission to teacher education. Rutherford (1962) studied 57 colleges accredited either by a regional accrediting agency or by the National Council for the Accreditation of Teacher Education (NCATE) to award bachelors degrees in elementary education. Over fifty per cent granted admission to the college on the basis of high school records and entrance examinations. The criteria considered to be most valuable by the officers of the cooperating institutions included: average or above average intelligence, English usage proficiency, speech free from defects, and an average grade of "C" earned in high school. The student who had achieved a grade average above "C" was esteemed as a highly desirable recruit (1962, p. 3939).

In an early study, Barr (1934) reported a survey of 662 schools offering teacher training programs. From a study of the catalogues of these institutions, he found that 33 used scholarships as the standard of selection, 20 used an English test, and three used achievement tests (1934, pp. 99-100).

The Michigan Cooperative Teacher Education Study, reported by Trout (1943), investigated selection procedures for teacher education programs at several universities. The University of Utah had utilized screening for teacher education candidates since 1936. Intelligence test scores, high school records, and college records were found to be the criteria in use there (1943, p. 12). English, speech, scholastic aptitude, and scholastic performance served as standards at Syracuse University's

School of Education (1943, p. 13). Trout says, "The most complex pattern of criteria for admission to the professional study of education is that used by the College of Education at Wayne University" (1943, p. 13). Tests, usually standardized tests, were utilized in as many situations as practical. The criteria included academic aptitudes, academic achievement, hearing, and speech (1943, p. 13). The six teacher colleges in the New Jersey state system used selective admissions procedures. Admission was granted on the basis of general education and scholarship among other criteria (1943, p. 14). Michigan's 22 institutions that have teacher education programs utilized scholarship and intelligence most frequently as criteria for admission (1943, p. 15).

In a study of students entering the University of Wisconsin in September, 1939, Lins (1946) found that a criterion based on a composite freshman and sophomore grade-point average was a valid measure of the possibility of the student being accepted for teacher education. Criteria that were assessed included: rank in the high school class; the Henmon-Nelson Test of Mental Ability; the Cooperative English Test, the Psychological Examination for College Freshmen, and the Cooperative General Culture Test of the American Council on Education; the National Teacher Examination; and a composite of the grade-point average actually earned at the University by the end of the sophomore year (1946, p. 3).

White surveyed selection practices then in use at Syracuse University. The criteria varied somewhat from those reported earlier by Trout (1943). White found that Syracuse in 1950 was using the following tests: the American Council on Education Test of Mental Ability, Cooperative General Culture Test, and Cooperative Reading Test (1950, p. 26).

And, whereas Trout found that, of the 1,490 students who applied during the period from 1939 through 1944, a total of 70.5 per cent were admitted (1943, p. 13); White found that, from among the 995 applicants from fall 1947 through summer 1949, 57.9 per cent were accepted for the teacher education program (1950, p. 30).

Stripling and Horton (1954) have described the selective admissions program adopted at the University of Florida in 1949. It was necessary for candidates to have completed 64 hours of the University program of comprehensive and required foundation courses before being admitted. Academic grade averages of "C" or higher, and satisfactory ratings on speech and hearing tests were additional prerequisites (1954, p. 74).

MacLean (1955) reported that at the University of California tests were being used in 1952 by the Teacher Selection and Counseling Service there, as follows: a speech test, an arithmetic test, and the American Council on Education Cooperative English Test and Psychological Examination for College Freshmen (1955, p. 671).

Stout (1957) did an intensive study of the selective admissions programs of 785 institutions of higher education during the 1952-53 term. Her sample represented 91 per cent of all the 865 then generally accredited institutions offering teacher education programs in the United States and the Territories. A questionnaire was used to gather the data. Five-sixths of the respondents believed that there should be some selection used, 79 respondents thought there should not, and 56 respondents expressed no opinion. Administrators were asked to identify the five most important criteria for selection from a suggested list of nine. First choice was given to emotional stability. Ethical and moral fitness tied with general intelligence for second place.

Demonstrated ability to work with children was next frequently chosen,

and professional interest and motivation was fifth in order of choice.

At the time of admission to the college, it was found that ten per cent

of the institutions used standardized tests in addition to other admis-

sions criteria to select prospective teachers. Apparently scholastic

standards for admission to teacher education programs compare favorably

with those for other undergraduate pre-professional and professional

curricula and for the liberal arts programs. Only six of the 765 insti-

tutions surveyed indicated standards lower for admission to teacher

education than those set for other professional fields or for the lib-

eral arts programs. A higher standard for teacher education candidates

than for those entering a liberal arts program was reported by 14 per

cent of the respondents. Two-thirds reported the same grade-point

average was used for all fields. Almost two-fifths used inventories

and tests to screen for admission to teacher education programs. About

20 per cent of all the institutions required an average above "C" in one

or more areas of the student's program for him to be admitted to teacher

education. Speech tests were used by about one-tenth of the schools for

admission to the institution, while ability to communicate effectively

was used as a standard for teacher certification by about two-fifths of

them. For admission to the teacher education programs, 58.8 per cent

employed previous academic records, 30.6 per cent utilized the students'

grades in prerequisite professional education courses, 21.5 per cent

used speech tests, and 25.7 per cent administered English proficiency

tests (1957, pp. 303-305).

Edson and Davies (1960) analyzed trends in selectivity in teacher

education in Minnesota, a study that in effect constituted a follow-up

study of the same 19 Minnesota colleges that had furnished data used

by Stout in her earlier study. While the five years between the studies

was admitted by the researchers to be a relatively short time to assess

trends, they did find much change in opinions held about admissions

policies, and a lesser but significant change in admissions practices

(1960, p. 328). In terms of academic achievement criteria, the

responses received in this category were summarized as follows:

	1953	1958
No standard prescribed until application for student teaching	12	12
C average in academic work	15	13
C average in education courses	8	6
C+ average in education courses	3	4
C average in the major field	6	5
C+ average in the major field	3	5

(Edson and Davies, 1960, Table VIII, p. 331).

Of the 18 colleges that offered programs in addition to teacher educa-

tion, three required grade-point averages higher for students in

teacher education than for others in 1953. By 1958, the number had

increased to four (1960, p. 331).

Magee (1961, p. 81) sent a questionnaire to 236 of the publicly

supported institutions accredited by the National Council for Accredita-

tion of Teacher Education (NCATE), with these results: 187 responded,

with 180 fully completed and usable questionnaires; 132 of the responses

were from colleges, teachers colleges, and institutions offering teacher

preparation; 48 were from university colleges of education; and the data

came from 45 states, the district of Columbia, and Puerto Rico. The

investigation was concerned primarily with the importance of grades

attained in initial college work in relationship to determining whether

or not the student should be permitted to enter a teacher preparation

program. Requirements were found to vary, but percentages were

reported. Sixteen per cent of the institutions that used only the pro-

fessional admission hurdle required better than a "C" (2.00) average in

specified areas or in the total program to that point. Only 19.5 per

cent of the schools surveyed required a grade-point average higher than

"C" in any part of the teacher candidate's program. The central find-

ing of the survey was the fact that 80 per cent of the institutions

that reported considered that the student who has maintained a "C"

average in his college work is eligible, so far as marks are concerned,

to enter, or to continue in, a program leading to teacher certification

(1961, pp. 83-84).

Michael and Jones (1961) reported that the School of Education at

the University of Southern California had been using a number of tests

in a battery called the Professional Aptitude Test (PAT) as an evalu-

ative instrument for selecting and counseling students in their teacher

education programs. The battery was made up of: the odd numbered

items from the subtests in the areas of history-social studies, litera-

ture, fine arts, and mathematics from the General Culture Test of the

Cooperative Testing Branch of the ETS; a comprehensive achievement

examination in English fundamentals known as the USC English Classifi-

cation Test; and measures from the 1957 California Tests Advanced Form

in the areas of Reading Vocabulary, Reading Comprehension, Mathematics

Reading, and Mathematics Fundamentals (1961, p. 995). The study made

comparisons of the scores on the PAT with grade-point averages in the

methods courses. "Coefficients of multiple correlations for the PAT

fall between .41 and .54, and .37 and .47, relative to the first and

second criterion variables, respectively," the authors found (1961,

p. 997).

Wilk (1963) and his co-workers described a longitudinal research

project in Student Personnel Work in Teacher Education which they

undertook at the University of Minnesota. Policies for admission to

the College of Education at the University were stated as follows:

> Students admitted directly from high school must rank in
> the top 60 per cent of their high school class. Students
> transferring to the College of Education to major in
> elementary education must have a C average (2.0 GPA) in
> specified work in composition, science and social science,
> and a C average in their total program. ... Majors in the
> secondary academic subjects who enter the College and the
> junior year at the same time, must have a C average in
> their total record and a C+ average (2.5 GPA) in courses
> of their intended teaching major. Agriculture teaching
> majors must have a 2.3 GPA in their agriculture courses at
> the time of admission, but must present a 2.5 GPA for
> graduation. ... Students take a battery of tests, (and)
> ... take a speech and hearing test. ...
>
> The psychological tests which are required for junior
> admission regardless of whether students were previously
> enrolled in the College or are transferring in from another
> school, are the Miller Analogies Test, form A, the Coopera-
> tive Reading Test, form C-2-R. ... There are no cutting
> scores on any of these tests or inventories. ... (Wilk,
> 1963, p. 10).

Farr (1965) used a questionnaire in a survey of the testing usage

at 443 institutions which were members of the American Association of

Colleges for Teacher Education (AACTE). He reported that 156 schools

used tests for screening at the time of admission to the teacher educa-

tion program. Tests most frequently used for this purpose were the

Cooperative School and College Ability Test, the College Entrance Exami-

nation Board Scholastic Aptitude Test, and the Cooperative English Test.

General educational development of students at the time of application

for admission to teacher education was assessed most often by one or

more of three tests: the Graduate Record Examination Area Tests, the

Cooperative General Culture Test, and the Sequential Test of Educational

Progress (1965, pp. 140-142).

Beggs (1965) has said that every institution which is accredited

by the National Council for the Accreditation of Teacher Education is

required to have established standards for admission, retention, and

graduation of teacher candidates. The criteria are to include academic

performance, speech proficiency, and proficiency in communication

especially with regard for proper English usage (1965, p. 41).

Ebel (1966, p. 15) has identified four ways in which tests have

been used, or could be used, in programs of teacher education:

    (1)   To help select those students who show the greatest
           promise on entering, continuing, and succeeding in
           teaching careers.
    (2)   To help advise students academically and counsel with
           them when problems arise.
    (3)   To help evaluate student achievement in each of the
           courses and other experiences that comprise the
           teacher education program.
    (4)   To help certify competence to teach at the completion
           of the teacher education program.

Summary of the Selective Admissions Literature

The review of the literature concerned with selective admissions

to teacher education programs seems to demonstrate the general assump-

tion that scholastic ability and the possession of academic knowledges

and intellectual skills make up highly desirable qualities in prospec-

tive teachers. Selective admission of students to teacher education

programs on the basis of academic achievement was found to be generally

accepted and practiced.

The total grade-point average as a measurement of academic achieve-

ment appeared to be the most popular criterion. Speech test ratings,

English proficiency test grades, and standardized test scores were also reported frequently as measures used in conjunction with other criteria.

Studies of Teacher Effectiveness

Crucial to the development of better teacher education programs are working definitions of what constitutes the "effective" teacher. If those who have responsibility for educating teacher candidates are to select potential teachers wisely, guide them through a professional training program intelligently, recommend them for certification with authority, and assist in their job placement with prudence, then goals and objectives that are precisely related to the end product, namely effective teachers, need to be defined and delineated as steps in the educational program. For definition and guidelines, research on teaching effectiveness ought to provide some information. Logical deduction infers a generic relationship between success in a well structured teacher education program and successful on-the-job experience as a teacher.

As an area of research, teacher effectiveness studies investigate relationships between characteristics of teachers as teachers, their personal traits and teaching acts, and the effects of such character-istics on the educational outcomes of their classroom environments. Most experts have agreed that the main problem inhibiting this area of research is the general lack of definitive measurable criteria for the concept "teacher effectiveness."

When research has discovered what teacher behaviors evoke specific learning responses, then those behaviors can be taught in the various programs of teacher preparation and practiced in the student teaching

experience. Then, also grades and ratings that are assigned in methods courses and in practice teaching can be objectively related to criteria which have operational meanings.

Sanford and Trump (1950, p. 1390) lamented the "lack of generally accepted criterion for the preservice selection of teachers." In their opinion, there was a devastating scarcity of adequate criteria for a definition of effectiveness, which largely accounted for a general ignorance of the specific factors which account for success in teaching.

Morsh and Wilder (1954, p. 4), after reviewing the research on teaching effectiveness published between 1900 and 1952, concluded that "No single specific observable teacher act has yet been found whose frequency or per cent of occurrence is invariably (and) significantly correlated with student achievement."

Mitzel (1960, p. 1481) said that:

> More than a half-century of research effort has not yet yielded meaningful, measurable criteria around which the nation's educators can rally. No standards exist which are commonly agreed upon as the criteria of teacher effectiveness.

Anderson and Hunka (1963), in an attempt to apply the psychology of learning and the techniques of multivariate statistical analysis to the problem of teacher evaluation, pointed out areas in particular need of further study. They discussed a number of studies which had used predictor or criterion variables and concluded that this kind of research had reached a dead end (1963, p. 74). Theories of teaching built on a statistical description of what is happening fail to prescribe what should be happening, they maintained (1963, p. 78).

Medley and Mitzel (1963) have said that much of the results of the work on teacher effectiveness is irrelevant and should be discarded. Their criticism is that such findings are invalid, based either on the

fact that the criteria for teacher effectiveness are not valid criteria, or on the basis that no really objective measures of teacher behavior have been used (1963, p. 247). They discussed the assumptions that underlie collections of classroom observational data, and also the limitations of studies that use rating scales. They suggest that more powerful statistical procedures would help to identify relationships between teaching behaviors and their effects (1963, p. 248).

Gage (1965, p. 85) suggested that the increasing growth in the quality and amount of research on teaching in the previous ten years may have made obsolete the results of much research done prior to that time. He concluded that a review of the current literature provided five global characteristics which seemed to be components of effective teaching: (1) warmth, (2) cognitive organization, (3) orderliness, (4) indirectness, and (5) problem solving ability (1965, p. 94).

Fattu (1962) reviewed the research on predictor criteria and teacher effectiveness. He reported that the results were inconclusive to a large extent because simplicity of the concept was assumed when it should not have been. He asked whether the term "effectiveness" was a statement about qualities of the teacher as a person, or a statement about attributes of a teacher in a particular teaching situation; or if it was a statement about the results of a teaching situation. He held that the "purpose of studies of teacher characteristics is to discover which traits or combination of traits are closely enough associated with teacher competence to permit prediction of such competence" (1962, p. 24). The traits he suggested were intelligence, knowledge of subject matter, scholarship, professional knowledge, age and experience, cultural background, socio-economic status, sex, marital status,

teaching aptitude, teaching attitude, job interest, voice and speech quality, and such special abilities as empathy, professional maturity, general knowledge, mental ability, and social adjustment (1962, pp. 24-26).

Howsam (1960) reviewed studies that used various kinds of ratings scales. He discussed four types commonly used in research. These were: self ratings by teachers; peer ratings by colleagues; pupil ratings; and supervisor, or administrator, ratings. His criticisms were were that self ratings have little reliability because there is a consistent bias in the direction of over-rating; peer ratings seem to be based on marginal evidence; supervisors' ratings do not correlate well either with other such ratings or with other external measures. He thought that student ratings alone were treated more consistently and favorably in the literature than other kinds of ratings (1960, p. 45).

Biddle and Ellena (1964) reviewed recent research on teaching effectiveness. They affirmed a need for agreement about the effects that the teacher is supposed to produce before the components of teacher effectiveness can be determined (1964, p. 18). They made a distinction between the research component and the criteria component of teacher effectiveness. The research component determines relationships between teacher characteristics and behaviors and pupil achievement. The criteria component is a question of selecting the pupil output components considered to be desirable. The authors specified that the collection of observational data should be the most direct method of learning about teaching, and they discussed the practical problems and limitations such classroom observation entails.

Soar (1964) discussed both criterion and methodological problems as difficulties standing in the way of research and interpretation of teacher effectiveness. Like Biddle and Ellena, he asserted a need for agreement on what teaching effects are to be produced. He summarized:

> ... when all (the) various aspects of the teaching-learning process are considered, it seems likely that effective research will require the identification and measurement of a variety of characteristics of the classroom, the simultaneous measurement of a number of dimensions of pupil learning, and the control or measurement of a number of pupil characteristics. Then it may be possible to find characteristics of the teacher which predict a classroom in which effective learning occurs, at least for an identifiable subgroup of pupils, and to improve teacher education on the basis of a better understanding of the teaching-learning process. Perhaps it will also be possible ultimately to relate aspects of pupil growth to the effectiveness, happiness, and responsibility of the mature adult to which this educational process ought to contribute (1964, p. 291).

Bellack and Huebner (1960) reviewed research that specifically was focused on teaching during the three years from 1956 through 1959. The conclusions they reached supports the contention that recent modes of inquiry have not been very fruitful of specific results. They have suggested the development of new concepts and theoretical systems which relate teacher behavior to desired outcomes (1960, p. 154).

Amidon and Simon (1965) looked at research concerned with teacher-pupil interaction in the classroom. They found definite patterns of interaction that could be objectively observed and categorized. They recommended applications of such research in teacher education programs as holding great promise for the improvement of education (1965, p. 136).

Smith (1962) commented on papers by Lewis and Newell, Bowers and Soar, Flanders et al., and Medley and Mitzel. Three were studies of teacher-student interaction. The fourth classified teacher behaviors in relation to their effectiveness. Smith (1962, p. 326) described them as

"a few straws in the wind - signs that we are entering a period of revolutionary studies in teaching." He suggested:

> ... that we become more intimately involved with the actual
> operations of instruction as they are carried out in the
> classroom before we try to relate gross categories of
> teaching behavior to the learning of students (1962, p. 326).

He pointed out that the value of these studies was their focus on the dynamics (what the teacher does) in the teaching situation, rather than on the global labels assigned to the teacher, such as authoritarian, dominative, autocratic, et cetera. He noted also that the pure type of teacher is an ideal; in reality such does not exist. Particular patterns or recurrent sets of behaviors should be described so that they are not obscured under broad category labels.

Ryans (1963) discussed the need for a conceptual framework for understanding the research findings on teacher effectiveness. He has developed a systems analysis approach. His review included an extensive listing of terms used to describe teachers' behavior patterns and the research related to them, or to the researchers who had identified or noted them (1963, pp. 284-289). He recommended that teacher education focus on teacher behavior as such. He cautioned:

> The usefulness of research findings pertaining to the pre-
> diction of teacher effectiveness will be greatest, therefore,
> when the results are considered in an actuarial context,
> rather than in attempting highly accurate prediction for
> given individuals (1963, p. 293).

Flanders and Simon (1969) provided a review of recent research which permits cautious optimism toward an understanding of the teaching, vis-a-vis learning, process. They said that in the past decade research has begun to relate certain teacher behaviors to specific conse-quences in the climate of the classroom and in the achievement of students. Emphasis has been shifted from subjective evaluations to

more specific counting of teacher-pupil interactions, using more
sophisticated observational systems, and handling the resulting quan-
tities of data by computers. They offered this note of optimism:
"Future discriminations and additional relationships now seem within
reach as future research builds upon present progress" (1969,
p. 1423).

Summary of the Teacher Effectiveness Studies

During the past fifty years most research seems to have been based
on the assumption that teaching competence is a unitary trait. It had
been generally assumed that the effective teacher, however defined, was
equally effective with all students and across all disciplines and
skills. Perhaps the greatest need for present and future research to
make provision for is a comprehensive theory of teacher behavior and
its relationship to learning that will channel further research efforts.

The most serious lack, according to the literature, has been for
reliable criteria which correlate with student achievement. When
desirable pupil output will have been identified and agreed upon, then
the methodological problems involved in identifying teacher character-
istics which are predictive of such output can be solved and taught in
programs of teacher preparation.

An optimistic note can be detected in the research literature of
the past ten years. There has been a perceptible shift from subjective
evaluations to more objective assessments of teacher-pupil interactions
which augur well for more definitive behavioral objectives in teacher
education.

Studies Related to Prediction of Success

The basic problem in the study of the prediction of success, either of teachers in the classroom or of teacher candidates in the process of training, may be stated as that of determining in what way and to what extent various data descriptive of successful teacher characteristics and behaviors are either antecedents or concommitants of some specified criterion of teaching competence. The establishment of such criteria is far from a settled issue, however. Cartter (1967, p. 162) says that operational definitions of effective teaching and functional instruments for the evaluation of it are a crippling lack. Research aimed at clarifying concepts and contributing to the development of theory continue, nevertheless.

Barr, Eustace, and Noe (1955) compiled a list of 86 studies that were published during the three-year period from 1952 to 1955. They concluded that research relative to the measurement and prediction of teaching effectiveness appeared to be on the increase, and seemed to be more sophisticated.

Rating of teachers by their students has been a frequently reported device. Downie (1952) described a study made at the State College of Washington. Approximately 16,000 evaluation forms containing 36 items in four categories were filled out by students. The summarized results were made available only to the instructor concerned. It appeared to be a useful assessment device when used by individual instructors to assist with their own self-improvement as instructors.

Crannell (1953) used an experimental form of the Miami University Instructor Rating Sheet in an attempt to identify factors involved in the appraisal of instructors by their students. Three clusters of

components were identified as factors that were significantly involved
in students' evaluation of their instructors. These clusters were
designed "course result," "personal interaction," and "instructor
effort" (1953, p. 419).

On the premise that the feeling tone of the classroom is a signifi-
cant ingredient of the educational process, Ruja (1953) attempted to
create an instrument for measuring emotional reactions to instructor
personality. He constructed an instructor-rating scale with a split-
half reliability coefficient of .969 for students to use. An item anal-
ysis revealed that an instructor's attitude toward his students, his
ability to stimulate them to think, his open-mindedness and freedom from
arrogance, and his wit and considerateness are what students stress when
they tell the difference between instructors they admire and those that
they dislike.

Bendig (1953) investigated the relationship of grades earned in
courses as an influencing factor in the evaluation of instructors by
their students. He demonstrated, by chi-square and analysis of co-
variance techniques, that low but significant relationships do exist
between the rating of a teacher and the achievement of the student of
that teacher.

Orleans (1952) and his co-workers advocated measurement of pupils'
academic growth as the most efficient approach to evaluation of teacher
effectiveness. They said, "As the ultimate criteria of the effective-
ness of the teacher's performance, we posit the changes which take
place in the behavior of pupils" (1952, p. 642).

The earlier efforts of Barr (1948) to analyze the difference
between good and poor teachers was continued in a later study by Jones

(1956). The subjects of her study were 46 women graduates from the classes of 1951, 1952, and 1953 who had received Teacher's Certificates at the School of Education at the University of Wisconsin, and who were still teaching in Wisconsin's secondary schools. Data were analyzed by an analysis of variance treatment and by a canonical correlation technique. The primary purpose of the study was to determine whether a group of good teachers could be differentiated from a group of poor teachers in terms of certain measures of pre-service achievement, temperament, and personality. A secondary, but important, purpose of the study was to investigate the relationships between a composite of three ratings of teaching success (practice teaching grade, placement bureau rating, and principal's rating on an adaptation of the M-Blank) and the measures of pre-service achievement, temperament, and personality specified above. She found that the more successful teachers had made higher college grade-point averages in both professional courses and in courses in their major teaching field than did those teachers who were rated less successful.

Ryans has conducted a number of studies of teacher characteristics over a substantial length of time. These have had their culmination in his major work reported in his book written under the sponsorship of the American Council on Education (Ryans, 1960). This study was a rigorously scientific investigation largely of teacher behaviors. He explained (1960, p. 6) that the study extended over six years, included approximately 100 subsidiary projects, and involved about 1,000 teachers. The problem undertaken by the research was to find those characteristics possessed by teachers who were classified as good, average, or poor teachers.

The search for specific criteria with high predictive value at the time of admission to student teaching has been pursued by a number of investigators. The three following are typical efforts.

Grim, Hoyt, and Peitersen (1954) attempted to develop and refine an attitude inventory which, when administered to pupils, would serve as one of several effective criteria of the competence of student teachers. The authors reported that the inventory proved to distinguish markedly among student teachers, and that it yielded information of a different nature than that which is commonly supplied by supervisor's ratings. They reported also on an investigation by factor analysis (using Thurstone's centroid method) of the source of commonalty among the five traits that were included in their survey. The traits included quality of classroom government, clarity of objectives, incentive quality, motivational intensity level, and provision for psychological needs. The researchers admit that "The current experimental form of the inventory does not seem suitable for yielding individual pupil achievement scores" (1954, p. 130).

Tyler (1954) conducted a study designed to develop criteria for predicting student teaching success from measures of personality adjustment. The predictive value of the Minnesota Multiphasic Personality Inventory (MMPI) and the Heston Personal Adjustment Inventory (HPAI) were investigated. He used a sample consisting of men who were enrolled in student teaching in secondary schools. Both empirical and validation groups were utilized, the reliability of the predictive instruments were calculated, comparisons were made between various methods of multivariate prediction, an item analysis was made of selected items, accuracy of prediction was ascertained for various

batteries of inventories, and tests were made of the significance of difference between obtained and predicted ratings of success in student teaching. Generally, predicted success and ratings by supervisors of the subjects could be shown to be related by only a low degree of confidence. The investigator opined that his criteria of teaching success might not have been sufficiently reliable. He expressed his misgivings thus: "The unreliability in the criteria may have been a major factor in the production of the negative results reported" (Tyler, 1954, p. 309).

A companion study was made by Michaelis (1954). The important differences between this study and Tyler's consisted in the use of additional instruments for personality assessment, in the use of two comparison groups instead of one set, and in the use of different test batteries to make predictions. In spite of the broader instrumentation and stronger control, the findings of this study were similar to those reported in the companion study. Only a low level of predictability was found (1954, p. 476). The measures with some predictive value included such factors as high morale, confidence, favorable attitudes toward children, and social adaptability. The use of these predictors with validation groups failed, however, to yield results with high enough predictive efficiency to enable the investigator to recommend their use as admission criteria.

What has proved to be one of the major efforts to derive instruments for predicting teaching success during the decade of the 1950's was at the University of Minnesota where Cook (1951) and co-workers developed the Minnesota Teacher Attitude Inventory (MTAI). In assessing the validity of their instrument, the authors reported that they

found validity coefficients of .50 and .63 for the MTAI when compared with student ratings of their teachers, and with ratings of teachers by their principals (1951, p. 170).

No single instrument for accurate prediction of over-all teacher effectiveness had been developed, however. Need was expressed by Tyler (1954, p. 308), and again by Michaelis (1954, p. 477), for more theoretical work in the area of teacher personality and the design of measures specifically oriented toward factors in teaching success.

In an article designed to challenge thinking and provoke discussion about the real benefits of selection for teacher education programs, Rabinowitz and Mitzel (1961, p. 15) provided this comment:

> Although the research literature has a great deal of discussion of specific tests and their correlation with various criteria, little attention has been directed toward analysis of the consequences that follow from the use of tests, however valid, in selection. Some educators have assumed that the discovery or development of tests which have some validity as the predictors of subsequent performance in teacher education programs will virtually solve the problem of selection and, by extention the problem of improving teacher quality. It is, of course, recognized that a perfect relationship between test or admission procedure and criterion is never found in practice. It follows, therefore, that selection decisions based on tests with less-than-perfect validities cannot be perfect.

Redfern (1966) discussed the prediction of teaching success within a total consideration of the process of teacher selection. He listed such factors as college grades, student teaching performance rating, general intelligence, personal motivation, empathy for children, and depth of interest in teaching to be given consideration in selection. He stressed the inadequacy of anything less than a battery of selection criteria when he said, "Despite all the evidence that has been amassed to predict teaching success through various kinds of selection procedures, it is difficult to cite any single criterion that has high

predictability" (1966, p. 563). He also said that first-class preparation (especially in student teaching) is paramount, particularly including competence in subject matter and experience in teaching skill. Other crucial qualities, in his estimation, were emotional stability and a high regard for, and pride in identification with, teaching as a profession.

Cornett (1969) evaluated three selective admissions criteria, used for admitting students to teacher education at Southeastern Louisiana College, to determine the effectiveness of these criteria in predicting performance of first-year teachers. An incidental effort was made also to determine if the prediction efficiency was the same for elementary and secondary teachers. The findings indicated that selecting students on the basis of 2.0 over-all grade-point average, a "C" or better in introductory courses in education, and a "C" or better in freshman English is not effective in predicting teaching performance. In addition, prediction efficiency differed in significant degree for elementary and secondary teachers.

The predictive value of some variables among teachers was studied by Koskenniemi (1965) and his co-workers at the University of Helsinki in Finland. Forty-eight male and 24 female students were followed through their training and the first three years of their teaching. Students rejected from the teacher training program on the basis of entrance examinations were compared with successful candidates. The successful differed only slightly in abilities, but were more often from urban areas, had stronger professional motives, and were clearer in their professional attitudes. Educational attitudes correlated somewhat with ability to adjust to supervising teachers, but did not predict

study success. Moderate intellectual ability and varied experience in caring for young children were positive predictors. Obvious weakness in logical thought, negative attitudes toward children and/or teaching, and choosing reaching as a career after unsuccessful experience in other fields were negative predictors. Negative development during the first years of professional teaching was found to be more predictable than positive development. The entrance examination proved not to predict success in student teaching.

Conant (1963) focused particular attention on practice teaching in teacher education programs in his much-discussed book. He recommended that the competence of teachers be tested, modified and reinforced in student teaching experiences under state-determined conditions and supervision. He stated flatly, "As we have seen, the one indisputably essential element in professional education is practice teaching" (1963, p. 142).

Aspy (1960) cautioned, however, that on the basis of a number of investigations of student teaching experiences there is good evidence that the student operates at a psychological level which precludes any fair estimation of his actual competence. He maintained that a large majority of student teachers are in a state of fear and are inhibited from displaying their best teaching performance as they enter the final and most crucial phase of their professional training. He said, "They are concerned with their own survival at a time when we are asking them to give to others" (1960, p. 304).

Yee (1960) investigated the "Student Teaching Triad" to determine the quality of the interpersonal relationships functioning among the student teacher, the college supervisor, and the cooperating teacher.

He found that the student teaching triad seemed to degenerate and become a less viable group as time passed. He observed:

> The results of this study for attitude relationships in
> student teaching indicate very great need to find means
> of improving what is essentially the educational setting
> in student teaching - the interpersonal relationship in
> the triad (1960, p. 106).

Wittrock (1962) conducted a study that showed the feasibility of basing student teaching grades on an induced set of specific goals. The results of the study indicated that specific behavioral goals can indeed influence the student teacher's behavior in the classroom.

Stiles (1960) and his co-authors reviewed a number of studies that were conducted on the relevancy of certain aspects of teacher education (such as academic and education courses) as they are viewed by teachers who have completed the program. It was pointed out that when any single factor was selected as best in preparation of students for teaching, the student teaching experience rated first among the alternatives.

Ort (1964) made a study of 443 seniors in the College of Education at Bowling Green State University. As a result of his findings he made the following comment:

> ... neither academic achievement in college nor the results
> of personality, attitude, and various other tests have
> significant value in predicting how successful a student will
> be as a student teacher or as a first-year teacher. Though
> limited and sometimes not too refined, the subjective evalu-
> ations made of students by supervising teachers and campus
> supervisors currently seems to provide the best evaluation
> yardstick for measuring the predicted success of neophyte
> teachers. ... (Ort, 1964, p. 67).

Also, he found that the correlations between grade-point averages and the evaluations of (1) the director of student teaching, (2) the campus supervisor, (3) the supervising teacher, and (4) first-year teachers were, respectively: .560, .213, .203, and .164 (1964, p. 69).

Apparently, as more variables were introduced to affect teaching success, the significance of the grade-point average decreased.

Labriola (1966) investigated the relationship between evaluation of the student teacher by the cooperating teacher and the unversity coordinator during the student teaching experience and the evaluation of the same subject by his immediate supervisor during his initial teaching experience as a professional teacher. Follow-up was made on 200 students who had completed their student teaching in the elementary schools in the York, Pennsylvania, area during the fall of 1961 through fall 1964 terms. Forty variables were developed as criteria. The investigator found that those students who were judged successful as student teachers could be predicted to enjoy success in their initial teaching experience as professionals.

Darrow (1962) studied prediction criteria for student teaching at the elementary level. She used a multiple correlation technique to find that only 10.98 per cent of the variance in student teaching effectiveness, as evaluated by the supervising teacher, was accounted for by a combination of grade-point average, the English subtest of the Iowa Test of Educational Development, and scholastic rank in high school.

Williams (1966) computed the relationships between eleven factors concerning student teachers and success in teaching. The factors were ACT percentile scores, percentile score on the MTAI, the individual IQ score, grade-point average in the area of teaching specialization, and scores on the seven areas of the Thurstone Temperament Schedule. From the viewpoint of the literature cited by the investigator, ratings by supervisors was recommended as one of the most valid measures of

success or effectiveness in teaching. The correlations of the study

showed that the best predictor of success in student teaching was the

grade-point average in the area of teaching specialization.

Salyer (1969, p. 44) pointed out that grade-point averages have

been used and are at present being used for admission to education pro-

grams: "perhaps without exception... ." Also, many institutions have

grade-point standards to be met at intervals in the program especially

at the point of admission to student teaching (1969, p. 44). He

designed his study for the purpose of determining if success in student

teaching (defined by grade achieved) and success in the first one or two

years of teaching in the Seattle Schools (defined by principal's

ratings) differentiated significantly between those students who had

attained minimal grade-point averages between 2.20 and 2.49 prior to

student teaching and those students who had attained grade-point aver-

ages of 2.50 or over prior to student teaching. There were 137

subjects: 107 were in the 2.5 or above group, and 30 were in the group

with averages below 2.5. The findings indicated that a subject with a

cumulative grade-point average of 2.50 or above was more likely to

receive an "A" in student teaching than those with averages below 2.50.

A chi-square test showed significance at the .025 level of confidence.

It was also indicated that students in the teacher education program

with grade-point averages below 2.50 had equal prospects of being judged

by their principals as successful in their initial teaching experience

as did those with grade-point averages of 2.50 or higher (1969, p. 48).

Diekrager (1969), in a synthesis and integration of research

findings, discovered that among academic criteria which appeared to be

most valuable in selecting teachers were grades in subject matter

courses, yet grades in professional education courses were among criteria which did not appear to be valuable.

Pickle (1967) undertook an analysis of entrance examination scores at the University of Arkansas to determine the extent these criteria predicted the grade-point averages of students in the College of Education, and to see if college grade-point averages could be used to predict future college grade-point averages. Entrance test data proved to be valid predictors of semester grade-point averages for the first seven semesters. He discovered that there was a trend for grade-point averages to increase somewhat systematically from the first to the last semesters, and also that the variabilities of the grades tended to decrease from the first to the last semesters.

Eckhoff (1966) investigated the relationship between selected background variables and achievement in graduate courses at Winona State College. The variables selected for evaluation were (a) undergraduate grade-point average, (b) the Miller Analogies Test scores, and (c) the Advanced Education Section scores from the Graduate Record Examinations. Stepwise multiple regression analysis was used to assess the relationship among the background variables and the criterion (over-all graduate grade-point average). The following conclusions were suggested: (1) optimum prediction of graduate success for secondary education majors can be made by using a least-squares regression function containing background variables of undergraduate grade-point average and a score on the Miller Analogies test; and (2) optimum prediction of graduate success for elementary majors can be made by using a least-squares regression function containing background variables of undergraduate

grade-point averages and a score on the Advanced Education section of the Graduate Record Examination.

Goodwin (1969) compared the occupational goals of college faculty and students with those of business executives. He noted, among other findings, that there is a distinct relationship between grade-point averages and occupational goals. "A" and "B" students tended to follow the pattern of professors, while students with "C" or lower grades tended to follow the pattern of the business world.

Woodring (1960) said of the teachers college, generically, "Because it will believe strongly in the importance of high standards for the teaching profession, it will admit only students of first-rate ability and will hold to high standards throughout the program" (1960, p. 341).

Simun and Asher (1964) reported an investigation that was typical of most of the predictive studies reviewed above. The purpose of their study was to assess singly and in combination the value of certain undergraduate variables for predicting school administrators' ratings of first-year teachers. They summarized their study in the paragraph quoted as follows:

> Twenty-five undergraduate variables were studied, both singly and in combination, to ascertain their value in predicting the ratings a first-year teacher would receive from school administrators on five criteria. Subjects included 111 teaching candidates graduated from Carnegie Institute of Technology between 1957 and 1960. Multiple correlations constituted the principle method of analysis. Multiple regression equations were developed for each criterion. The results seem to indicate that some positive and significant relationships do exist between certain undergraduate variables, both singly and in combination, and four of the five criteria. The best single predictors of ratings were student teaching grades, academic averages, and certain faculty ratings. High intercorrelations existed among the five criterion variables and also among the various items in the faculty ratings (Simon and Asher, 1964, p. 301).

Summary of the Literature Concerned

With Prediction of Success

This section of the review of the literature found emphasis upon the fact that educational researchers labor under a universal handicap caused by a paucity of operational definitions for what constitutes success in teaching. There also appeared to be a lack of functional instruments for identifying variables that relate directly to the criteria. However, the literature indicated that studies concerned with the measurement and prediction of teacher effectiveness during the last 25 years have increased and have become more sophisticated. In the search for specific criteria with reliable predictive value, investigators have explored in numerous directions with only moderate results.

The assumption generally conceded is that student teaching ranks at the top of importance in any teacher preparation program. Yet, factors definitive of the teacher-learner situation, which can be assessed in the classroom and related statistically to effective on-the-job performance, remain unclear and only vaguely delineated.

Authorities have acknowledged that in practice subjective evaluations of student performance occur generally and with some degree of validity. Ratings of teachers by their pupils, by their peers, and by their supervisors have been shown to be valid measures related to given criteria. Standardized test batteries and prior achievement records are usually included in admission and selection procedures utilized. Among the predictors of success, both in student teaching and in early professional teaching, grade-point averages are used consistently often. While the correlations of grade-point averages with specific criteria of

success are not always high, generally they correlate positively within a statistically significant level of confidence.

This study of the predictive value of the admissions criteria in use at Oklahoma State University was justified on the basis that grades and test scores are used generally in screening procedures by Colleges of Education, and that researchers normally find low but significant correlations between prior achievement standards and various selected specific criteria of later performance.

CHAPTER III

DESIGN AND METHOD

The primary objective of this study was to assess the value of the
ACT scores used at admission to the University and the STEP scores and
grade-point averages used at admission to programs of teacher education
at Oklahoma State University as criteria for predicting eligibility for
retention and advancement in the programs. The specific purpose was to
derive statistical relationships between admissions criteria and ex-
pected achievement at the point of admission to student teaching, during
the student teaching experience, and at the time of graduation from the
program.

The purpose of this chapter is to set forth the design, to identify
the population, and to describe the collection and the treatment of the
data.

Design of the Study

The study was designed to determine if there are any significant
relationships between the data collected at the freshman and sophomore
levels and grades at the point of admission to student teaching, grades
for student teaching, and grades at the point of graduation from the
programs. The problem was to determine if ACT scores, STEP scores, and
grade-point averages at admission to teacher education can be used to
predict grade-point average at admission to student teaching, grade

earned for student teaching, and grade-point average at graduation from the program.

The design for the study was essentially a "follow-up" investigation. Normally, ex post facto research is involved in this type of investigation. Kerlinger (1966, p. 360) provided a definition, as follows:

> Ex post facto research may be defined as that research in which the independent variable or variables have already occurred and in which the research starts with the observation of a dependent variable or variables. He then studies the independent variables in retrospect for their possible relations to, and effects on, the dependent variable or variables.

Then, in discussing the limitations of ex post facto research, he urged this caution:

> Ex post facto research has three major weaknesses ...
> (1) the inability to manipulate variables,
> (2) the lack of power to randomize, and
> (3) the risk of improper interpretation (1966, p. 371).

Yet, ex post facto research holds high value in the field of education. Kerlinger said:

> Despite its weakness, much ex post facto research must be done in psychology, sociology, and education simply because many research problems in the social sciences and education do not lend themselves to experimental inquiry (1966, p. 372).

Subjects

The subjects of the study were selected from the sample used by Fisher (1968). Her sample consisted of the 428 students who completed the Sequential Test of Educational Development (STEP) and the essay examination in February, 1966, as part of the screening procedures used for admission to the teacher education programs at Oklahoma State University. A list of those subjects was obtained from Dr. Fisher, who had procured them for her study from the Bureau of Tests and

Measurements of the University via the Office of the Department of

Education in the College of Education. Included in that list were the

names of the subjects and the colleges in which they were enrolled at

the time they took the STEP test in February, 1966.

The subjects of this study included 291 of Fisher's subjects who

were admitted to student teaching and who had ACT and STEP scores. Of

these, 286 completed courses in student teaching and received grades.

Two hundred and eighty finally completed a program of teacher education

and were graduated by the end of the 1968 spring term. Those subjects

not included in the study were either rejected as teacher candidates,

changed to another program, terminated, or postponed their programs

before graduation.

Collection of the Data

The data used in the study included grade-point averages and test

scores. Grade-point averages considered were over-all averages at the

time of admission to the teacher education programs and at the time of

admission to the student teaching experiences. Grade-point ratings for

student teaching were computed from the letter grades earned in only

the courses directly involved with student teaching. Test scores con-

sidered were the composite of the scaled scores of the American College

Test (ACT) and the total of the raw scores on the subtests of the

Sequential Test of Educational Progress (STEP). Other data collected

included the sex of the subject and whether or not employment as a

teacher had been undertaken after completion of the program.

The data were gathered from several sources. Over-all grade-point

averages at the time of admission to the teacher education programs, at

the time of admission to student teaching, at the point of graduation

from the program, and the grade rating for student teaching were pro-

cured from the subject's file in the student personnel office of the

college concerned, or in the offices of the department heads in the

several colleges, or were derived from the records in the registrar's

office.

Test scores for the STEP and ACT were obtained from the Fisher

(1968) thesis, Appendix A. These individual scores were cross-checked

with the original IBM data sheet used by Dr. Fisher in the preparation

of the computer cards for her study.

The sex differential for each subject was acquired at the time and

from the same source that grade-point values were obtained. The employ-

ment status of each subject was determined from the records of the

University Placement Services office at the University.

Treatment of the Data

The following brief description of the analysis procedure is given

to provide the reader with an overview of the statistical treatment of

the data.

Stepwise regression, a method of multiple regression calculation,

was used in the analysis of the data. Stepwise regression, as explained

by Draper and Smith (1968, pp. 171-172) included: (a) computation of

simple correlation matrices, (b) computation of partial and multiple

correlation coefficients, and (c) formation of multiple regression

equations. This analysis procedure allowed organization of intercorre-

lation matrices to show relationships among all variables considered in

the study.

A second part of the analysis was the computation of partial and multiple coefficients of correlation between the optimum composite of variables and the criteria.

A third part of the analysis was the formulation of simple and multiple regression equations. The equations provide a record of the intercept values and regression coefficients yielded by the step-wise regression analysis of the data for availability to any possible future study.

The final part of the analysis was a test of the hypotheses of the study. This was accomplished by the application of the appropriate coefficient of correlation to each of the first nine hypotheses to indicate the degree of relationship that existed between the independent variables (ACT scores, STEP scores, and GPA at admission to teacher education) and the three classification variables (GPA at admission to student teaching, grade-rating for student teaching, and GPA at graduation) of the study. The last three hypotheses were tested by analysis of variance procedures to show the amount that each independent variable contributed to the explanation of the variance in each of the three classification variables.

Hypotheses

1. There is no significant correlation between ACT scores used at admission to the University and GPA at admission to student teaching.

2. There is no significant correlation between ACT scores used at admission to the University and grade-point rating earned for student teaching.

3. There is no significant correlation between ACT scores used at admission to the University and GPA achieved at graduation.

4. There is no significant correlation between STEP scores used for admission to teacher education and GPA at admission to student teaching.

5. There is no significant correlation between STEP scores used for admission to teacher education and grade-point rating earned for student teaching.

6. There is no significant correlation between STEP scores used for admission to teacher education and GPA achieved at graduation.

7. There is no significant correlation between GPA scores used for admission to teacher education and GPA at admission to student teaching.

8. There is no significant correlation between GPA scores used for admission to teacher education and grade-point rating earned for student teaching.

9. There is no significant correlation between GPA scores used for admission to teacher education and GPA achieved at graduation.

10. The amount of variance in GPA at admission to student teaching accounted for by GPA at admission to teacher education is not significantly increased by the addition of ACT scores and STEP scores.

11. The amount of variance in grade-point rating for student teaching accounted for by ACT scores is not significantly

increased by the addition of STEP scores and GPA at admission to teacher education.

12. The amount of variance in GPA achieved at graduation accounted for by GPA at admission to teacher education is not significantly increased by the addition of ACT scores and STEP scores.

CHAPTER IV

RESULTS

The purpose of this study was to determine the relationships of ACT
scores, STEP scores and GPAs at admission to teacher education to
attained levels of GPA at admission to student teaching, grade-point
rating for student teaching, and GPA at graduation from the programs.
A population of teacher education students was selected, data related to
the problem were collected for analysis by computer, and the results of
the analyses of the data are reported in this chapter.

The findings are presented first in terms of the analyses of all
the variables of the study applied to the undivided sample. The sample
was then divided according to sex of the subjects and the findings are
presented on such basis. A third presentation is offered with a
division made according to employment undertaken by the subjects after
graduation either as teachers or in non-teaching fields of endeavor.

The initial presentation includes: (1) a description of the sample
populations with the means and standard deviations of the GPAs, ratings
and test scores introduced; (2) the computation of zero order coeffi-
cients of correlation; (3) the computation of partial and multiple
coefficients of correlation between the optimum composite of predictive
variables and the criterion; (4) the formulation of simple and multiple
regression equations; and (5) tests of the hypotheses.

Description of the Data

The subjects of the study were selected from the 428 students who took the STEP test at Oklahoma State University in February of 1966. They were selected on the basis that they had been admitted to a program of teacher education, had STEP scores and ACT scores on record, and subsequently had been admitted to student teaching. There were 291 subjects in the first category group that provided GPA data at admission to student teaching. Five who qualified in the first category did not complete course requirements and reduced the sample to 286 who received grades for student teaching. Six of those who received grades for student teaching did not complete requirements for graduation and thus further reduced the sample size to 280 subjects in the category group who provided GPA data at the point of graduation from the programs.

The three groups are differentiated in Table I on page 52, which shows the means and standard deviations of all the GPAs, ACT scores, STEP scores and grade-point ratings used in the study. The variables have been categorized according to the three sample group sizes.

The mean GPA for the 291 subjects who were admitted to student teaching was 2.79, with a standard deviation of 0.48, at the time of their admission to student teaching. This group also yielded an ACT composite mean score of 20.73 with a standard deviation of 3.98. The mean for their STEP raw score totals was 143.25 and had a standard deviation of 20.20. The mean GPA for this sample group at the time they were admitted to teacher education programs was 2.74 with a standard deviation of 0.55.

The second sample group of 286 subjects who received grades for student teaching produced a mean grade-point rating for student teaching

TABLE I

MEANS AND STANDARD DEVIATIONS OF ACT SCORES, STEP SCORES, GRADE–POINT AVERAGES,
AND GRADE RATINGS FOR THE UNDIVIDED SAMPLE

	GPA at Admission to Student Teaching N = 291		GP Rating for Student Teaching N = 286		GPA at Graduation N = 280	
	Mean	SD	Mean	SD	Mean	SD
GPA, admission to student teaching:	2.79	0.48				
GP rating for student teaching:			3.55	0.46		
GPA at graduation:					2.87	0.44
ACT composite scores:	20.73	3.98	20.73	4.01	20.71	4.03
STEP raw score totals:	143.25	20.20	143.40	20.31	143.38	20.44
GPA, admission to teacher education:	2.74	0.55	2.74	0.55	2.74	0.55

of 3.55 with a standard deviation of 0.46. The mean of the ACT scores

produced by this sample was 20.73, with a standard deviation of 4.01.

The mean for the STEP raw score totals derived from this group was

143.40 with a standard deviation of 20.31. The mean GPA at admission

to teacher education for this sample that had earned grades for student

teaching fell at 2.74 with a standard deviation of 0.55.

The third sample group of 280 subjects who provided GPA data at the

point of graduation from the programs of teacher education had a mean

GPA at graduation of 2.87 with a standard deviation of 0.44. The mean

for the ACT composite scores for this graduating group was 20.71 with a

standard deviation of 4.03. Their STEP raw score totals yielded a mean

of 143.38 with a standard deviation of 20.44. The GPAs at the point of

admission to teacher education for the graduating sample produced a

mean of 2.74 with a standard deviation of 0.55.

The slight differences in means and standard deviations that

occurred among the three group categories can be explained by the vari-

ations in the category group sizes: 291 subjects made up the group that

was admitted to student teaching, 286 subjects earned grades for student

teaching, and 280 subjects graduated. Only one variable, GPA at ad-

mission to teacher education, remained entirely consistent across the

three categories. As the number of the subjects in each of the three

categories decreased, both the means and standard deviations were

affected for the ACT scores and the STEP scores. The following pages

of this chapter describe the relationships among the variables and

report the additional analyses of the data.

Intercorrelations Among All Variables

Considered in the Study

The first part of the analyses of the data of the study was the computation of zero order coefficients of correlation among all the variables in the study. The relationships are presented systematically in Table II to show the coefficients of correlation that were found for ACT scores, STEP scores and GPA at admission to teacher education when correlated severally with GPA at admission to student teaching, grade-point rating for student teaching and GPA at graduation.

TABLE II

INTERCORRELATIONS AMONG ALL GRADE-POINT AVERAGES, GRADE RATINGS, ACT SCORES AND STEP SCORES USED IN THE STUDY

	GPA at Admission to Student Teaching	Grade Rating for Student Teaching	GPA at Graduation
	r	r	r
ACT composite scores:	.47**	.19**	.48**
STEP raw score totals:	.44**	.11	.44**
GPA, admission to teacher education:	.91**	.17*	.89**

** Significant at the .01 level of confidence.
 * Significant at the .05 level of confidence.

In the table, involving nine correlations, seven are seen to be significant at the .01 level of confidence. One is significant at the .05 level of confidence, and one is not significant. The z_r transformation method was used to test the significance of the coefficients of correlation from zero.

GPA at admission to student teaching correlated with ACT composite scores for a coefficient of .47; with STEP raw score totals to yield a coefficient of .44; and with GPA at admission to teacher education to produce the highest coefficient in this section of the analysis of the data at .91. All of the coefficients of the correlations with GPA at admission to student teaching were significant at the .01 level.

Correlations of grade rating for student teaching with ACT scores, STEP scores and GPA at admission to teacher education were lower than they were for the correlations with GPA at admission to student teaching or with GPA at graduation. Grade rating for student teaching correlated best with ACT composite scores with a coefficient of .19 being obtained. This r proved to be significant at the .01 level of confidence. Grade rating for student teaching correlated with GPA at admission to teacher education to produce a coefficient of .17, and this coefficient was found to be significant at the .05 level of confidence. The one coefficient that proved to be not significant, at a coefficient of correlation of .11, was that between grade rating for student teaching and STEP raw score totals.

The sample that provided the GPAs at graduation produced a mean score at that point in their careers that was slightly above, and had a slightly lower standard deviation than, the mean for the group at the point of admission to student teaching. However, when correlated

with ACT composite scores, STEP raw score totals and GPA at admission

to teacher education, GPA at graduation produced coefficients of corre-

lation similar to those for GPA at admission to student teaching. GPA

at graduation correlated with ACT scores to yield a coefficient of .48;

with STEP scores to produce a coefficient of .44; and with GPA at

admission to teacher education to generate a coefficient of .89. All

three coefficients for the correlations with GPA at graduation proved

to be significant at the .01 level of confidence.

Analysis of Variance

Grade-point average at admission to student teaching was the first

category of data dealt with in the analysis of the total data. The

partial and multiple coefficients of correlation and the amounts of

variance in GPA at admission to student teaching accounted for by each

combination in terms of percentages (R^2) are presented in Table III.

TABLE III

ANALYSIS OF VARIANCE IN GPA AT ADMISSION TO STUDENT TEACHING
FOR THE UNDIVIDED SAMPLE

Correlation		Percentage	
$r_a.1$	.912	$r_a.1^2$	83.2%
$R_a.1,2$	.914	$R_a.1,2^2$	83.6%
$R_a.1,2,3$	.914	$R_a.1,2,3^2$	83.6%

a = GPA at admission to student teaching.
1 = GPA at admission to teacher education.
2 = STEP raw score totals.
3 = ACT composite scores.

In the step-wise multiple regression analysis procedure, the first variable entered into correlation with GPA at admission to student teaching was GPA at admission to teacher education. The coefficient of correlation produced at this first step was .912 and accounted for 83.2 per cent of the variance in GPA at admission to student teaching. The second step in the procedure entered STEP raw score totals and produced a multiple coefficient for the two variables of .914, and increased the amount of variance accounted for by the combination only .4 of one per cent to a total of 83.6 per cent. A z_r transformation test of the significance of the difference showed that the amount accounted for by the addition of the second variable was not significantly increased within the .05 level of confidence. The variable entered at the third step in the analysis procedure was ACT composite scores. The multiple coefficient of correlation that resulted from all three variables in relationship with GPA at admission to student teaching was .914, the same coefficient derived from the combination at the previous step. No additional significant contribution to the percentage of variance in GPA at admission to student teaching explained by GPA at admission to teacher education was made by the addition of STEP raw score totals or by the further addition of ACT composite scores.

Grade-point rating earned for student teaching was the second category of data dealt with in the analysis of the undivided data. The partial and multiple coefficients of correlation and the amounts of variance in grade rating for student teaching explained by each of the three combinations of variables in terms of percentages (R^2) are shown in Table IV on page 58.

TABLE IV

ANALYSIS OF VARIANCE IN GRADE–POINT RATING FOR STUDENT
TEACHING FOR THE UNDIVIDED SAMPLE

Correlation		Percentage	
$r_b \cdot 3$	.193	$r_b \cdot 3^2$	3.7%
$R_b \cdot 3,2$	.214	$R_b \cdot 3,2^2$	4.6%
$R_b \cdot 3,2,1$	.231	$R_b \cdot 3,2,1$	5.3%

b = Grade–point rating for student teaching.
1 = GPA at admission to teacher education.
2 = STEP raw score totals.
3 = ACT composite scores.

Referral to Table II on page 54 shows that ACT composite scores
had the highest correlation with grade rating for student teaching.
Thus, the first variable entered in the step-wise multiple regression
procedure that treated grade rating for student teaching was ACT com-
posite socres, and the simple correlation produced a coefficient of
.193 which explained 3.7 per cent of the variance in grade rating for
student teaching. At the second step, STEP scores were combined with
ACT scores to produce a multiple coefficient of correlation of .214.
The R^2 showed that this combination accounted for 4.6 per cent of the
variance, an increase of only .9 of one per cent more than the amount
explained by ACT scores alone. A z_r transformation test showed that
the difference in the amount of variance accounted for by the addition
of the second variable was not increased significantly within the .05
level of confidence. GPA at admission to teacher education was the
variable entered into combination at the third step, and increased the

multiple coefficient to .231. The R^2 for this coefficient showed an increase of .7 of one per cent for the combination of three variables over the previous combination of two variables, with a total of 5.3 per cent of the variance in grade rating earned for student teaching accounted for by all three variables. A z_r transformation test showed that the combination of three variables was not significantly different within the .05 level of confidence from either the combination of ACT and STEP scores or of ACT scores alone in accounting for variance in grade-point rating earned for student teaching.

Grade-point average at graduation was the third category of data dealt with in the analysis of the undivided data. Table V gives the partial and multiple coefficients of correlation and the amounts of variance in GPA at graduation accounted for by each combination of variables in terms of percentages (R^2).

TABLE V

ANALYSIS OF VARIANCE IN GPA AT GRADUATION
FOR THE UNDIVIDED SAMPLE

Correlation		Percentage	
$r_c \cdot 1$	.891	$r_c \cdot 1^2$	79.4%
$R_c \cdot 1,2$	.893	$R_c \cdot 1,2^2$	79.8%
$R_c \cdot 1,2,3$	.893	$R_c \cdot 1,2,3^2$	79.8%

c = GPA at graduation.
1 = GPA at admission to teacher education.
2 = STEP raw score totals.
3 = ACT composite scores.

In the step-wise multiple regression procedure, the first variable entered into correlation with GPA at graduation was GPA at admission to teacher education to produce a coefficient of .891 and account for 79.4 per cent of the variance in GPA at graduation. At the second step, STEP raw score totals were entered into combination with GPA at admission to teacher education to correlate with GPA at graduation and produced a coefficient of .893. The R^2 for this coefficient showed that the combination accounted for 79.8 per cent of the variance in GPA at graduation, which was an increase of only .4 of one per cent over the amount explained by GPA at admission to teacher education alone. A z_r transformation test showed that the difference between the amounts of variance in GPA at graduation accounted for by the combination of variables and by GPA at admission to teacher education alone was not significant within the .05 level of confidence. The variable entered into this combination at the third step to correlate with GPA at graduation was ACT composite scores, and this correlation yielded a coefficient of .893, an identical coefficient to that produced at the second step. Thus, no significant additional contribution was made by combining STEP scores and ACT scores with GPA at admission to teacher education to account for variance in GPA at graduation over the amount that was explained by GPA at admission to teacher education alone.

Regression Equations

The question arises, consequently, that since relationships between GPAs, test scores and grade ratings have been investigated and analyzed, and significant correlations have been identified and reported, what do these imply in terms of prediction? The step-wise multiple regression

analysis procedures yielded intercept values and regression coefficients that might prove to be useful to some future predictive study. Thus, regression equations have been derived from the findings of the study are presented as artifacts incidental to the main problem but worthy of becoming a part of the record. To simplify the presentation of the equations, symbols are used as follows:

X_1 = GPA at admission to teacher education;

X_2 = STEP raw score totals;

X_3 = ACT composite scores;

Y_1' = predicted GPA at admission to student teaching;

Y_2' = predicted grade-point rating for student teaching; and

Y_3' = predicted GPA at graduation from program.

The first part of the analysis dealt with the relationships of GPA at admission to student teaching with the predictor variables. Table VI offers a concise presentation of the findings that resulted from the partial and multiple relationships in this part of the analysis.

TABLE VI

STEP-WISE REGRESSION VALUES PRODUCED BY CORRELATIONS OF GPA AT
ADMISSION TO STUDENT TEACHING WITH THE PREDICTOR VARIABLES

	GPA at Admission to Teacher Education (Step 1)	GPA and STEP Raw Score Totals (Step 2)	GPA. STEP and ACT Composite Scores (Step 3)
Correlation coefficient	.912	.914	.914
Variance explained (R^2)	83.2%	83.6%	83.6%
Intercept value	0.62588	0.46060	0.44945
Regression coefficients	0.79174	0.76650	0.76986
(second step)	---	0.00164	0.00206
(third step)	---	---	-0.00286
Std. error of estimate	0.195	0.194	0.194

For clarity, the correlation coefficients and the R^2 percentages have been included in the tables that present the regression values. In the preceding discussion of the analysis of variance it was pointed out that GPA at admission to teacher education accounted for 83.2 per cent of the variance in GPA at admission to student teaching, that the addition of STEP raw score totals added only another 0.4 per cent, and that the further addition of ACT composite scores made no additional improvement at all. The table graphically shows this finding reflected by the regression coefficients at the second and third steps in the regression analysis procedure. Thus, both from the analysis of variance results and from the smallness of the regression coefficients associated with STEP and ACT scores when added to GPA at admission to teacher education as contributory predictor variables, multiple regression equations incorporating the additional values can be considered unprofitable to predict with enough additional accuracy to make their employment worthwhile. GPA at admission to student teaching can be predicted for practical purposes from GPA at admission to teacher education. The simple regression equation derived from the findings of this part of the study is:

$$Y_1{}' = .62588 + .79174X_1 \ (\pm.195) \ .$$

The amount in parenthesis is the standard error of estimate associated with the regression values at the first step. This means that the chances are about two in three (.68 confidence) that the predicted GPA at admission to student teaching will not miss the actual GPA by more than plus-or-minus .195 points.

The second part of the regression analysis procedure dealt with the relationships of grade-point earned for student teaching with the

predictor variables. Table VII presents the results of this part of

the regression analysis procedure in a synoptic form.

TABLE VII

STEP-WISE REGRESSION VALUES PRODUCED BY CORRELATIONS
OF GRADE-POINT RATING FOR STUDENT TEACHING WITH
THE PREDICTOR VARIABLES

	ACT Composite Scores (Step 1)	ACT and STEP Scores (Step 2)	ACT, STEP and GPA at Adm. to Tea. Ed. (Step 3)
Correlation coefficient	.193	.214	.231
Variance explained (R^2)	3.7%	4.6%	5.3%
Intercept value	3.09658	3.30576	3.20011
Regression coefficients	0.02197	0.03766	0.03276
(second step)	---	0.00373	-0.00385
(third step)	---	---	0.08208
Std. error of estimate	0.449	0.449	0.448

Generally, the values produced by the relationships of grade-point

rating for student teaching with the predictor variables were much less

definitive than those produced by grade-point averages (both at admis-

sion to teacher education and at graduation) related to the predictors.

Grade-point rating for student teaching correlated best with ACT com-

posite scores but the coefficient of .193 explained only 3.7 per cent

of the variance. The addition of STEP scores increased the amount of

variance accounted for to 4.6 per cent, and the further addition of GPA

at admission to teacher education increased the amount of variance in

grade-point rating for student teaching accounted for by the combination

of all three predictor variables to a total of only 5.3 per cent.

Consequently, the multiple regression equation using values derived

from all three predictor variables in combination is offered here for

the optimum predictability possible to calculate expected grades for

student teaching. The regression equation is:

$$Y_2{}' = 3.20011 + .03276X_2 - .00385X_3 + .08208X_1 \ (\pm .448) \ .$$

The third part of the regression analysis procedure dealt with the

relationships of GPA at graduation with the predictor variables. Table

VIII gives a systematic presentation of the findings that resulted from

the partial and multiple relationships in this third part.

TABLE VIII

STEP-WISE REGRESSION VALUES PRODUCED BY CORRELATIONS OF
GPA AT GRADUATION WITH THE PREDICTOR VARIABLES

	GPA at Admission to Teacher Education (Step 1)	GPA and STEP Raw Score Totals (Step 2)	GPA, STEP and ACT Composite Scores (Step 3)
Correlation coefficient	.891	.893	.893
Variance explained (R^2)	79.4%	79.8%	79.8%
Intercept value	0.91535	0.75731	0.75625
Regression coefficients	0.71507	0.69009	0.69039
(second step)	---	0.00158	0.00162
(third step)	---	---	0.00026
Std. error of estimate	0.201	0.199	0.200

The correlation of GPA at graduation with GPA at admission to teacher education produced a coefficient of .891. The R^2 for this coefficient shows that it accounts for 79.4 per cent of the variance in GPA at graduation. Addition of STEP scores into combination increased the amount explained by only .02 per cent, and the further addition of ACT scores into the combination made no additional increase. The intercept values and regression coefficients yielded for the three combinations reflect the negligible amounts of percentage contributed by the additional variables. Thus, for practical purposes the use of a simple regression equation derived from the relationship of GPA at graduation with GPA at admission to teacher education will serve to predict expected GPA at graduation. The equation is:

$$Y_3' = .91535 + .71507X_1 \ (\pm.201) \ .$$

Tests of the Hypotheses of the Study

An integral part of the study was the testing of the hypotheses related to the problem of the study as presented in Chapter III. The tests of the first nine hypotheses were accomplished by the application of the appropriate coefficient of correlation (previously tested for significance) which indicated the degree of relationship existing between each independent variable and the dependent variables of the study. The tenth, eleventh, and twelfth hypotheses were tested by the application of the findings of the analysis of variance reported in a previous section of this chapter. Each hypothesis is stated in full and is then followed by the findings related specifically to that particular hypothesis.

Hypothesis 1. -- There is no significant correlation between ACT
scores used for admission to the University and GPA at admission to
student teaching. This hypothesis was rejected. The coefficient of
correlation calculated for the relationship between ACT composite
scores and GPA at admission to student teaching was .47, a coefficient
that proved to be significant at the .01 level of confidence.

Hypothesis 2. -- There is no significant correlation between ACT
scores used for admission to the University and grade-point rating
earned for student teaching. This hypothesis was also rejected because
the coefficient of correlation yielded by the relationship between the
two variables was .19, a coefficient that proved to be significant at
the .01 level of confidence.

Hypothesis 3. -- There is no significant correlation between ACT
scores used for admission to the University and GPA achieved at gradu-
ation. This hypothesis was rejected. The coefficient of correlation
for the variables of the hypothesis was .48, which was significant at
the .01 level of confidence.

Hypothesis 4. -- There is no significant correlation between STEP
scores used for admission to teacher education and GPA at admission to
student teaching. STEP raw score totals correlated with GPA at admis-
sion to student teaching to produce a coefficient of .44, which was
significant at the .01 level of confidence. The fourth hypothesis was
rejected on that basis.

Hypothesis 5. -- There is no significant correlation between STEP
scores used for admission to teacher education and grade-point rating
earned for student teaching. This hypothesis was accepted. The
coefficient of correlation between STEP raw score totals and grade-point

rating for student teaching was .11, and this coefficient was not significant within the .05 level of confidence.

Hypothesis 6. — There is no significant correlation between STEP scores used for admission to teacher education and GPA achieved at graduation. This hypothesis was rejected. The coefficient of correlation for these two variables was .48, and when tested, this coefficient proved to be significant at the .01 level of confidence.

Hypothesis 7. — There is no significant correlation between GPA scores used for admission to teacher education and GPA at admission to student teaching. This hypothesis was rejected on the basis of the highest coefficient of correlation produced from the undivided data of the study. The coefficient of correlation between GPA at admission to teacher education and GPA at admission to student teaching was .91, significant at the .01 level of confidence.

Hypothesis 8. — There is no significant correlation between GPA scores used for admission to teacher education and grade-point rating earned for student teaching. The relationship between GPA at admission to teacher education and grade-point rating for student teaching gave a coefficient of correlation of .17, which proved to be significant at the .05 level of confidence but not at the .01 level. The hypothesis was rejected on this basis.

Hypothesis 9. — There is no significant correlation between GPA scores used for admission to teacher education and GPA achieved at graduation. The hypothesis was rejected. The second highest correlation in this part of the study was produced by the relationship between these two variables, with a coefficient of .89 which was found to be significant at the .01 level of confidence.

Hypothesis 10. -- The amount of variance in GPA at admission to student teaching accounted for by GPA at admission to teacher education is not significantly increased by the addition of ACT scores and STEP scores. This hypothesis was accepted. The analysis of variance showed that GPA at admission to teacher education accounted for 83.2 per cent of the variance in GPA at admission to student teaching, and that the addition of STEP scores and ACT scores did not contribute a statistically significant additional amount.

Hypothesis 11. -- The amount of variance in grade-point rating for student teaching accounted for by ACT scores is not significantly increased by the addition of STEP scores and GPA at admission to teacher education. This hypothesis was accepted. The analysis of variance showed that ACT scores alone accounted for 3.7 per cent of the variance in grade-point earned for student teaching, that the addition of STEP scores increased the amount to 4.6 per cent, and that the further addition of GPA at admission to teacher education increased the total amount of variance accounted for by all three variables to only 5.3 per cent. The difference in the amounts of variance accounted for by ACT scores and STEP scores, and by the combination of ACT scores, STEP scores and GPA at admission to teacher education proved to be not statistically significant over the amount accounted for by the use of ACT scores alone.

Hypothesis 12. -- The amount of variance in GPA at graduation accounted for by GPA at admission to teacher education is not significantly increased by the addition of ACT scores and STEP scores. This hypothesis was accepted. The analysis of variance demonstrated that GPA at admission to teacher education accounted for 79.4 per cent of

the variance in GPA at graduation, that the addition of STEP scores

increased the amount to 79.8 per cent, and the addition of ACT scores

contributed nothing more. The increases proved to be not significant.

Description of the Data Divided According
to Sex of Subjects

This section of the chapter presents the results of the study as

the data were differentiated for male subjects as a group and for female

subjects as a separate group in each of the three sample categories of

the study. For convenience of reference and comparison, the data are

arranged in systematic and condensed form in Table IX which shows the

means and standard deviations of ACT scores, STEP scores, and GPAs at

admission to teacher education divided on the basis of the sex of the

subjects in each classification group (those who were admitted to

student teaching, those who earned grades for student teaching, and

those who graduated).

Across the three categories, the number of female subjects in each

classification group was reduced from 208 who were admitted to student

teaching to 203 who completed course requirements to receive grades for

student teaching, and then was reduced again to 197 female subjects who

had continued in the programs to graduate. For the male subjects, tabu-

lation of the data revealed that 83 males were admitted to student

teaching, 83 earned grade ratings for student teaching, and the same 83

continued on in their programs until they graduated. Thus, it is

demonstrated that among the subjects of this study males persisted in

the programs of teacher education with about five per cent more

constancy than did the female subjects. However, grades and scores

TABLE IX

MEANS AND STANDARD DEVIATIONS OF ACT SCORES, STEP SCORES, GRADE-POINT AVERAGES,
AND GRADE RATINGS WITH DATA DIVIDED ACCORDING TO SEX OF SUBJECTS

	GPA at Admission to Student Teaching				GP Rating for Student Teaching				GPA at Graduation			
	Male N = 83		Female N = 208		Male N = 83		Female N = 203		Male N = 83		Female N = 197	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
GPA, admission to student teaching:	2.61	0.40	2.87	0.48								
GP rating for student teaching:					3.48	0.43	3.58	0.47				
GPA at graduation:									2.96	0.36	2.95	0.45
ACT composite scores:	20.24	4.18	21.36	3.64	20.24	4.18	21.40	3.69	20.24	4.18	21.24	3.82
STEP raw score totals:	143.60	21.47	146.02	19.48	143.60	21.47	146.46	19.65	143.60	21.47	146.28	20.04
GPA, admission to teacher education:	2.71	0.56	2.77	0.54	2.71	0.56	2.78	0.54	2.71	0.56	2.84	0.56

averaged slightly higher for female subjects than for male subjects in the samples on all measures used in the study.

In the group consisting of 208 female subjects and 83 male subjects that made up the sample that had GPAs at admission to student teaching, the mean GPA for males was 2.61, with a standard deviation of 0.40, and the mean GPA for females was 2.87, with a standard deviation of 0.48, at the time of their admission to student teaching. The mean GPA for this same group at the time of their admission to the teacher education programs was 2.71, with a standard deviation of 0.56, for the male subjects, and the mean GPA for the female subjects was 2.77, with a standard deviation of 0.54. The mean of the ACT composite scores for the male subjects who were admitted to student teaching was 20.04, with a standard deviation of 4.18, and the mean of the ACT composite scores for the female subjects in this category was 21.36, with a standard deviation of 3.64. The mean of the STEP raw score totals for the male subjects who were admitted to student teaching was 143.60, with a standard deviation of 21.47, and the mean of the STEP raw score totals for the female subjects in the same category was 146.02, with a standard deviation of 19.48.

The sample that had grade-point ratings for student teaching (the second classification group) was made up of 203 female subjects and 83 male subjects. The mean of the grade-point rating earned by the male subjects for student teaching was 3.48, with a standard deviation of 0.43, and the mean of the grade-point rating earned by the female sub-jects was 3.58, with a standard deviation of 0.47. The mean of the GPAs for this second classification group at the time of their admission to programs of teacher education was 2.71, with a standard deviation of

0.56, for the males, and 2.78, with a standard deviation of 0.54, for the female subjects. The mean of the ACT composite scores for the male subjects who earned grade ratings for student teaching was 20.24, with a standard deviation of 4.18, and the females in the same category had a mean of their ACT scores of 21.40, with a standard deviation of 3.69. The mean of the STEP raw score totals for the males who earned grade ratings for student teaching was 143.60, with a standard deviation of 21.47, and the mean of the STEP raw score totals for the female subjects in the same category was 146.46, with a standard deviation of 19.65.

The third classification group (the group that graduated) consisted of 197 female subjects and 83 male subjects. The mean of the GPAs at the point of graduation was 2.69, with a standard deviation of 0.36, for the male subjects, and 2.95, with a standard deviation of 0.45, for the female subjects. The mean of the GPAs for the male subjects who graduated, at the time of their admission to teacher education, was 2.71, with a standard deviation of 0.56, and the mean of the GPAs for the female subjects who graduated, at the time of their admission to teacher education, was 2.84, with a standard deviation of 0.56. The mean of the ACT composite scores for the males in this group was 20.24, with a standard deviation of 4.18, and the mean of the ACT composite scores for the female subjects in this same category was 21.24, with a standard deviation of 3.82. The mean of the STEP raw score totals for the male subjects who graduated was 143.60, with a standard deviation of 21.47, and the mean of the STEP raw score totals for the females who graduated was 146.28, with a standard deviation of 20.04.

Intercorrelations Among All Variables, With the

Data Divided According to Sex of Subjects

Intercorrelations among the variables of the study are arranged in

a condensed and systematic form in Table X.

TABLE X

INTERCORRELATIONS AMONG ACT SCORES, STEP SCORES, GRADE-POINT
AVERAGES AND GRADE RATINGS USED IN THE STUDY
DIVIDED ACCORDING TO SEX OF SUBJECTS

	GPA at Admission to Student Teaching		GP Rating for Student Teaching		GPA at Graduation	
	Male N = 83	Female N = 208	Male N = 83	Female N = 203	Male N = 83	Female N = 197
	r	r	r	r	r	r
ACT composite scores:	.35**	.49**	.15	.19**	.40**	.47**
STEP raw score totals:	.34**	.50**	.06	.13	.38**	.49**
GPA at admission to teacher education:	.92**	.90**	.26*	.11	.91**	.87**

** Significant at the .01 level of confidence.
 * Significant at the .05 level of confidence.

Table X was designed to present the coefficients of correlation

for the nine possible relationships between the dependent variables

(ACT composite scores, STEP raw score totals, and GPA at admission to

teacher education) and the classification, or independent variables of

GPA at admission to student teaching, grade-point rating for student teaching, and GPA at graduation as these were found for males as a distinct sub-group of the samples and for females as a separate sub-group of the samples. The significances of the zero-order coefficients of correlation are also indicated by asterisks attached to the coefficients in the tabulation. In seven out of the nine relationships, female subjects had higher coefficients of correlation than did the male subjects. However, z_r transformation tests of the significance of the differences between the coefficients for males and the coefficients for females showed that none were different enough from each other to be significant within the .05 level of confidence. Significance of the correlation coefficients from zero were about equal for the male and for the female subjects. For the male subjects, seven out of the nine possible coefficients of correlation were significantly different from zero, with six significant at the .01 level of confidence and one significant at the .05 level. Seven out of the nine possible coefficients of correlation were significant for the female subjects, with all seven significantly different from zero at the .01 level of confidence.

GPA at admission to student teaching correlated with ACT composite scores to yield a coefficient of correlation of .35 for the male subjects and a coefficient of .49 for the female subjects. GPA at admission to student teaching correlated with STEP raw score totals to yield a coefficient of correlation of .34 for the male subjects and a coefficient of .50 for the female subjects. GPA at admission to student teaching correlated with GPA at admission to teacher education to yield a coefficient of correlation of .92 for the male subjects and a coefficient of .90 for the female subjects. All of the correlations in this

category were significantly different from zero at the .01 level of confidence.

Grade-point ratings for student teaching correlated with ACT composite scores for a coefficient of correlation of .15 for the male subjects and a coefficient of .19 for the female subjects. Grade-point ratings for student teaching correlated with STEP raw score totals for a coefficient of correlation of .26 for the male subjects and a coefficient of .11 for the female subjects. The correlations that were significant in this category were the correlations between grade-point ratings for student teaching and ACT composite scores for the female subjects (which at a coefficient of .19 was significantly different from zero at the .01 confidence level), and the correlation of grade-point ratings for student teaching with GPA at admission to teacher education for the male subjects (which at a coefficient of .26 was significantly different from zero at the .05 confidence level).

GPA at graduation correlated with ACT composite scores to produce a coefficient of correlation of .40 for the male subjects in this category, and a coefficient of correlation of .47 for the female subjects. GPA at graduation correlated with STEP raw score totals to produce a coefficient of correlation of .38 for the male subjects and a coefficient of correlation of .49 for the female subjects. GPA at graduation correlated with GPA at admission to teacher education for a coefficient of correlation of .91 for the male subjects and a coefficient of correlation of .87 for the female subjects. All of the correlations in this category were significantly different from zero at the .01 level of confidence.

Analysis of Variance With the Data Divided

According to Sex of Subjects

Grade-point average at admission to student teaching was the first category dealt with in the analysis of the data divided according to the sex of the subjects. The partial and multiple coefficients of correlation and the amounts of variance in GPA at admission to student teaching each combination accounts for in terms of percentages (R^2) are presented in Table XI.

TABLE XI

ANALYSIS OF VARIANCE IN GPA AT ADMISSION TO STUDENT TEACHING
WITH DATA DIVIDED ACCORDING TO SEX OF SUBJECTS

Correlation				Percentage			
Males		Females		Males		Females	
$r_a.1$	.918	$r_a.1$	.903	$r_a.1^2$	84.2%	$r_a.1$	81.5%
$R_a.1,3$	.917	$R_a.1,2$	.907	$R_a.1,3^2$	84.0%	$R_a.1,2$	82.2%
$R_a.1,3,2$	.916	$R_a.1,2,3$	.906	$R_a.1,3,2^2$	83.9%	$R_a.1,2,3^2$	82.0%

a = GPA at admission to student teaching.
1 = GPA at admission to teacher education.
2 = STEP raw score totals.
3 = ACT composite scores.

In the step-wise multiple regression analysis procedure, the sequence of entry of the predictor variables into partial and multiple correlation with GPA at admission to student teaching differed slightly

at the second and third steps between the two groups. GPA at admission to teacher education was entered at the first step for both females and males and accounted for a high percentage of the variance in GPA at admission to student teaching for both groups. Referral to the table shows that, for the male group, the combination of additional scores caused a slight decrease in percentage from the optimum of 84.2 per cent produced by correlation of GPA at admission to teacher education with GPA at admission to student teaching. For the females, combining additional variables increased the percentage of variance in GPA at admission to student teaching accounted for by GPA at admission to teacher education from 81.5 per cent to an optimum of 82.2 per cent for the two-variable combination of GPA at admission to teacher education and STEP raw score totals. However, z_r transformation tests of the significance of the differences showed that the coefficients .918, .917, and .916 for the males were not significantly different from each other within the .05 level of confidence; and the coefficients of .903, .907, and .906 were not significantly different from each other within the .05 level of confidence for the female group.

Grade-point rating for student teaching was the category treated in the second part of the step-wise multiple regression analysis of the data divided according to sex of the subjects. Table XII shows the partial and multiple coefficients of the correlations and the amounts of variance accounted for by each in terms of percentages (R^2).

Table XII graphically reveals the fact that sequence of entry of the predictor variables was not the same for the female group as it was for the male group. Referral back to Table X on page 73 reveals that the highest correlation with grade-point rating for student teaching was

yielded by the relationship with GPA at admission to teacher education with a coefficient of .26 for the males; but the best relationship for the female group was evidenced by ACT scores correlated with grade-point rating for student teaching to produce a coefficient of .19. Thus, the sequence of entry of the predictor variables for the female group was ACT scores at the first step in the step-wise multiple regression analysis procedure, STEP scores at the second step, and GPA at admission to teacher education at the third step. The sequence for the male group began with GPA at admission to teacher education at the first step, and STEP scores and ACT scores, respectively, at the second and third steps in the procedure.

TABLE XII

ANALYSIS OF VARIANCE IN GRADE-POINT RATING FOR STUDENT TEACHING
WITH DATA DIVIDED ACCORDING TO SEX OF SUBJECTS

Correlation				Percentage			
Males		Females		Males		Females	
$r_b \cdot 1$	.260	$r_b \cdot 3$	.191	$r_b \cdot 1^2$	6.9%	$r_b \cdot 3^2$	3.7%
$R_b \cdot 1,2$	.248	$R_b \cdot 3,2$	.189	$R_b \cdot 1,2^2$	6.2%	$R_b \cdot 3,2^2$	3.6%
$R_b \cdot 1,2,3$	.260	$R_b \cdot 3,2,1$	.178	$R_b \cdot 1,2,3^2$	6.8%	$R_b \cdot 3,2,1^2$	3.2%

b = Grade-point rating for student teaching.
1 = GPA at admission to teacher education.
2 = STEP raw score totals.
3 = ACT composite scores.

None of the partial and multiple coefficients of correlation were high for either group. For both groups, the initial correlation at the first step in the procedure produced the highest correlation. For the males, the second step combination of variables decreased the coefficient from the initial .264 to .248, and the multiple correlation at the third step yielded a coefficient of .260. For the female group, the coefficients decreased progressively from an initial .191 to .189 and then to .178 finally at the third step in the procedure.

The greatest amounts of variance in grade-point rating for student teaching were accounted for by the simple correlations at the first step of the regression analysis procedure for both groups. However, with an optimum of 6.9 per cent for the male group and an optimum of only 3.7 per cent for the female group, it became apparent that very little of the variance in grade-point rating for student teaching was explained by GPA at admission to teacher education, STEP scores, or ACT scores, or by any combination of the three predictor variables.

Significance of the differences between the coefficients of correlation was tested by z_r transformations. The coefficients of .264, .248, and .260 for the males were found to be not significantly different from each other within the .05 confidence level. The coefficients of .191, .189, and .178 for the females were found to be not significantly different from each other within the .05 confidence level, also.

GPA at graduation was the category treated in the third and final part of the step-wise multiple regression analysis procedure with the data divided according to sex of the subjects. Listed in Table XIII are the partial and multiple coefficients of the correlations and the amounts of variance accounted for by each in terms of percentages (R^2).

TABLE XIII

ANALYSIS OF VARIANCE IN GPA AT GRADUATION WITH DATA
DIVIDED ACCORDING TO SEX OF SUBJECTS

Correlation				Percentage			
Males		Females		Males		Females	
$r_c \cdot 1$	.912	$r_c \cdot 1$	.874	$r_c \cdot 1^2$	83.2%	$r_c \cdot 1^2$	76.4%
$R_c \cdot 1,3$	.914	$R_c \cdot 1,2$	.876	$R_c \cdot 1,2^2$	83.5%	$R_c \cdot 1,2^2$	76.7%
$R_c \cdot 1,3,2$	.913	$R_c \cdot 1,2,3$	.876	$R_c \cdot 1,2,3^2$	83.3%	$R_c \cdot 1,2,3^2$	76.7%

c = GPA at graduation.
1 = GPA at admission to teacher education.
2 = STEP raw score totals.
3 = ACT composite scores.

The sequence of entry of the predictor variables into correlation with GPA at graduation differed slightly at the second and third steps in the step-wise multiple regression analysis procedure for both the female and the male groups. However, GPA at admission to teacher education was the first variable entered into correlation with GPA at graduation for both groups, and in both cases all but 0.3 per cent of the optimum percentage was accounted for by these initial correlations. For the female group the optimum percentage was produced at the second step by the combination of GPA at admission to teacher education and STEP raw score totals correlated with GPA at graduation. The further addition of ACT scores yielded the same coefficient and R^2 at the third step. For the male group the optimum percentage was reached at the second step also, with the combination of GPA at admission to teacher education added to ACT composite scores to correlate with GPA at

graduation. The further addition of STEP scores into the combination decreased the correlation and percentage slightly from the optimum but increased the percentage one tenth of one per cent over the initial amount of variance in GPA at graduation accounted for by GPA at admission to teacher education alone.

Tests of the significance of differences were made by z_r transformations. The coefficients of .912, .914, and .913 for the male group were found to be not significantly different from each other within the .05 level of confidence. The coefficients of .874, .876, and .876 were also found to be not significantly different from each other within the .05 level of confidence.

In addition, z_r transformation tests were made for differences between the male groups and the female groups in the results from the data divided according to the sex of the subjects. None of the coefficients were found to be different enough between the two groups to be significant within the .05 level of confidence. A casual observation could suggest (see Table XII) that there might be a significant difference between the groups in the category of grade-point rating for student teaching. Yet, a z_r transformation test between the lowest R for the female group and the highest R for the male group showed that with a transformation value of .180 for the coefficient and a standard error of z_r at .139 for the 203 female subjects, and with a transformation value of .270 for the coefficient and a standard error of z_r at .219 for the 83 male subjects, the difference between the two groups was not significant within the .05 level of confidence.

Regression Equations Appropriate

to the Sex Differentials

The step-wise multiple regression analysis procedures yielded intercept values and regression coefficients from the data generated by the male subjects as a distinct group and by the female subjects as a separate distinct group. Regression equations have been developed from the findings of this part of the study and are presented here for their usefulness to any researcher or worker in education or to any otherwise interested persons in the future.

To clarify terms and make the presentation of the regression equations brief, the variables are identified by the following symbols:

X_1 = GPA at admission to teacher education,

X_2 = ACT composite scores,

X_3 = STEP raw score totals,

Y_1' = predicted GPA at admission to student teaching,

Y_2' = predicted grade-point rating for student teaching, and

Y_3' = predicted GPA at graduation from programs.

The first part of the analysis procedure treated the relationships of GPA at admission to student teaching with GPA at admission to teacher education, with STEP raw score totals and with ACT composite scores. The values appropriate to regression equations that were produced by the computation procedures for the male subjects as one group and for the female subjects as a separate group are shown in Table XIV on page 83 For convenience of reference, the correlation coefficients that resulted from the different combinations of variables and the percentages of variance in GPA at admission to student teaching accounted for by R^2 calculations are included in the table.

TABLE XIV

STEP-WISE REGRESSION VALUES PRODUCED BY DATA DIVIDED ACCORDING TO SEX
THROUGH CORRELATIONS OF GPA AT ADMISSION TO STUDENT TEACHING
WITH THE PREDICTOR VARIABLES

	Step 1		Step 2		Step 3	
	Males	Females	Males	Females	Males	Females
Correlation coefficient	0.918	0.903	0.917	0.907	0.916	0.906
Variance explained (R^2)	84.2%	81.5%	84.0%	82.2%	83.9%	82.0%
Intercept value	0.56877	0.63086	0.54341	0.40667	0.54632	0.39805
Regression coefficients	0.81817	0.78874	0.81397	0.74905	0.81363	0.75192
	---	---	0.00025	0.00235	0.00017	0.00291
	---	---	---	---	0.00047	-0.00375
Std. error of estimate	0.160	0.208	0.162	0.205	0.164	0.206

Step 1 = GPA at admission to teacher education entered for males and for females.
Step 2 = GPA at admission to teacher education entered with ACT composite socres for males, but with
STEP raw score totals for females.
Step 3 = GPA at admission to teacher education, STEP scores and ACT scores entered for both males
and females.

The analysis of variance demonstrated that with the data divided according to the sex of the subjects the amounts of variance in GPA at admission to student teaching that were accounted for by the multiple coefficients were not significantly different from the amount explained by a simple coefficient derived from a correlation with the most efficient single predictor in each case. For both males and females, the highest simple coefficient was produced by correlating GPA at admission to teacher education with GPA at admission to student teaching. Thus, a simple regression equation using the values produced at the first step in the procedure is sufficient for practical purposes to predict expected GPA at admission to student teaching for both groups.

The equation for the male subjects (utilizing the symbols defined above with the values in the first column of Table XIV) to predict expected GPA at admission to student teaching is as follows:

$$Y_1' = .56877 + .81817X_1 \ (\pm.160) \ ;$$

and for the female subjects the following equation should serve for practical purposes to predict expected GPA at admission to student teaching:

$$Y_1' = .63086 + .78874X_1 \ (\pm.208) \ .$$

The second part of the analysis procedure dealt with the relationships of grade-point rating for student teaching to GPA at admission to teacher education, to STEP raw score totals and to ACT composite scores. The values appropriate to regression equations that were produced by the computation procedures with the data for both the females and for the males are presented in Table XV on page 85. Included in

TABLE XV

STEP-WISE REGRESSION VALUES PRODUCED BY DATA DIVIDED ACCORDING TO SEX
THROUGH CORRELATIONS OF GRADE-POINT RATING FOR STUDENT TEACHING
WITH THE PREDICTOR VARIABLES

	Step 1		Step 2		Step 3	
	Males	Females	Males	Females	Males	Females
Correlation coefficient	0.264	0.191	0.248	0.189	0.260	0.178
Variance explained (R^2)	6.9%	3.7%	6.2%	3.6%	6.8%	3.2%
Intercept value	1.85843	3.08008	2.79750	3.21672	3.08890	3.19095
Regression coefficients	0.24960	0.02356	0.22966	0.03595	0.23975	0.03479
	---	---	0.00569	-0.00279	0.02777	-0.00293
	---	---	---	---	-0.00520	0.02496
Std. error of estimate	0.413	0.459	0.418	0.461	0.419	0.463

Step 1 = GPA at admission to teacher education entered for males, but ACT composite scores
        entered for females.
Step 2 = GPA at admission to teacher education and STEP raw score totals entered for males, and
        ACT scores with STEP raw score totals entered for females.
Step 3 = GPA at admission to teacher education, STEP scores and ACT scores entered for males, and
        ACT scores, STEP scores and GPA at admission to teacher education entered for females.

the table are the coefficients yielded by the different combinations of predictor variables when correlated with grade-point rating for student teaching as well as the percentages of variance in grade-point rating for student teaching accounted for by R^2 calculations.

The analysis of variance showed that with the data divided according to the sex of the subjects the amounts of variance in grade-point rating for student teaching that were accounted for by the multiple coefficients of correlation were not significantly different from the amount explained by a coefficient derived from a simple correlation with the most efficient single predictor. For grade-point rating for student teaching the highest simple coefficient was produced for the female group by a correlation with ACT composite scores; but for the male group the highest coefficient was yielded by a correlation with GPA at admission to teacher education. None of the coefficients were high, however. For the females, the best coefficient was generated by the initial correlation with ACT scores alone at .191. For the male subjects, the highest coefficient (.264) was produced also by the initial correlation, in this case of GPA at admission to teacher education with grade-point rating for student teaching. For optimum predictability of grade-point rating for student teaching from the measures considered in this study, then, the simple regression equation should be used for females, as follows:

$$Y_2' = 3.08008 + .02356X_2 \ (\pm.459) \ ;$$

and for the male subjects the simple regression equation to be used for optimum predictability of grade-point rating for student teaching is:

$$Y_2' = 1.85843 + .24960X_1 \ (\pm.413) \ .$$

The third part of the analysis procedure considered the relation-
ships of GPA at graduation with GPA at admission to teacher education,
with STEP raw score totals and ACT composite scores. The values that
were found appropriate to regression equations generated from the com-
putation procedures with the data from the male subjects as a group and
from the female subjects as a separate group are presented in Table XVI
on page 88. For ready reference, the coefficients of correlations of
the different combinations of the predictor variables with GPA at grad-
uation and the percentages of variance in GPA at graduation calculated
by R^2 that they explain are included in the table.

The analysis of variance demonstrated that with the data divided
according to the sex of the subjects the amounts of variance in GPA at
graduation that were accounted for by the multiple coefficients were
not significantly different from the amount accounted for by a simple
coefficient obtained from a correlation using the most efficient single
predictor variable. In the case of GPA at graduation, the highest
simple coefficient was yielded by correlation with GPA at admission to
teacher education both for the female group and for the male group.
Consequently, for simplicity of computation and efficiency of adminis-
tration, and adequate for practical applications, the simple regression
equation is hereby offered to be used to predict expected GPA at gradu-
ation for females, as follows:

$$Y_3' = .95673 + .70249X_1 \ (\pm.219) \ ;$$

and for use with males to predict expected GPA at graduation the
following regression equation should prove to be adequate for practical
applications:

TABLE XVI

STEP-WISE REGRESSION VALUES PRODUCED BY DATA DIVIDED ACCORDING TO SEX
THROUGH CORRELATIONS OF GPA AT GRADUATION
WITH THE PREDICTOR VARIABLES

	Step 1		Step 2		Step 3	
	Males	Females	Males	Females	Males	Females
Correlation coefficients	0.912	0.874	0.914	0.876	0.913	0.876
Variance explained (R^2)	83.2%	76.4%	83.5%	76.7%	83.3%	76.7%
Intercept value	0.84392	0.95673	0.77430	0.76838	0.76681	0.75249
Regression coefficients	0.73870	0.70249	0.71551	0.66757	0.71526	0.67252
	---	---	0.00650	0.00201	0.00593	0.00295
	---	---	---	---	0.00013	-0.00631
Std. error of estimate	0.150	0.219	0.150	0.217	0.152	0.218

Step 1 = GPA at admission to teacher education entered for both males and females.
Step 2 = GPA at admission to teacher education entered with ACT scores for males, but with
          STEP raw score totals for females.
Step 3 = GPA at admission to teacher education, STEP scores and ACT scores entered for both
          males and females.

$$Y_3' = .84392 + .73870X_1 \ (^{\pm}.150) \ .$$

Tests of the Hypotheses of the Study With Data

Divided According to Sex of the Subjects

For purposes of comparison, the findings of the part of the study
that divided the data according to the sex of the subjects to treat
females as a distinct group and males as a separate distinct group were
applied to the hypotheses of the study. Statements of the significance
of the appropriate coefficients of correlations for females as one
group and for the males as another group were used to test the first
nine hypotheses. The tenth, the eleventh, and the twelfth hypotheses
were tested by the application of the different analyses of variance
percentages for each of the two groups as detached entities. The hy-
potheses were accepted or rejected separately on the basis of the
findings for the female group, and again separately on the basis of the
findings for the male group, and reported accordingly.

In the presentation that follows, the hypothesis is stated in full
and is then followed by the findings related to that hypothesis for
the males and then for the females.

Hypothesis 1. -- There is no significant correlation between ACT
scores used for admission to the University and GPA at admission to
student teaching. The coefficient of correlation calculated for the
relationship between ACT composite scores and GPA at admission to
student teaching for the male subjects was .35, and the female subjects
had a coefficient of correlation of .49. Both coefficients were found
to be significantly different from zero at the .01 level of confidence.
Hypothesis number one was rejected both for males and for females.

Hypothesis 2. -- There is no significant correlation between ACT

scores used for admission to the University and grade-point rating for

student teaching. The coefficient of correlation yielded by the rela-

tionship between ACT scores and grade-point rating for student teaching

for the male subjects was .15, a coefficient that was found to be not

significantly different from zero within the .05 level of confidence.

The female group had a coefficient of correlation between these two

variables of .19, a coefficient that proved to be significant at the

.01 level of confidence for a group of 203. Hypothesis number two

was accepted on the basis of the findings for the male subjects, but it

was rejected on the basis of the findings for the female subjects.

Hypothesis 3. -- There is no significant correlation between ACT

scores used for admission to the University and GPA achieved at gradu-

ation. The coefficient of correlation produced by the relationship of

ACT composite scores and GPA at graduation was .40 for the male subjects,

and for the female subjects the coefficient was .47. Both of the co-

efficients were found to be significantly different from zero at the

.01 level of confidence. Hypothesis number three was rejected on the

basis of the findings for both the male group and the female group.

Hypothesis 4. -- There is no significant correlation between STEP

scores used at admission to teacher education and GPA at admission to

student teaching. The coefficient of correlation generated by the

correlation of STEP raw score totals and GPA at admission to student

teaching was .34 for the male subjects, a coefficient significantly

different from zero at the .01 level of confidence; and for the female

group the coefficient was .50, also significant at the .01 level.

Hypothesis number four was rejected both for males and for females.

Hypothesis 5. -- There is no significant correlation between STEP

scores used for admission to teacher education and grade-point rating

earned for student teaching. The coefficient of correlation produced

by the correlation of STEP raw score totals with grade-point rating

for student teaching was .06 for the male group and .13 for the female

group. Neither of these coefficients were found to be significantly

different from zero within the .05 level of confidence. Hypothesis

number five was accepted for both males and females.

Hypothesis 6. -- There is no significant correlation between STEP

scores used for admission to teacher education and GPA achieved at

graduation. The coefficient of correlation between STEP raw score

totals and GPA at graduation for the male group was .38, and the coef-

ficient for the female group was .49. Both of these coefficients were

found to be significantly different from zero at the .01 level of

confidence. Hypothesis number six was rejected both for males and for

females.

Hypothesis 7. -- There is no significant correlation between GPA

scores used for admission to teacher education and GPA at admission to

student teaching. The coefficient of correlation for the relationship

of GPA at admission to teacher education with GPA at admission to

student teaching was .92 for the male group and .90 for the female

group. Both of these coefficients proved to be significantly different

from zero at the .01 level of confidence. Hypothesis number seven was

rejected both for the male subjects and for the female subjects.

Hypothesis 8. -- There is no significant correlation between GPA

scores used for admission to teacher education and grade-point rating

earned for student teaching. The coefficients of correlation produced

by the correlation of GPA at admission to teacher education with grade-point rating for student teaching were .26 for the male subjects and .11 for the female subjects. The coefficient of .26 for the male group was found to be significantly different from zero at the .01 level of confidence, but the coefficient of .11 for the female group proved to be not significantly different from zero within the .05 level of confidence. Hypothesis number eight was rejected for males, but it was accepted for females.

Hypothesis 9. -- There is no significant correlation between GPA scores used for admission to teacher education and GPA achieved at graduation. The coefficient of correlation for the relationship of these two variables for the male subjects was .91, and for the female subjects the coefficient was .87. The coefficients of correlation for both the male group and the female group proved to be significantly different from zero at the .01 level of confidence. Hypothesis number nine was rejected both for the males and for the females.

Hypothesis 10. -- The amount of variance in GPA at admission to student teaching accounted for by GPA at admission to teacher education is not significantly increased by the addition of ACT scores and STEP scores. The analysis of variance demonstrated that with a coefficient produced by the correlation of GPA at admission to student teaching with GPA at admission to teacher education of .918 for the male subjects, 84.2 per cent of the variance in GPA at admission to student teaching was accounted for by GPA at admission to teacher education, and the addition of ACT scores and STEP scores that produced multiple coefficients of correlation of .917 and .916 did not contribute any statistically significant additional amounts. For the female subjects

the initial correlation of GPA at admission to student teaching with

GPA at admission to teacher education produced a coefficient of .903,

which explained 81.5 per cent of th variance in GPA at admission to

student teaching for the females; and the addition of ACT scores and

STEP scores to yield multiple coefficients of correlation of .907 and

.906 did not add any statistically significant amount to account for

the variance in GPA at admission to student teaching for the female

group. Hypothesis number ten was accepted both for the males and for

the females.

Hypothesis 11. -- The amount of variance in grade-point rating

earned for student teaching accounted for by ACT scores is not signifi-

cantly increased by the addition of STEP scores and GPA at admission to

teacher education. The findings yielded by the data for the male sub-

jects were not appropriate to test this hypothesis as stated. The

sequence of entry of the variables was changed for the male

group to enter GPA at admission to teacher education as the initial

variable into correlation with grade-point rating for student teaching.

If the hypothesis was restated as "The amount of variance in grade-point

rating earned for student teaching accounted for by GPA at admission to

teacher education is not significantly increased by the addition of

STEP scores and ACT scores," the hypothesis would be accepted for the

males. The correlation of GPA at admission to teacher education with

grade-point rating for student teaching yielded a coefficient of .246

for the male group, and accounted for 6.0 per cent of the variance in

their grade-point rating for student teaching; and the addition of STEP

scores and ACT scores produced multiple coefficients of correlation of

.248 and .260 which did not significantly increase the amount of

variance in grade-point rating for student teaching explained for the
male subjects. Analysis of variance showed that for the female group
ACT scores had a coefficient of correlation with grade-point rating for
student teaching of .191 which accounted for 3.6 per cent of the vari-
ance in grade-point rating for student teaching for the females. The
addition of STEP scores and GPA at admission to teacher education
produced multiple coefficients of correlation of .189 and .178 which
did not significantly increase the amount explained by ACT scores alone
for variance in the female group's grade-point rating for student
teaching. Hypothesis number eleven was accepted for the female group.

Hypothesis 12. -- The amount of variance in GPA at graduation
accounted for by GPA at admission to teacher education is not signifi-
cantly increased by the addition of ACT scores and STEP scores. The
analysis of variance demonstrated that GPA at admission to teacher
education, with a coefficient of correlation of .912, accounted for
83.1 per cent of the variance in GPA at graduation for the male sub-
jects; and that the addition of ACT scores and STEP scores produced
multiple coefficients of correlation of .914 and .913 which did not
contribute any statistically significant additional amount to account
for the variance in GPA at graduation for the male group. For the
female subjects, the correlation of GPA at graduation with GPA at admis-
sion to teacher education yielded a coefficient of .874, which the
analysis of variance demonstrated to have accounted for 76.3 per cent
of the variance at graduation for the females. The addition of ACT
scores and STEP scores produced multiple coefficients of correlation of
.876 and .876 which proved not to contribute any additional statis-
tically significant amount to the product of the initial correlation to

explain the variance in GPA at graduation for the female group.

Hypothesis number twelve was accepted both for males and for females.

Description of the Data Divided According

to Employment of Subjects

This section of the chapter presents the results of the study with the data divided according to the employment of the subjects following their graduation from programs of teacher education either as teachers, who made up one group, or as non-teachers (became housewives, entered the armed services, continued graduate programs, or found employment in work other than teaching) who formed a separate heterogeneous group. The subjects are divided thus across the three categories of the study. For convenience of reference and comparison, the data are tabulated in a condensed and systematic form in Table XVII on page 96 which shows the means and standard deviations of ACT composite scores, STEP raw score totals, and GPA at admission to teacher education divided on the basis of employment of the subjects in each classification group (those who were admitted to student teaching, those who earned grades for student teaching, and those who graduated).

The subjects of this part of the study included, in the category that related GPAs at admission to student teaching to ACT scores, STEP scores and GPAs at admission to teacher education, 161 students who took jobs as teachers following their graduation and 130 students who engaged in non-teaching occupations following their graduation. The tabulation showed that those who became teachers had a mean GPA at the time of their admission to student teaching of 2.78, with a standard deviation of 0.47, while those that did not become teachers had a mean GPA at

TABLE XVII

MEANS AND STANDARD DEVIATIONS OF ACT SCORES, STEP SCORES, GRADE-POINT AVERAGES,
AND GRADE RATINGS WITH DATA DIVIDED ACCORDING TO EMPLOYMENT OF SUBJECTS

	GPA at Admission to Student Teaching				GP Rating for Student Teaching				GPA at Graduation			
	Teachers N = 161		Non-teachers N = 130		Teachers N = 161		Non-teachers N = 125		Teachers N = 158		Non-teachers N = 119	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
GPA, admission to student teaching:	2.78	0.47	2.82	0.48								
GP rating for student teaching:					3.57	0.44	3.54	0.48				
GPA at graduation:									2.85	0.44	2.90	0.45
ACT composite scores:	20.24	4.18	21.36	3.64	20.24	4.18	21.40	3.69	20.18	4.20	21.40	3.72
STEP raw score totals:	141.17	20.57	146.02	19.48	141.17	20.57	146.46	19.65	141.00	20.68	146.45	19.78
GPA, admission to teacher education:	2.71	0.56	2.77	0.54	2.71	0.56	2.78	0.54	2.70	0.55	2.78	0.54

admission to student teaching of 2.82, with a standard deviation of 0.48. The means of the ACT composite scores for the two groups in this category were 20.24, with a standard deviation of 4.18, for the teachers, and 21.36, with a standard deviation of 3.64, for the non-teachers. The means of the STEP raw score totals for the two groups in this category were 141.17, with a standard deviation of 20.57, for the teacher group, and 146.02, with a standard deviation of 19.48, for those in the non-teacher group. The means of the GPAs at admission to teacher education were 2.71, with a standard deviation of 0.56, for the teacher group, and 2.77, with a standard deviation of 0.54 for the non-teacher group in this first category, that related GPAs at admission to student teaching to the GPAs and scores summarized above.

A careful look at Table XVII reveals that in all cases, except one, the means of grades and test scores are slightly higher for non-teachers than for teachers. The exception is the 0.03 higher mean grade-point rating earned for student teaching by the group that became teachers.

In the second category, that related grade-point ratings for student teaching to ACT scores, STEP scores and GPAs at admission to teacher education, there were 161 subjects who became teachers following their graduation and 125 who did not become teachers. The mean of the grade-point ratings for the teacher group was 3.57, with a standard deviation of 0.44, and the mean of the grade-point ratings for those who received grades for student teaching but did not subsequently become teachers was 3.54, with a standard deviation of 0.48. The mean of the ACT composite scores for the teacher group was 20.24, with a standard deviation of 4.18, and the mean of the ACT composite scores for those in the non-teacher group was 21.40, with a standard deviation

of 3.69. The mean of the STEP raw score totals in this category for the group that became teachers was 141.17, with a standard deviation of 20.57, and for the group that did not become teachers the mean was 146.46, with a standard deviation of 19.65. The mean of the GPAs at admission to teacher education for the teacher group that earned grades for student teaching was 2.71, with a standard deviation of 0.56, and the mean for the non-teachers in this category was 2.78, with a standard deviation of 0.54.

The third category of this final section of the study related GPAs at graduation to ACT scores, STEP scores and GPAs at admission to teacher education. There were 158 subjects in this category who became teachers after graduation, and 119 subjects who found other occupations. The total number of the subjects in this category deviates from the number in the corresponding categories in the first two sections of the study. A review of the data by the investigator revealed that three subjects who did in fact graduate and then became teachers had semester hours erroneously recorded on their computer data cards that totaled below 124 hours. The criterion set up in the programming for the computer selection of subjects in the third run of the data was 124 or more hours of total credit to differentiate subjects who had graduated from the members of the parent sample that had not graduated. The three subjects that were eliminated did not constitute a select group in any way. The erroneous elimination of the three subjects was a random circumstance and does not bias the part of the study it affects.

The mean of the GPAs at the time of graduation for the subjects that subsequently became teachers was 2.85, with a standard deviation of 0.44, and the mean of the GPAs at the time of graduation for the

group of subjects that did not become teachers after graduation was

2.90, with a standard deviation of 0.45. The mean of the ACT composite

scores for the teacher group that graduated was 21.40, with a standard

deviation of 4.20, and the mean of the ACT composite scores for the

non-teacher group that graduated was 21.40, with a standard deviation

of 3.72. The mean of the STEP raw score totals for the teacher group

that graduated was 141.00, with a standard deviation of 20.68, and for

the non-teachers in this category the mean was 146.45, with a standard

deviation of 19.78. The mean of the GPAs at admission to teacher edu-

cation for the teacher group that graduated was 2.70, with a standard

deviation of 0.55, and the mean of the GPAs at admission to teacher

education for the non-teacher group that graduated was 2.78, with a

standard deviation of 0.54.

Intercorrelations Among All Variables With

Data Divided According to Employment of

the Subjects Following Graduation

Intercorrelations among the variables of the study are arranged for

convenience of comparison between the employment classifications in the

several relationships of the variables in Table XVIII.

Table XVIII was arranged to present the coefficients of correlation

for the nine possible relationships between ACT composite scores, STEP

raw score totals, and GPA at admission to teacher education and GPA at

admission to student teaching, grade-point rating for student teaching,

and GPA at graduation as these were found separately for subjects that

took jobs as teachers following graduation and for those subjects that

found occupations in fields other than teaching. The coefficients of

correlation are presented for the two sub-groups in parallel columns

under a single heading for each classification variable and the signifi-

cances are indicated by asterisks to make comparisons convenient.

TABLE XVIII

INTERCORRELATIONS AMONG ACT SCORES, STEP SCORES GRADE-POINT
AVERAGES AND GRADE RATINGS WITH DATA DIVIDED
ACCORDING TO EMPLOYMENT OF SUBJECTS

	GPA at Admission to Student Teaching		GP Rating for Student Teaching		GPA at Graduation	
	Teach.	Non-teach.	Teach.	Non-teach.	Teach.	Non-teach.
	N = 162	N = 129	N = 162	N = 124	N = 158	N = 119
	r	r	r	r	r	r
ACT composite scores:	.46**	.50**	.12	.30**	.45**	.52**
STEP raw score totals:	.46**	.41**	.03	.21*	.45**	.42**
GPA, admission to teacher education:	.89**	.94**	.18*	.16	.87**	.92**

** Significant at the .01 level of confidence.
 * Significant at the .05 level of confidence.

In six of the nine relationships, the coefficients of correlation

were higher for the non-teachers than for the teachers when compared as

separate groups. The teacher group had higher coefficients of correla-

tion for GPA at admission to student teaching related to STEP raw score

totals, for grade-point rating for student teaching related to GPA at

admission to teacher education, and for GPA at graduation related to STEP raw score totals than did the non-teacher group. Six of the coefficients of correlation were significant at the .01 level of confidence, one was significant at the .05 level of confidence, and two were not significant for the teacher group; and seven coefficients of correlation were significant at the .01 level of confidence, one was significant at the .05 level of confidence, and one was not significant for the non-teacher group.

GPA at admission to student teaching correlated with ACT composite scores to produce a coefficient of correlation of .46 for the subjects in the teacher group and a coefficient of .50 for the subjects in the non-teacher group. GPA at admission to student teaching correlated with STEP raw score totals to produce a coefficient of correlation of .46 for the subjects in the teacher group and a coefficient of .41 for the subjects in the non-teacher group. GPA at admission to student teaching correlated with GPA at admission to teacher education to produce a coefficient of correlation of .89 for the subjects in the teacher group and a coefficient of .94 for the subjects in the non-teacher group. All of the correlations in this category of GPA at admission to student teaching were significant at the .01 level of confidence.

Grade-point ratings for student teaching correlated with ACT composite scores for a coefficient of correlation of .12 for the subjects in the teacher group and a coefficient of .30 for the subjects in the non-teacher group. The correlation for the teachers was not significant, but the coefficient of .30 for the non-teachers was significant at the .01 level of confidence. Grade-point rating for student teaching

correlated with STEP raw score totals for a coefficient of correlation of .03 for the subjects in the teacher group and a coefficient of .21 for the subjects in the non-teacher group. The correlation was not significant for the teachers, but the coefficient of .21 for the non-teachers was significant at the .05 level of confidence. Grade-point rating for student teaching correlated with GPA at admission to teacher education for a coefficient of correlation of .18 for the subjects in the teacher group and a coefficient of .16 for the subjects in the non-teacher group. The coefficient of .18 was significant at the .05 level of confidence for the teachers, but the correlation was not significant for the non-teachers.

GPA at graduation correlated with ACT composite scores to yield a coefficient of correlation of .45 for the subjects in the teacher group and a coefficient of .52 for the subjects in the non-teacher group. GPA at graduation correlated with STEP raw score totals to yield a coefficient of correlation of .45 for the subjects in the teacher group and a coefficient of .42 for the subjects in the non-teacher group. GPA at graduation correlated with GPA at admission to teacher education to yield a coefficient of correlation of .87 for subjects in the teacher group and a coefficient of .92 for the subjects in the non-teacher group. All of the correlations were significant at the .01 level of confidence for all the coefficients in the GPA at graduation category.

Analysis of Variance With the Data Divided
According to Employment of Subjects

The initial category dealt with in the step-wise multiple regression analysis procedure with the data divided according to employment

of the subjects was GPA at admission to student teaching. The partial

and multiple coefficients of correlation and the amounts of variance in

GPA at admission to student teaching accounted for by each combination

in terms of percentages (R^2) are presented in Table XIX.

TABLE XIX

ANALYSIS OF VARIANCE IN GPA AT ADMISSION TO STUDENT TEACHING
WITH DATA DIVIDED ACCORDING TO EMPLOYMENT OF SUBJECTS

Correlation				Percentage			
Teachers		Non-teachers		Teachers		Non-teachers	
$r_a.1$	.890	$r_a.1$	.941	$r_a.1^2$	79.2%	$r_a.1^2$	88.5%
$R_a.1,2$	.892	$R_a.1,2$	.942	$R_a.1,2^2$	79.6%	$R_a.1,2^2$	88.7%
$R_a.1,2,3$	.892	$R_a.1,2,3$	.942	$R_a.1,2,3^2$	79.6%	$R_a.1,2,3^2$	88.7%

a = GPA at admission to student teaching.
1 = GPA at admission to teacher education.
2 = STEP raw score totals.
3 = ACT composite scores.

In the procedure, the sequence of entry of the predictor variables

into partial and multiple correlation with GPA at admission to student

teaching was the same for both the group that became teachers and the

group that did not become teachers following graduation. GPA at admis-

sion to teacher education was the first predictor variable entered at

the first step for both groups and accounted for a high percentage of

the variance in GPA at admission to student teaching in both cases.

Examination of Table XIX shows that the optimum percentage was reached

at the second step for both groups, but adding STEP raw score totals to GPA at admission to teacher education increased the percentage by only .2 of one per cent for the teachers and only .1 of one per cent for the non-teachers. Addition of ACT composite scores into the combination at the third step made no further increase over the two-variable combination. Test by z_r transformation showed that the coefficients of .890 and .892 for the teachers were not significantly different from each other within the .05 confidence level, and the coefficients of .941 and .942 for the non-teachers proved to be not significantly different from each other within the .05 level of confidence either.

The second category dealt with in the procedure was grade-point rating for student teaching. The following table shows the partial and multiple coefficients of correlation and their R^2 percentages.

TABLE XX

ANALYSIS OF VARIANCE IN GRADE-POINT RATING FOR STUDENT TEACHING
WITH DATA DIVIDED ACCORDING TO EMPLOYMENT OF SUBJECTS

Correlation				Percentage			
Teachers		Non-teachers		Teachers		Non-teachers	
$r_b.1$	.181	$r_b.2$	.304	$r_b.1^2$	3.2%	$r_b.2^2$	9.2%
$R_b.1,2$	.174	$R_b.2,3$	.301	$R_b.1,2^2$	3.0%	$R_b.2,3^2$	9.1%
$R_b.1,2,3$	.205	$R_b.2,3,1$	.289	$R_b.1,2,3^2$	4.2%	$R_b.2,3,1^2$	8.4%

b = Grade-point rating for student teaching.
1 = GPA at admission to teacher education.
2 = STEP raw score totals.
3 = ACT composite scores.

The sequence of entry for the predictor variables into correlation with grade-point rating for student teaching differed for the teacher and the non-teacher groups. Table XVIII on page 100 shows that the highest correlations in this category were those between grade-point rating for student teaching and GPA at admission to teacher education with a coefficient of .18 for the teacher group, and between grade-point rating for student teaching and ACT composite scores with a coefficient of .30 for the non-teacher group. For the teacher group, then, GPA at admission to teacher education was entered at the first step, STEP raw score totals was entered secondly and ACT composite scores was entered as the third variable into the combination at the third step in the procedure. For the non-teacher group the sequence was ACT composite scores at the first step, STEP scores at the second, and GPA at admission to teacher education at the third step.

None of the partial or multiple coefficients of correlation were high for either group. For the teacher group, the initial correlation produced a coefficient of .181 which was decreased to .174 by the addition of STEP scores and then increased to .205 by the further addition of ACT scores at the third step in the procedure. For the non-teachers, the coefficients were decreased progressively with the addition of variables after the first step from .304 to .301 at the second step and .289 at the third step.

The optimum amounts of variance in grade-point rating for student teaching were accounted for by the multiple coefficient produced at the third step for the teacher group, and by the simple correlation for the non-teachers produced at the first step. However, with 4.2 per cent as the optimum amount for the teacher group and an optimum amount of 9.2

per cent for the non-teachers, very little of the variance in grade-point rating for student teaching was explained by GPA at admission to teacher education, STEP scores or ACT scores, or by any combination of the three predictor variables.

Tests of the significance of difference were made by z_r transformations. The coefficients of .181, .174, and .205 were found to be not significantly different from each other within the .05 level of confidence for the teacher group; and the coefficients of .304, .301, and .289 for the non-teachers were found to be not significantly different from each other within the .05 confidence level, as well.

GPA at graduation was the third category treated in the step-wise multiple regression analysis procedure. The table that follows below lists the partial and multiple coefficients of correlation and the amounts of variance in GPA at graduation for the teacher group and for the non-teacher group in terms of percentages (R^2).

TABLE XXI

ANALYSIS OF VARIANCE IN GPA AT GRADUATION WITH DATA DIVIDED
ACCORDING TO EMPLOYMENT OF SUBJECTS

Correlation				Percentage			
Teachers		Non-teachers		Teachers		Non-teachers	
$r_c.1$	.869	$r_c.1$	.920	$r_c.1^2$	75.5%	$r_c.1^2$	84.6%
$R_c.1,2$	.870	$R_c.1,2$	.923	$R_c.1,2^2$	75.6%	$R_c.1,2^2$	85.2%
$R_c.1,2,3$	.871	$R_c.1,2,3$	.923	$R_c.1,2,3^2$	75.9%	$R_c.1,2,3^2$	85.2%

c = GPA at graduation.
1 = GPA at admission to teacher education.
2 = STEP raw score totals.
3 = ACT composite scores.

The predictor variables were entered into correlation with GPA at graduation in the same sequence for both the teacher group and the non-teacher group. The variable entered at the first step for both groups was GPA at admission to teacher education and this one variable alone accounted for 75.5 per cent of the variance in GPA at graduation for the teachers and 84.6 per cent for the non-teachers. The optimum percentage for the teacher group was reached at the third step by the combination of all three predictor variables, but the increase was only .4 of one per cent to a total o 75.9 per cent. For the non-teachers, the optimum percentage was reached at the second step with GPA at admission to teacher education in combination with STEP raw score totals to account for 85.2 per cent of the variance in GPA at graduation for this group; but when compared with 84.6 per cent explained by GPA at admission to teacher education alone the increase is seen to be slight indeed.

Tests of the significance of differences were made by z_r transformations. The coefficients of .869, .870, and .871 were found to be not significantly different from each other within the .05 level of confidence for the teacher group. The coefficients of .920, .923, and .923 for the non-teacher group were also found to be not significantly different from each other within the .05 confidence level.

In addition, z_r transformation tests were made for differences between the teacher group and the non-teacher group in the results of the data in all three categories. None of the coefficients were found to be different enough between the two groups to be significant within the .05 level of confidence. The greatest range in coefficients was produced in the category of grade-point rating for student teaching

(see Table XX) with .174 for the teachers the lowest and .304 the highest in the category. A z_r transformation test showed that with a transformation value of .176 and a standard error of z_r for the 161 teachers, and a transformation value of .314 and a standard error of z_r for the 124 non-teachers, the difference between the two groups was not significant within the .05 level of confidence.

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Regression Equations Appropriate to the

Employment Differentials

</div>

The step-wise multiple regression analysis procedures generated intercept values and regression coefficients from the data produced by the subjects who were employed as teachers as one distinct group and by the subjects who did not take employment as teachers as a separate distinct group. Regression equations were developed from the findings of this part of the study and are presented here for their value to any future research or study or otherwise interested persons.

To make the presentation of the regression equations brief and to clarify terms the variables are identified by symbols, as follows:

X_1 = GPA at admission to teacher education,

X_2 = ACT composite scores,

X_3 = STEP raw score totals,

Y_1' = predicted GPA at admission to student teaching,

Y_2' = predicted grade-point rating for student teaching, and

Y_3' = predicted GPA at graduation.

The first part of the analysis procedure dealt with the relationships of GPA at admission to student teaching to GPA at admission to teacher education, STEP raw score totals and ACT composite scores. The

values appropriate to regression equations that were yielded by the computation procedures for the teacher group and for the non-teacher group are presented in Table XXII on page 110. For ready reference, the coefficients of correlation that resulted from the different combinations of variables as well as the percentages of variance in GPA at admission to student teaching accounted for by R^2 calculations are included with the intercept values, regression coefficients and standard error of estimates in the table.

The analysis of variance demonstrated that with the data divided according to the employment of the subjects the amounts of variance in GPA at admission to student teaching that were accounted for by the multiple coefficients were not significantly different from the amounts accounted for by a simple correlation with GPA at admission to teacher education both in the case of the teacher group and in the case of the non-teacher group as well. Thus, a simple regression equation using the values produced at the first step in the step-wise multiple regression procedure will serve for practical purposes to predict GPA at admission to student teaching for both teachers and non-teachers.

The equation for the teacher group (utilizing the symbols defined above and the values in the first column of Table XXII) to predict expected GPA at admission to student teaching is as follows:

$$Y_1' = .73217 + .75442X_1 \ (\pm.215) \ ;$$

and for the non-teacher group the following equation is appropriate for practical purposes to predict expected GPA at admission to student teaching:

$$Y_1' = .47493 + .84423X_1 \ (\pm.165) \ .$$

TABLE XXII

STEP-WISE REGRESSION VALUES PRODUCED FROM DATA DIVIDED ACCORDING TO EMPLOYMENT
THROUGH CORRELATIONS OF GPA AT ADMISSION TO STUDENT TEACHING
WITH THE PREDICTOR VARIABLES

	Step 1		Step 2		Step 3	
	Teachers	Non-teachers	Teachers	Non-teachers	Teachers	Non-teachers
Correlation coefficient	0.890	0.941	0.892	0.942	0.892	0.942
Variance explained (R^2)	79.2%	88.5%	79.6%	88.7%	79.6%	88.7%
Intercept value	0.73217	0.47493	0.56947	0.28677	0.54538	0.29147
Regression coefficients	0.75442	0.84423	0.72626	0.82073	0.73164	0.81837
	---	---	0.00169	0.00174	0.00253	0.00150
	---	---	---	---	-0.00537	0.00174
Std. error of estimate	0.215	0.165	0.214	0.163	0.215	0.164

Step 1 = GPA at admission to teacher education entered for both teachers and non-teachers.
Step 2 = GPA at admission to teacher education and STEP raw score totals entered for both
        teachers and non-teachers.
Step 3 = GPA at admission to teacher education, STEP scores and ACT composite scores entered
        for both teachers and non-teachers.

The second part of the analysis procedure treated the relation-
ships of grade-point rating for student teaching with GPA at admission
to teacher education, STEP raw score totals, and ACT composite scores.
The values appropriate to regression equations that were generated by
the computation procedures for both the teacher group and the non-
teacher group are presented in parallel columns in Table XXIII on page
112. To save turning back to Table XX for comparison, the coefficients
of correlation and the percentages of variance accounted for by R^2
calculations are included in Table XXIII along with the intercept
values, regression coefficients, and standard errors of estimate.

The analysis of variance showed that with the data divided accord-
ing to the employment of the subjects the amounts of variance in grade-
point rating for student teaching that were accounted for by the
multiple coefficients were not significantly different from the amounts
accounted for by correlations between grade-point rating for student
teaching and the most efficient single predictor for each division (GPA
at admission to teacher education for the teacher group and ACT compos-
ite scores for the non-teacher group). None of the percentages derived
from the coefficients were high, however. The optimum percentage was
obtained for the teacher group at the third step in the procedure with
the combination of all three predictor variables in the correlation,
but only 4.2 per cent of the variance in grade-point rating for student
teaching was explained for the teacher group. For the non-teachers,
the optimum percentage was obtained at the first step in the procedure
where ACT composite scores alone explained 9.2 per cent of the variance
and the addition of the other predictor variables progressively reduced
the amount. Thus, for optimum predictability of expected grade-point

TABLE XXIII

STEP-WISE REGRESSION VALUES PRODUCED FROM DATA DIVIDED ACCORDING TO EMPLOYMENT
THROUGH CORRELATIONS OF GRADE-POINT RATING FOR STUDENT TEACHING
WITH THE PREDICTOR VARIABLES

	Step 1		Step 2		Step 3	
	Teachers	Non-teachers	Teachers	Non-teachers	Teachers	Non-teachers
Correlation coefficient	0.181	0.304	0.174	0.301	0.205	0.289
Variance explained (R^2)	3.2%	9.2%	3.0%	9.1%	4.2%	8.4%
Intercept value	3.18365	2.68429	3.32097	2.85370	3.43441	2.83971
Regression coefficients	0.14126	0.03988	0.16503	0.05425	0.13970	0.72052
	---	---	− 0.00143	− 0.00326	− 0.00537	− 0.00323
	---	---	---	---	0.02528	0.01001
Std. error of estimate	0.430	0.463	0.431	0.465	0.430	0.469

Step 1 = GPA at admission to teacher education entered for teachers, but ACT composite
        scores entered for non-teachers.
Step 2 = STEP raw score totals entered with GPA at admission to teacher education for teachers, and
        STEP raw score totals entered with ACT scores for the non-teachers.
Step 3 = GPA at admission to teacher education, STEP scores and ACT scores entered for teachers,
        and ACT scores, STEP scores and GPA at admission to teacher education entered for non-teachers.

rating for student teaching for the teacher group the multiple equation
should be used, as follows:

$$Y_2' = 3.43441 + .13970X_2 - .00537X_3 + .02528X_1 \ (\pm.430) \ ;$$

and for the non-teacher group the simple regression equation to provide
the optimum predictability of grade-point rating is as follows:

$$Y_2' = 2.68429 + .3988X_1 \ (\pm.463) \ .$$

The third part of the analysis procedure considered the relation-
ships of GPA at graduation with the three predictor variables (GPA at
admission to teacher education, STEP raw score totals and ACT composite
scores). The values that were found to be appropriate to regression
equations developed from the computation procedures with both the
teacher group and the non-teacher group are presented in parallel
columns in Table XXIV on page 114. For convenience of comparison the
coefficients of correlation (see Table XXI) and the percentages of
variance accounted for by R^2 calculations are included in Table XXIV
along with the intercept values, regression coefficients and standard
errors of estimate.

The analysis of variance showed that with the data divided accord-
ing to the employment of the subjects the amounts of variance in GPA at
graduation that were accounted for by the multiple correlation coeffi-
cients were not significantly different from the amounts accounted for
by correlations between GPA at graduation with the most efficient
single predictor variable for each of the groups. For both the teacher
group and the non-teacher group, the highest coefficient of correlation
for the relationship of GPA at graduation with one predictor variable

TABLE XXIV

STEP-WISE REGRESSION VALUES PRODUCED FROM DATA DIVIDED ACCORDING TO EMPLOYMENT
THROUGH CORRELATIONS OF GPA AT GRADUATION
WITH THE PREDICTOR VARIABLES

	Step 1		Step 2		Step 3	
	Teachers	Non-teachers	Teachers	Non-teachers	Teachers	Non-teachers
Correlation coefficient	0.869	0.920	0.870	0.923	0.871	0.923
Variance explained (R^2)	75.5%	84.6%	75.7%	85.2%	75.8%	85.2%
Intercept value	0.99768	0.79417	0.85992	0.57642	0.84687	0.59331
Regression coefficients	0.68679	0.75582	0.66256	0.72802	0.66540	0.72052
	---	---	0.00144	0.00202	0.00190	0.00129
	---	---	---	---	- 0.00295	- 0.00518
Std. error of estimate	0.218	0.175	0.218	0.172	0.218	0.174

Step 1 = GPA at admission to teacher education entered for both teachers and non-teachers.
Step 2 = GPA at admission to teacher education and STEP raw score totals entered for both teachers
        and non-teachers.
Step 3 = GPA at admission to teacher education, STEP scores and ACT composite scores entered for
        both teachers and non-teachers.

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was produced by the correlation with GPA at admission to teacher edu-
cation. The difference between the amounts accounted for by the first
step correlations and the optimum amounts in each case were .3 of one
per cent for the teacher group and .6 of one per cent for the non-
teacher group. Thus, for simplicity of computation and efficiency of
time in administration, and adequate for practical purposes, the simple
equations developed from the values derived from the first step in the
analysis procedures are offered here to be used to predict expected
GPA at graduation. For the teacher group the equation is:

$$Y_3' = .99768 + .68679X_1 \ (\pm.218) \ ;$$

and for the non-teacher group the equation is:

$$Y_3' = .79417 + .75582X_1 \ (\pm.175) \ .$$

Tests of the Hypotheses of the Study With
Data Divided According to Employment
of Subjects

For the purpose of comparison, the findings of the study with the
data divided according to the subjects of the study who took employment
as teachers after they graduated as one distinct group and the other
subjects who did not become teachers as a separate distinct hetero-
geneous group were applied to the hypotheses of the study. Appropriate
coefficients of correlation for the teachers as one group and for the
non-teachers as another group were used to test each of the first nine
hypotheses. The tenth, eleventh, and twelfth hypotheses were tested by
the application of the separate analyses of variance for each of the

two groups separately. In the presentation that follows, the hypothesis is stated in full and then followed by the findings related to that particular hypothesis using the data for the teachers first, then the data for the non-teachers next.

Hypothesis 1. -- There is no significant correlation between ACT scores used for admission to the University and GPA at admission to student teaching. The coefficient of correlation obtained for the relationship between ACT scores and GPA at admission to student teaching for the teacher group was .46, and the non-teachers had a coefficient of correlation between these two variables of .50. Both coefficients were found to be significant at the .01 level of confidence. Hypothesis number one was rejected.

Hypothesis 2. -- There is no significant correlation between ACT scores used at admission to the University and grade-point rating for student teaching. The coefficient of correlation yielded by the relationship between ACT scores and grade-point rating for student teaching for the teacher group was .12, a coefficient that was found to be not significantly different from zero within the .05 level of confidence. The non-teacher group had a coefficient of correlation between these variables of .30, a coefficient that proved to be significant at the .01 level of confidence. Hypothesis number two was accepted for the teachers; but it was rejected for the non-teachers.

Hypothesis 3. -- There is no significant correlation between ACT scores used at admission to the University and GPA achieved at graduation. The coefficient of correlation produced by the relationship of ACT composite scores and GPA at graduation was .45 for the teacher group, and for the non-teacher group the coefficient was .52. Both

coefficients were found to be significantly different from zero at the .01 level of confidence. Hypothesis number three was rejected for both groups.

Hypothesis 4. -- There is no significant correlation between STEP scores used at admission to teacher education and GPA at admission to student teaching. The coefficient of correlation generated by the correlation of STEP raw score totals and GPA at admission to student teaching was .46 for the teacher group, a coefficient that proved to be significantly different from zero at the .01 level of confidence; and for the non-teacher group the coefficient of correlation for these two variables was .41, also significant at the .01 level of confidence. Hypothesis number four was rejected for both teachers and non-teachers.

Hypothesis 5. -- There is no significant correlation between STEP scores used at admission to teacher education and grade-point rating earned for student teaching. The coefficient of correlation produced by the correlation of STEP raw score totals and grade-point rating for student teaching was .03 for the teacher group, a coefficient that was found to be not significantly different from zero within the .05 level of confidence. The non-teacher group produced a coefficient of correlation between these two variables of .21, and this coefficient proved to be significant at the .05 level of confidence but not at the .01 level. Hypothesis number five was rejected for the non-teacher group on this basis, but it was accepted for the teacher group.

Hypothesis 6. -- There is no significant correlation between STEP scores used at admission to teacher education and GPA achieved at graduation. The coefficient of correlation between STEP raw score totals and GPA at graduation for the teacher group was .45, and the

coefficient for the non-teacher group was .52. Both of these coefficients were found to be significantly different from zero at the .01 level of confidence. Hypothesis number six was rejected both for the teacher group and for the non-teacher group.

Hypothesis 7. -- There is no significant correlation between GPA scores used for admission to teacher education and GPA at admission to student teaching. The coefficient of correlation for the relationship of GPA at admission to teacher education and GPA at admission to student teaching was .89 for the teacher group and .94 for the non-teacher group. Both of these coefficients proved to be significantly different from zero at the .01 level of confidence. Hypothesis number seven was rejected for the teachers and for the non-teachers.

Hypothesis 8. -- There is no significant correlation between GPA scores used for admission to teacher education and grade-point rating earned for student teaching. The coefficient of correlation produced by the relationship of GPA at admission to teacher education with grade-point rating for student teaching was .18 for the teacher group, a coefficient that proved to be significantly different from zero at the .05 level of confidence but not at the .01 level. The coefficient of correlation for these two variables for the non-teacher group was .16, and this coefficient was found to be not significant within the .05 level of confidence. Hypothesis number eight was rejected for the teachers, but it was accepted for the non-teachers.

Hypothesis 9. -- There is no significant correlation between GPA scores used for admission to teacher education and GPA achieved at graduation. The coefficient of correlation for the relationship of GPA at admission to teacher education and GPA at graduation was .87 for

the teacher group, and for the non-teacher group the coefficient for the correlation of these two variables was .92. The coefficients of correlation for the teacher group and for the non-teacher group were found to be significantly different from zero at the .01 level of confidence. Hypothesis number nine was rejected both for the teachers and for the non-teachers.

Hypothesis 10. -- The amount of variance in GPA at admission to student teaching accounted for by GPA at admission to teacher education is not significantly increased by the addition of ACT scores and STEP scores. Analysis of variance demonstrated that for the teacher group which produced a coefficient of .890 for the correlation of GPA at admission to student teaching with GPA at admission to teacher education, 72.9 per cent of the variance in their GPA at admission to student teaching was accounted for by the one variable alone; and the addition of ACT scores and STEP scores which produced multiple coefficients of .892 and .892 did not contribute any statistically significant additional amounts. For the non-teacher group the initial correlation of GPA at admission to student teaching with GPA at admission to teacher education produced a coefficient of .941, which accounted for 88.5 per cent of the variance in their GPA at admission to student teaching; and the addition of ACT scores and STEP scores that yielded multiple coefficients of correlation of .942 and .942 did not add any additional significant amounts to account for the variance. Hypothesis number ten was accepted for both the teacher group and the non-teacher group.

Hypothesis 11. -- The amount of variance in grade-point rating earned for student teaching accounted for by ACT scores is not significantly increased by the addition of STEP scores and GPA at admission to

teacher education. The findings yielded by the data for the teacher
group were not appropriate to test this hypothesis as stated. The
sequence of entry of the variables was changed for the teacher group to
enter GPA at admission to teacher education as the initial variable into
correlation with grade-point rating for student teaching. With the
hypothesis restated as "The amount of variance in grade-point rating
earned for student teaching accounted for by GPA at admission to teacher
education is not significantly increased by the addition of STEP scores
and ACT scores," the hypothesis would be accepted for the teacher group.
The correlation of GPA at admission to teacher education with grade-
point rating for student teaching produced a coefficient of .181, which
accounted for 3.2 per cent of the variance in grade-point rating for
student teaching for the teacher group; and the addition of STEP scores
and ACT scores produced multiple coefficients of correlation of .174 and
.205, which did not significantly increase the amounts accounted for in
the variance of grade-point rating for the teacher group. For the non-
teacher group, ACT composite scores was the variable entered first into
correlation with grade-point rating for student teaching, and the hypoth-
esis was tested directly as stated for this group. With a coefficient
for the correlation of ACT composite scores and grade-point rating for
student teaching of .304, analysis of variance showed that 9.2 per cent
of the variance in grade-point rating for student teaching produced by
the non-teachers was accounted for. The addition of STEP scores and GPA
at admission to teacher education produced coefficients of .301 and .289
(actually reductions) which did not contribute any significant additional
amounts to account for variance in grade-point rating for student teach-
ing for the non-teachers. Hypothesis number eleven was accepted for

the non-teacher group.

Hypothesis 12. -- The amount of variance in GPA at graduation accounted for by GPA at admission to teacher education is not significantly increased by the addition of ACT scores and STEP scores. The teacher group generated a coefficient of .869 for the correlation of GPA at graduation with GPA at admission to teacher education. Analysis of variance showed that the coefficient accounted for 75.5 per cent of the variance in GPA at graduation for the teacher group; and that the addition of ACT scores and STEP scores which produced multiple coefficients of .870 and .871 did not contribute any statistically significant additional amounts to account for the variance in GPA at graduation for the teacher group. For the non-teachers, the correlation of GPA at graduation with GPA at admission to teacher education yielded a coefficient of .920, which the analysis of variance showed accounted for 84.6 per cent of the variance in GPA at graduation for the non-teacher group. The addition of ACT scores and STEP scores produced multiple coefficients of correlation of .923 and .923 which proved not to contribute any statistically significant additional amount to the explanation of variance in GPA at graduation for the non-teacher group. Hypothesis number twelve was accepted for both the teacher group and for the non-teacher group.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

This study was concerned with the relationships between admissions

criteria and later achievement levels of students in programs of teacher

education at Oklahoma State University. Statistical relationships were

derived for ACT scores used at admission to the University, and STEP

scores and GPA used at admission to teacher education programs as they

related to achievement at the time of admission to student teaching,

during the student teaching experience, and at the point of graduation

from the program. Basically, the study aimed to assess the value of

these admissions criteria as indicators of probable future performance

of students who desire to enter a program of teacher education in one

of the several colleges at the University.

The subjects of the study were those students who had completed the

STEP in February of 1966 and, in addition, had completed records of ACT

scores, GPA at admission to teacher education, GPA at admission to stu-

dent teaching, a grade rating for student teaching, and GPA at gradua-

tion. Data were procured from the University records and from Appendix

A of the Fisher (1968) thesis that had studied the same parent popula-

tion. Step-wise regression, a method of multiple regression calculation

was used in the analysis of the data. Correlation matrices were erected,

partial and multiple coefficients of correlation were computed, analyses

of variances were ascertained, regression equations were formulated, and

the hypotheses of the study were tested. Collaterally, the data were divided according to the sex of the subjects, and again on the basis of the employment undertaken by the subjects after graduation either as teachers or in some non-teaching endeavor, and the differential results were treated in the same manner as the results from the undivided data were treated.

<div align="center">Findings of the Study</div>

The study considered ACT scores, STEP scores, and GPA at admission to teacher education for their relationships to GPA at admission to student teaching, grade-point rating for student teaching, and GPA at graduation. The nine possible relationships among the variables were provided for in the hypotheses of the study, as was the significance of ACT scores, STEP scores, and GPA at admission to teacher education in accounting for variance in GPA at admission to student teaching, grade-point rating for student teaching, and GPA at graduation. The findings of the study were as follows:

1. The first hypothesis stated that there is no significant relationship between ACT scores used at admission to the University and GPA at admission to student teaching. The relationship between these two variables, based on the data from the undivided sample, was expressed by a coefficient of correlation of .47, which was found to be significant at the .01 level of confidence. Based on the data divided according to sex, the relationship produced coefficients of .35 for the males and .49 for the females, both of which were found to be significant at the .01 level

of conficence. Based on the data divided on the basis of employment, the relationship produced coefficients of .46 for the teachers and .50 for the non-teachers, both of which were found to be significant at the .01 level of confidence. The null hypothesis was rejected on the basis of the findings for the undivided sample, and for males and for females, and for teachers and for non-teachers.

2. The second hypothesis stated that there is no significant relationship between ACT scores used at admission to the University and grade-point rating earned for student teaching. The relationship between the two variables, based on the data from the undivided sample, was expressed by a coefficient of correlation of .19, which was found to be significant at the .01 level of confidence. Based on the data divided according to sex, the relationship produced a coefficient of .15 for the males and was not signif-icant within the .05 level of confidence, and a coefficient of .19 for the females which proved to be significant at the .01 level of confidence. Based on the data divided according to employment, the relationship produced a coefficient of .12 for the teachers and was not significant within the .05 level of confidence, and a coefficient of .30 for the non-teachers which proved to be significant at the .01 level of confidence. The null hypothesis was rejected on the basis of the findings for the undivided sample, for the females, and for the non-teachers. The null hypothesis was accepted on the basis of the findings

for the males and for the teachers.

3. The third hypothesis stated that there is no significant
    relationship between ACT scores used at admission to the
    University and GPA achieved at graduation. The relation-
    ship between the two variables, based on the data from the
    undivided sample, was expressed by a coefficient of corre-
    lation of .48, which was found to be significant at the
    .01 level of confidence. Based on the data divided
    according to sex, the relationship produced coefficients
    of .40 for the males and .47 for the females, both of
    which were found to be significantly different from zero
    at the .01 level of confidence. Based on the data
    divided on the basis of employment, the relationship pro-
    duced coefficients of .45 for the teachers and .52 for the
    non-teachers, both of which proved to be significantly
    different from zero at the .01 level of confidence. The
    null hypothesis was rejected on the basis of the findings
    for the undivided sample, and for males and for females,
    and for teachers and for non-teachers.

4. The fourth hypothesis stated that there is no significant
    relationship between STEP scores used at admission to
    teacher education and GPA at admission to student teaching.
    The relationship between the two variables, based on the
    data from the undivided sample, was expressed by a coeffi-
    cient of correlation of .44, which was found to be signifi-
    cant at the .01 level of confidence. Based on the data
    divided according to sex, the relationship produced

coefficients of .34 for the males and .50 for the females, both of which were found to be significant at the .01 level of confidence. Based on the data divided on the basis of employment, the relationship produced coefficients of .46 for the teachers and .41 for the non-teachers, both of which were found to be significant at the .01 level of confidence. The null hypothesis was rejected on the basis of the findings for the undivided sample, and for males and for females, and for teachers and for non-teachers.

5. The fifth hypothesis stated that there is no significant relationship between STEP scores used at admission to teacher education and grade-point rating earned for student teaching. The relationship between the two variables, based on the data from the undivided sample, was expressed by a coefficient of correlation of .11, which was found to be not significantly different from zero within the .05 level of confidence. Based on the data divided according to sex, the relationship produced coefficients of .06 for the males and .13 for the females, neither of which was found to be significantly different from zero within the .05 level of confidence. Based on the data divided according to employment, the relationship produced a coefficient of .03 for the females, which proved to be not significant within the .05 level of confidence; and, on the same basis, a coefficient of .21 was produced for the males, which was found to be significant at the .01

level of confidence. The null hypothesis was accepted for
the undivided sample, and for the males and for the
females, and for the teachers. The null hypothesis was
rejected in the one case of the non-teacher group.

6. The sixth hypothesis stated that there is no significant
relationship between STEP scores used at admission to
teacher education and GPA achieved at graduation. The
relationship between the two variables, based on the
data from the undivided sample, was expressed by a coeffi-
cient of correlation of .44, which was found to be signif-
icant at the .01 level of confidence. Based on the data
divided according to sex, the relationship produced coeffi-
cients of .34 for the males and .49 for the females, both
of which were found to be significant at the .01 level of
confidence. Based on the data divided according to employ-
ment, the relationship produced coefficients of .45 for the
teachers and .42 for the non-teachers, both of which proved
to be significant at the .01 level of confidence. The null
hypothesis was rejected on the basis of the findings for
the undivided sample, and for males and for females, and
for teachers and non-teachers.

7. The seventh hypothesis stated that there is no significant
relationship between GPA scores used at admission to teacher
education and GPA at admission to student teaching. The
relationship between the two variables, based on the data
from the undivided sample, was expressed by a coefficient
of correlation of .91, which was found to be significant

at the .01 level of confidence. Based on the data divided according to sex, the relationship produced coefficients of .92 for the males and .90 for the females, both of which were found to be significant at the .01 level of confidence. Based on the data divided according to employment, the relationship yielded coefficients of .87 for the teachers and .92 for the non-teachers, both of which were found to be significant at the .01 level of confidence. The null hypothesis was rejected for the undivided sample, for the males and for the females, and for the teachers and for the non-teachers.

8. The eighth hypothesis stated that there is no significant relationship between GPA scores used at admission to teacher education and grade-point rating earned for student teaching. The relationship between the two variables, based on the data from the undivided sample, was expressed by a coefficient of correlation of .17, which was found to be significantly different from zero at the .05 level of confidence but not at the .01 level. Based on the data divided according to sex, a coefficient of .26 was produced for the males and was found to be significant at the .05 level of confidence; and, on the same basis, a coefficient of .11 was produced for the females, which was found to be not significant within the .05 level of confidence. Based on the data divided according to employment, a coefficient of .18 was yielded for the teachers and was found to be significant at the .05 level

of confidence; and on the same basis, a coefficient of .16 was produced for the non-teachers and proved to be not significant within the .05 level of confidence. The null hypothesis was accepted on the basis of the findings for the females and for the non-teachers. The null hypothesis was rejected on the basis of the findings for the undivided sample, for the males, and for the teachers.

9. The ninth hypothesis stated that there is no significant relationship between GPA scores used at admission to teacher education and GPA achieved at graduation. The relationship between the two variables, based on the data from the undivided sample, was expressed by a coefficient of correlation of .89, which was found to be significant at the .01 level of confidence. Based on the data divided according to sex, the relationship produced coefficients of .91 for the males and .87 for the females, both of which were found to be significant at the .01 level of confidence. Based on the data divided according to employment, the relationship produced coefficients of .87 for the teachers and .92 for the non-teachers, and both of these coefficients proved to be significant at the .01 level of confidence. The null hypothesis was rejected on the basis of the findings for the undivided sample, for the males and for the females, and for the teachers and for the non-teachers.

10. The tenth hypothesis stated that the amount of variance in GPA at admission to student teaching accounted for by GPA at admission to teacher education is not significantly

increased by the addition of ACT scores and STEP scores.

Analysis of variance, based on the data from the undivided

sample, demonstrated that no additional significant con-

tribution was made to the 83 per cent of the variance in

GPA at admission to student teaching accounted for by GPA

at admission to teacher education with the addition of

STEP scores and ACT scores. Based on the data divided

according to sex, an analysis of variance showed that no

additional significant contribution was made to the 84.2

per cent of the variance in GPA at admission to student

teaching accounted for by the males, and the 82.0 per cent

accounted for by the females, by GPA at admission to

teacher education alone with the addition of STEP scores

and ACT scores. Based on the data divided according to

employment, an analysis of variance showed that no addi-

tional significant contribution was made to the 79.2 per

cent of the variance in GPA at admission to student

teaching accounted for by the teacher group, and the

88.5 per cent accounted for by the non-teachers, by GPA

at admission to teacher education alone with the addition

of STEP scores and ACT scores. The null hypothesis was

accepted on the basis of the findings for the undivided

sample, for the males and the females, and for the

teachers and the non-teachers.

11. The eleventh hypothesis stated that the amount of variance

in grade-point rating earned for student teaching accounted

for by ACT scores is not significantly increased by the

addition of STEP scores and GPA at admission to teacher
education. Analysis of variance based on the data from
the undivided sample showed that ACT scores alone
accounted for 3.7 per cent of the variance in grade-
point rating earned for student teaching, that ACT scores
and STEP scores accounted for 4.6 per cent, and that ACT
scores and STEP scores and GPA at admission to teacher
education accounted for 5.3 per cent, amounts that were
not significantly different within the .05 level of con-
fidence. Based on the data divided according to sex, an
analysis of variance showed that for the female subjects
ACT scores alone accounted for 3.6 per cent of the
variance in grade-point rating for student teaching, that
ACT scores and STEP scores accounted for 3.6 per cent, and
that ACT scores and STEP scores and GPA at admission to
teacher education accounted for 3.2 per cent, amounts that
were not significantly different within the .05 level of
confidence. For male subjects, the sequence of entry of
variables in the step-wise multiple regression procedure
was changed to enter GPA at admission to teacher education
into correlation first with grade-point rating for student
teaching; and the analysis of variance showed that GPA at
admission to teacher education accounted for 6.0 per cent
of the variance in grade-point rating for student teaching,
that the addition of ACT scores raised the amount to 6.2
per cent, and that ACT scores and STEP scores added to GPA
at admission to teacher education accounted for a total of

6.8 per cent of the variance in grade-point rating for

student teaching for the males; but the amount proved

to be not significantly different within the .05 level

of confidence. Based on the data divided according to

employment, an analysis of variance showed that for the

non-teacher group, ACT scores alone accounted for 9.2

per cent of the variance in grade-point rating for stu-

dent teaching, that ACT scores and STEP scores decreased

the amount to 9.0 per cent, and that ACT scores and STEP

scores and GPA at admission to student teaching decreased

the amount again to 8.3 per cent, although the amounts

proved not to be significantly different within the .05

level of confidence. For the teacher group, the sequence

of entry of variables in the step-wise multiple regression

procedure was changed to enter GPA at admission to teacher

education into correlation first with grade-point rating

for student teaching; and the analysis of variance showed

that GPA at admission to teacher education accounted for

3.2 per cent of the variance in grade-point rating for

student teaching, that the addition of STEP scores decreased

the amount to 3.0 per cent, and that ACT scores and STEP

scores added to GPA at admission to teacher education

accounted for a total of 4.2 per cent of the variance of

grade-point rating for student teaching for the teacher

group; but the amounts proved to be not significantly

different within the .05 level of confidence. The null

hypothesis was accepted for the undivided sample, for the

females and for the non-teachers; and if the hypothesis

was changed to state that the amount of variance in grade-

point rating earned for student teaching accounted for by

GPA at admission to teacher education is not significantly

increased by the addition of ACT scores and STEP scores,

the null hypothesis would be accepted for the male sub-

jects and the teacher group as well.

12. The twelfth hypothesis stated that the amount of variance

in GPA at graduation accounted for by GPA at admission to

teacher education is not significantly increased by the

addition of ACT scores and STEP scores. Analysis of vari-

ance, based on the data from the undivided sample,

demonstrated that no additional significant contribution

to the 79.4 per cent of the variance in GPA at graduation

accounted for by GPA at admission to teacher education was

made by the addition of ACT scores and STEP scores.

Based on the data divided according to sex, an analysis of

variance showed that no additional significant contribution

to the 83.1 per cent of the variance in GPA at graduation

accounted for by GPA at admission to teacher education for

the males, and the 76.3 per cent for the females, was made

by the addition of ACT scores and STEP scores. Based on the

data divided according to employment, an analysis of vari-

ance showed that no additional significant contribution to

the 75.5 per cent of the variance in GPA at graduation

accounted for by GPA at admission to teacher education for

the teacher group, and the 84.6 per cent for the non-teacher

group, was made by the addition of ACT scores and STEP
scores.   The null hypothesis was accepted for the teachers
and for the non-teachers, for the males and for the
females, and for the undivided sample.

Conclusions

Based on the findings of the study, the following conclusions
emerge as being of particular importance:

1. In the several treatments of the data correlations between
    GPA at admission to teacher education and GPA at admission
    to student teaching, and between GPA at admission to
    teacher education and GPA at graduation, were consistently
    high.   With coefficients of correlation ranging from .87
    to .94, the addition of more variables did not signif-
    icantly increase the predictive value of a combination of
    variables over the predictive value of GPA at admission
    to teacher education alone as a predictor of expected
    future over-all GPA.

2. Neither ACT scores, STEP scores, or GPA at admission to
    teacher education, nor any combination of these variables,
    yielded a high correlation with grade-point earned for
    student teaching.   Twelve out of fifteen of the coeffi-
    cients of correlation where grade for student teaching
    was a factor were under .20, with the highest at .30
    and the lowest at .03.

3. Division of the sample, first according to the sex of the
    subjects and then a second time on the basis of the

employment undertaken by the subjects following gradua-

tion either as teachers or in some other field, showed

that while slightly higher scores and grades were found

in most instances for the females and for the non-teacher

group, the differences were not significantly different

from each other; nor were the results from the divided

samples significantly different from the results yielded

by the undivided sample in all of the categories.

Recommendations

The results of this study suggest further research in several

directions. Quite high correlations among some of the variables and

very low correlations among others show a need for further investiga-

tion. Other areas, related to the problem of this study, but beyond the

scope of this thesis, should also be studied.

The first area of research suggested by the results of this study

should look into the question whether or not GPA alone is the essential

predictor variable to screen for the academic knowledges and skills the

Council on Teacher Education deems to be necessary achievements for all

teacher education candidates to meet. The high correlations of GPA at

admission to teacher education with GPA at admission to student teaching

and with GPA at graduation that were found for this sample implies that

in the prediction of over-all grade-point average no other contributory

variable is likely to add greatly to the efficiency of GPA alone as a

predictor. Perhaps the regression equations formulated from the find-

ings of this study might prove to be useful to some future research in

this direction.

A second area of research suggested by the results of this study concerns the grades that are assigned for student teaching. The generally low relationships that were found between the predictor variables of this study and grade-point earned for student teaching raises some essential questions. A representative few are offered here. Are the criteria used for grading student teaching courses the same as, or at least directly related to, the criteria used for grading professional and subject-matter courses? Are the objectives of the student teaching experience as clearly defined as they are for the other courses? Do the supervisors of the student teaching courses differ in how they teach and assign grades from the regular classroom teachers of other courses? A very careful study, or series of studies, of grading procedures that are practiced during student teaching is recommended.

A third area of research is suggested by the concept of this study as one step in a longitudinal study (p. 3, Chapter I, supra; also Fisher, 1968, p. 2). This study used a select population of students that was also studied by Fisher (1968). The recommendation is offered here that the same population should be studied again for the implications that their scores and grades hold for success on-the-job. Until the original population is followed beyond the college environment to relate career success to academic achievement, the sequence in the longitudinal study is incomplete.

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