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UNDERGRADUATE ACADEMIC ACHIEVEMENT AND TEACHING PERFORMANCE.

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DESCRIPTORS- *AGRICULTURAL EDUCATION, *ACADEMIC ACHIEVEMENT, *TEACHER EDUCATION, *VOCATIONAL AGRICULTURE TEACHERS, *TEACHING QUALITY, UNDERGRADUATE STUDY, GRADE POINT AVERAGE, TEACHER EVALUATION,

THE OBJECTIVES OF THIS STUDY WERE TO DETERMINE (1) THE RELATIONSHIP BETWEEN TEACHER PERFORMANCE AND UNDERGRADUATE ACHIEVEMENT IN SELECTED DISCIPLINES, (2) THE RELATIONSHIPS BETWEEN UNDERGRADUATE ACHIEVEMENT, BOTH TOTAL AND IN EACH OF 12 SUBJECTS, AND TEACHING PERFORMANCE, BOTH TOTAL AND IN NINE TEACHING FUNCTIONS, AND (3) THE VARIABILITY OF TEACHER PERFORMANCE ACCORDING TO UNDERGRADUATE ACADEMIC ACHIEVEMENT. A 25 PERCENT RANDOM CLUSTER SAMPLE OF 1959 AND 1960 AGRICULTURAL EDUCATION GRADUATES FROM 16 INSTITUTIONS IN THE UNITED STATES PRODUCED 188 TEACHERS WHO HAD COMPLETED BETWEEN 2 1/2 AND 3 1/2 YEARS OF TEACHING IN THEIR OWN STATES. DATA WERE GATHERED ON ACADEMIC ACHIEVEMENT FROM COLLEGE TRANSCRIPTS AND ON TEACHING PERFORMANCES FROM RATINGS BY PRINCIPALS AND DISTRICT SUPERVISORS. SIGNIFICANT POSITIVE CORRELATION WAS FOUND BETWEEN TEACHING PERFORMANCE AND ACADEMIC ACHIEVEMENT IN BIOLOGICAL SCIENCES, AGRICULTURAL EDUCATION, AND STUDENT TEACHING. NEGATIVE CORRELATION WAS FOUND BETWEEN TEACHING PERFORMANCE AND ACADEMIC ACHIEVEMENT IN MATHEMATICS, GENERAL EDUCATION, AND AGRICULTURAL ECONOMICS COURSES. THERE WAS NO SIGNIFICANT DIFFERENCE IN THE VARIATION OF TEACHING PERFORMANCE AMONG TEACHERS GROUPED ACCORDING TO UNDERGRADUATE ACHIEVEMENT. A PREVIOUS ASSUMPTION THAT AVERAGE STUDENTS ARE THE BEST TEACHERS WAS NOT SUSTAINED. (JM)

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Undergraduate Academic Achievement and Teaching Performance

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UNDERGRADUATE ACADEMIC ACHIEVEMENT AND TEACHING PERFORMANCE

V. R. Cardozier*

INTRODUCTION

In recent years, increasing attention has been given in colleges and universities to excellence in scholarship and to upgrading standards in undergraduate programs of study. This has been manifested in undergraduate teacher education programs through such devices as requiring a 2.3 or 2.5 (C plus) academic average at the end of the freshman or sophomore year in order to be admitted to teacher education programs, or as a prerequisite for student teaching. This trend has affected all teacher education programs to greater or lesser degrees, including agricultural teacher education. Inherent in this change in practice is the assumption that students who earn higher marks in undergraduate academic work, or at least higher than minimum for graduation, are more likely to be successful teachers.

On the other hand, there is a long held belief among many educators, particularly superintendents, principals, and supervisors of vocational agriculture, all of whom have some responsibility for employment of teachers of vocational agriculture, that the "average" student is more likely to become a successful teacher than one who earns higher grades.

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The two foregoing points of view suggest contradiction. To date, not enough evidence has been provided to support either point of view. Several studies of limited scope have been completed which suggested conclusions that might be generalized, but none that would provide a valid basis for generalizing nationally.

Armstrong[1], in 1930, studied 51 vocational agriculture teachers in Kentucky who had graduated from the University of Kentucky between 1921 and 1930. Undergraduate academic achievement and ratings of success by two supervisors and two teacher trainers resulted in a .50±.07 correlation between academic standing in college and success in teaching.

Sutherland[2] studied 31 vocational agriculture teachers in California in 1936-37, comparing grades earned during junior and senior years and teaching performance as rated by regional and state supervisors. Grade point average for the 15 teachers rated superior was 1.86 (on a 3.0 point scale) and for the remainder, 1.57. However, of the seven who had a grade point average of 1.0 to 1.4, three were "above average" teachers.

The contention of administrators and supervisors that the academically average individual is not most likely to be highly successful is supported by a 1948 study of engineers working for the National Advisory Committee for Aeronautics. The study showed that highest job performance was not in the top

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[1]Watson Armstrong, "Relation Between College Grades and Success of Teachers of Agriculture in Kentucky", College of Education, University of Kentucky, Lexington, 1933, p. 15.

[2]S. S. Sutherland, "Can We Predict Success in Teaching", Agricultural Education Magazine, August 1937, pp. 35, 38.

one-fourth group scholastically but in the second and third quartiles. In a study of a sampling of 99 engineers at the Hughes Tool Company, a low positive correlation between class standing and salaries was found in engineers with eight years' experience.[3]

Torrence[4], in a study of 60 vocational agriculture teachers in southern Wisconsin, "found no statistically significant correlation between teacher effectiveness as he measured it and the vocational agriculture teacher's knowledge of technical agriculture, agricultural manipulative skills, knowledge of professional education, or combinations of these."

Stuit[5] examined "superior" and "inferior" teachers, according to ratings by their principals and superintendents, and found that the majority of teachers who were rated superior were above average in scholarship.

In his study of 65 teachers, Jones[6] correlated two measures of teaching success --- principals' ratings (M blank) and pupil gain --- with 16 variables including, among others, undergraduate grade point average in education courses. It was concluded that "achievement in formal education courses seemed to be

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[3]Business Week, February 24, 1962, pp. 77-78.

[4]A.S. Barr and others, Wisconsin Studies of The Measurement and Prediction of Teacher Effectiveness: A Summary of Investigations, (Madison, Wisconsin: Dembar Publications), 1961, p. 144.

[5]D.B. Stuit, "Scholarship as a Factor in Teaching Success," School and Society, Vol. 47, September 1937, pp. 382-384.

[6]Leland E. Jensen, "A Non-additive Approach to the Measurement of Teacher Effectiveness," in A. S. Barr, The Measurement and Prediction of Teaching Effectiveness, (Madison, Wisconsin: Dembar Publications, 1961), p.67.

most relevant variable to pupil gain." Pupil gain was determined by administration of achievement tests to pupils of the teachers being studied at the beginning and end of a three-month period.

After reviewing a number of studies dealing with correlates of teaching success, Jensen[7] concluded that teacher "candidates who possess average college-level abilities and are superior in course work seem to be more effective teachers than mentally superior people who did less well academically...Superior college academic achievement, whether due to intellectual or motivational factors, appears to be the best indicator from preservice data."

Studies previously conducted have not established conclusively the relationship between undergraduate academic achievement and success in teaching. They have produced both positive and negative conclusions on the question. Studies involving teachers of agriculture have been inconclusive and have usually been conducted on a limited basis, most often within a single state.

There appeared to be a need to approach this question as it applies to agriculture teachers and to deal with it on a national basis in order that findings might have national application.

Objectives of the Study

The major purpose of this study was to determine the relationship between undergraduate academic achievement and subsequent performance in teaching vocational agriculture in the United States.

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[7]Ibid., p. 81

Specific objectives:

(1) To determine the relationship between teaching performance and undergraduate academic achievement in selected disciplines and subject areas: English, social sciences, mathematics, basic biological and physical sciences, speech, plant and soil sciences, animal sciences, agricultural engineering, agricultural economics, agricultural education, other education courses, student teaching.

(2) To determine the relationship between undergraduate academic achievement, both in toto and in each subject noted above, and performance in teaching, both total teaching performance and in the individual functions that constitute the job of the teacher of vocational agriculture --- classroom teaching, farming program supervision, program planning, farm mechanics instruction, Future Farmers of America, young and adult farmer programs, relationships in the school, community relationships, and professional standards and improvement.

(3) To determine the variability of teaching performance according to undergraduate academic achievement.

RESEARCH PROCEDURES

Vocational agriculture teachers' performance in teaching, both in terms of overall performance and performance in nine designated functions, was compared with their academic achievement at the undergraduate level, as measured by grades. Performance in teaching was determined by ratings of supervisors of vocational agriculture and high school principals who supervised the teachers in the sample.

Population

The population consisted of all teachers of vocational agriculture in the United States. This was reduced to those teachers who graduated from college during 1959 and 1960, had entered vocational agriculture teaching upon graduation in the state where they graduated and were still teaching in that state at the time of the survey (winter - spring, 1962-63). These years were chosen because (1) the teachers studied had been teaching long enough for supervisors to be able to rate them (it should be noted that in many states teacher trainers supervise teachers during their first year on the job), and (2) a greater time distance from undergraduate study would have increasingly induced additional influential factors, such as graduate study, increased in-service training, changes in teaching procedures and program approaches based on prolonged personal experience, and others.

Sampling

From the "Statistical Summary of Agricultural Teacher Training", issued by the U.S. Office of Education, the numbers of graduates in agricultural education from the institutions which trained vocational agriculture teachers was obtained. The institutions were arrayed according to the number graduated during 1959 and 1960. The range was from zero to 53 per institution. The 10 institutions which had no graduates in this category were eliminated. The remainder were stratified into four approximately equal groups. The lowest quartile had from one to five graduates each. In the next, there were five to 13 individuals, in the third there were 13 to 27, and in the top 30 to 53 each.

Using the table of random numbers, approximately one-fourth of the institutions were sampled from each of the four strata. This resulted in four institutions from each stratum.

Data Collection

Through the assistance of heads of agricultural teacher education in the 16 institutions in the sample, a copy of the undergraduate academic record of each teacher in the sample was obtained. Each head teacher educator also furnished the name of the principal of the school where each teacher in the sample was located.

A device for rating the performance of vocational agriculture teachers was developed and sent to the vocational agriculture supervisor and principal of each teacher in the sample.

The term "principal" is used in this study to note the local school administrative head; in those states having local school districts, the rater, in most cases, was the local superintendent whose function includes many of the duties that are performed by a principal in a county unit system.

Measurement of Teaching Performance

One of the first questions when looking toward such a study is how does one measure performance in teaching? The late A.S. Barr of the University of Wisconsin studied predictability of success in teaching for almost a lifetime, and concluded that not only had he discovered no valid measure for predicting success in teaching but that the matter of measuring effective teaching was far from absolute.[8]

This writer was aware of these weaknesses in a study such as the present one but proceeded upon the assumption that even if a completely objective device for measuring performance in teaching were available, it would perhaps have less value, for certain purposes, than the opinions of professional workers who have the responsibility for a given teacher's work. While not precisely correct, this is substantially the position that "it doesn't make any difference whether the teacher is successful or not as long as those responsible for his work think he is effective," or "he is effective if those who supervise him think he is effective." Superficially, this may appear to be a cynical position. Actually, it is fairly sound. Research evidence indicates that supervisors'

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[8]Barr, op. cit., pp. 5-9.

appraisals probably constitute the best measure of an individual's performance.[9] This may err in the case of one individual, but with a large sample, it appears to have high validity. Further, one might ask: If supervisors and principals are not able to determine teachers' effectiveness, who is? Thus, for the purpose of this study, teaching effectiveness is defined as "whatever the supervisors and principals rating the teacher say it is," within the framework of the rating scale.

Rating Scale

The "Guide for Rating Teachers of Vocational Agriculture", a copy of which appears in the appendix, was used by supervisors and principals to rate teachers' performance in each of nine functions on which the vocational agriculture teacher's effectiveness is likely to be determined. This device is a condensation of an instrument developed by George W. Sledge in a doctoral study in Michigan and subsequently refined by him in work in Wisconsin. Sledge's rating guide is more analytical and likely to obtain a more objective rating of teachers' performance when completed by persons who are adequately motivated to give the time and attention to the device that is required. However, the length of the device appeared to be such that a complete and careful rating of each item by supervisors and principals contacted by mail seemed unlikely. Since this study was concerned with areas of responsibility or functions, the items in Sledge's scale were grouped into the nine functions; some of the key activities under each were listed to aid the rater in making an objective rating.

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[9] Ibid.

The rating scale was then pretested for supervisor reaction by submitting it to six supervisors of vocational agriculture in as many different states.

Hypotheses

Hypotheses tested in this study were that:

1. There is significant positive correlation between performance in teaching vocational agriculture and undergraduate academic achievement.

2. Teaching performance of teachers who earn higher marks as undergraduates is superior to that of teachers whose undergraduate academic achievement is "average"; the latter group surpasses in teaching performance those teachers whose undergraduate academic achievement was lowest.

3. Teaching performance varies less among teachers whose undergraduate academic achievement was "average" than among teachers whose undergraduate academic achievement was "high" or "low".

4. Within the respective academic disciplines, undergraduate academic achievement in English, social sciences, education, including agricultural education and student teaching, and speech are more closely related to teaching performance than undergraduate academic achievement in other disciplines.

Treatment of Data

The undergraduate academic achievement of each teacher in the sample was tabulated. Courses were grouped into the following categories, the total semester hours of credit in each was tabulated, and the grade point average of each category computed.

1. English
2. Mathematics
3. Basic biological sciences
4. Basic physical sciences
5. Social sciences
6. Humanities
7. Speech
8. General education (i.e. education courses other than agricultural education)
9. Agricultural education
10. Student teaching
11. Agricultural economics
12. Agricultural engineering
13. Plant and soil sciences
14. Animal sciences
15. Other agriculture courses
16. Miscellaneous courses

Credits from institutions not on the semester system were converted to semester hours. Grades were recorded as follows, regardless of the practice of the institution involved: A=4 ; B=3 ; C=2 ; D=1 ; F=0 .

Statistical Analyses

For the purpose of analysis, the population was grouped into three approximately equal groups, as explained elsewhere. These were the top third, middle third, and lowest third, based on undergraduate grade point average (except in two cases, noted later). Analysis of variance was used to test differences in each three groupings. If the analysis of variance revealed a

significant difference (at the 5 percent level), then individual z-tests of mean differences were made between middle and high, middle and low, and low and high groups to determine wherein the difference(s) lay.

During data analysis, it appeared that some distributions of the dependent variable departed significantly from normal. Tests for normality, as described later, showed this to be true for a number of distributions. This suggested the use of nonparametric tests; however, for several reasons it was more desirable to use parametric tests.

According to Lindquist, "the F-distribution is practically unaffected by lack of symmetry, per se, in the distributions of criterion measures but is slightly affected if the distribution of criterion measures is roughly symmetrical but either very flat or very peaked." Based on work by Cochran and Norton, Lindquist concluded that "if one wished the risk of a Type I error to be less than 5 percent, he might require that the obtained F exceed the 2.5 percent point in the normal-theory F-distribution."[10]

Examination of distributions showed that most of them tended to be peaked, and therefore offered the slight likelihood of a Type I error by using the 5 percent level of significance. Thus, in this report, for tests of significance involving one or more abnormally distributed groups, the 2.5 percent level is

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[10]E.L. Lindquist, Design and Analysis of Experiments, (Boston: Houghton-Mifflin), 1963, pp. 78-86.

used instead of the 5 percent level. For those tests in which all groups are normally distributed, the 5 percent level is used. In instances where one or more groups are abnormally distributed, and the differences are significant at the 5 percent but not the 2.5 percent level, the hypothesis is rejected. However, it is recognized that some students of the question consider the F-test to be sufficiently robust to be relatively unaffected by the kind of abnormality shown in Figures 1 and 2. Therefore, in instances where the differences are significant at the 5 percent level but not at the 2.5 percent level, a footnote to the table is listed which notes this. In view of the considerable disagreement in the literature concerning academic achievement and teaching performance, it seems more prudent to attempt to avoid Type I errors than to risk Type II errors.

Normality of distribution was tested by use of a four-cell Chi-square test; results were considered not abnormally distributed if they did not differ significantly from the theoretical distribution at the 5 percent level.

To help avoid confusion in this report, the terms F-ratio and F-value are given different meanings, although the two are used interchangeably by most writers. In this report, F-ratio, sometimes referred to as variance ratio, is used to denote homogeneity of variance; it is the result of dividing the smaller variance by the larger variance of two distributions. The F-value refers to analysis of variance.

Correlations were computed between teachers' grade point averages and ratings by supervisors and principals; a standard t-test formula was used to determine significance of each r value.

Limitations

This study was limited to undergraduate achievement as related to teaching performance. In orienting on this aspect, it was fully recognized that many other factors affect teaching success, not the least of which is the complex of personal factors, a subject of considerable study already.

A major limitation was the ability of the rating scales to secure valid and reliable ratings. This is contingent upon the instruments themselves and the ability and application of the raters in completing them. Although there is no absolute evidence to substantiate, it appears that the halo effect influenced some of the supervisors and principals in their ratings of teachers. This is to be expected; it is difficult, if not impossible, to control, especially when securing ratings by correspondence.

Approximately one-third of the raters returned the scale with all items checked except the "overall" rating in the rectangle, indicating that they probably did not read the instructions carefully. The overall rating subsequently was obtained through follow-up for most of these, but a few of the raters did not return follow-up rating forms.

FINDINGS

A total sample of 210 teachers was identified, based on lists furnished by teacher education departments. Subsequently, it was found that a number of these were ineligible for the study --- they had received master's degrees, had ceased teaching vocational agriculture in that state, or other reasons. Table I shows the number of individuals for whom data were available.

Table 1. Means and standard deviations of principals' and supervisors' ratings of vocational agriculture teachers.

	Supervisors' ratings			Principals' ratings		
Teaching function	N[a]	Mean	s.d.	N[a]	Mean	s.d.
Classroom teaching	171	2.86	.70	180	2.97	.63
Program planning	172	2.67	.78	181	2.91	.75
Supervised farming	170	2.68	.76	178	2.79	.74
Farm mechanics	169	2.67	.75	176	2.91	.77
Future Farmers of America	171	2.76	.77	180	3.07	.73
Young/adult farmer program	166	2.47	.89	174	2.66	.93
Relationships in the school	172	3.04	.76	181	3.10	.91
Community relationships	172	2.92	.75	180	3.01	.84
Professional standards & improvement	172	2.86	.75	181	2.97	.76
TOTAL PERFORMANCE	169	2.80	.73	176	3.00	.66

[a]N=188

Transcripts of six teachers were not available; these were eliminated from analyses involving undergraduate academic achievement.

A total of 188 individuals was eligible for the final sample, less the six just mentioned for part of the analyses. One or more principals or superintendents failed to complete each item on the rating scale.

Variations in ratings were small (Table 1). Variation in ratings was greater among principals than supervisors and in each case there was greater variation in ratings of teachers' work in young and adult farmer education. In the cases of supervisors' and principals' ratings, variation was least on the classroom teaching function, followed by total performance.

An analysis of the grade point average in each discipline (more correctly, each subject area) appears in Table 2. Striking is the fact that 22.5 percent had taken no mathematics, 36.2 percent had taken no humanities courses, 19.2 percent had taken no speech courses, and 17 percent had taken no courses in education, other than agricultural education.

The highest overall grade point average was in student teaching, which is not surprising in view of the fact that most teacher educators consider performance in student teaching as the single best predictor of success in teaching agriculture.

The second highest grade point average was in agricultural education courses: it is not unusual for students to perform best in their major subjects in college.

The lowest grade point average was in English, also not surprising to faculty advisors of undergraduate students majoring in agricultural education.

The highest variation in grade point average was in mathematics, due perhaps in part to the small number of students who had studied that subject and also because most students had completed only one course in it. It is interesting to note that the mean grade point average in physical science was significantly less than that in biological sciences; the standard deviation of the two differed little.

Table 2. Means and standards deviations of teachers' total grade point averages in undergraduate academic work.

Discipline	N	Mean	s.d.
English	182	2.03	.56
Mathematics	141	2.17	.87
Biological sciences	182	2.49	.59
Physical sciences	181	2.11	.62
Social sciences	180	2.30	.59
Speech	141	2.53	.65
General education	151	2.52	.56
Agricultural education	181	3.22	.44
Student teaching	176	3.33	.52
Agricultural economics	182	2.77	.57
Agricultural engineering	182	2.91	.56
Animal sciences	181	2.95	.53
Plant and soil sciences	182	2.83	.56
TOTAL GRADE POINT AVERAGE	182	2.68	.35

Data in Table 3 show the high school vocational agriculture experience of the respondents. This was not a major question in the study and hence data were not requested; however, most of the transcripts had the data listed. There is no reason to believe that the high school experience of the 82 for whom this information was not available differed from those for whom it was available. Based on that assumption, it appears that about seven out of eight teachers in the study had completed one or more years of vocational agriculture in high school, and almost half had completed four years. Because of the small number who had not had vocational agriculture in high school, any comparison of teaching performance according to high school experience in vocational agriculture would be open to question.

Table 3. Years of high school vocational agriculture completed by teachers.

Years of vocational agriculture	1959 graduates	1960 graduates	Total	
			Number	Per cent
0	7	7	14	13.3
1	3	5	8	7.5
2	5	6	11	10.4
3	14	9	23	21.6
4	21	29	50	47.2
Total			106	100.0
Year graduated not available			6	
Vocational agriculture experience not known	38	38	76	

Groupings According to Academic Achievement

Much of the discussion about teaching performance refers to the "average" student. In this report teachers are divided into three groups, based on their total grade point average and average in each subject. In this study, the middle group was considered "average". An attempt was made to divide these into three exact sized groups for each subject, but the distribution of grade point averages did not permit it. As an alternative, groups were divided nearest the one-third point. The distribution of groups according to grade point average in each subject appears in Table 4.

In the case of student teaching and speech no middle group appears. Most students had received only one mark in each of these courses. In student teaching there were very few grades other than 3.0 and 4.0, i.e., B and A. A similar situation existed in the case of speech, except that grades were C and B, respectively. The numbers of individuals appearing in each of these groups are given in data tables that follow.

For brevity and simplicity, throughout this report, the low grade point average group is referred to frequently as Group I, the middle or "average" grade point average group is referred to as Group II, and the high grade point average group is referred to as Group III.

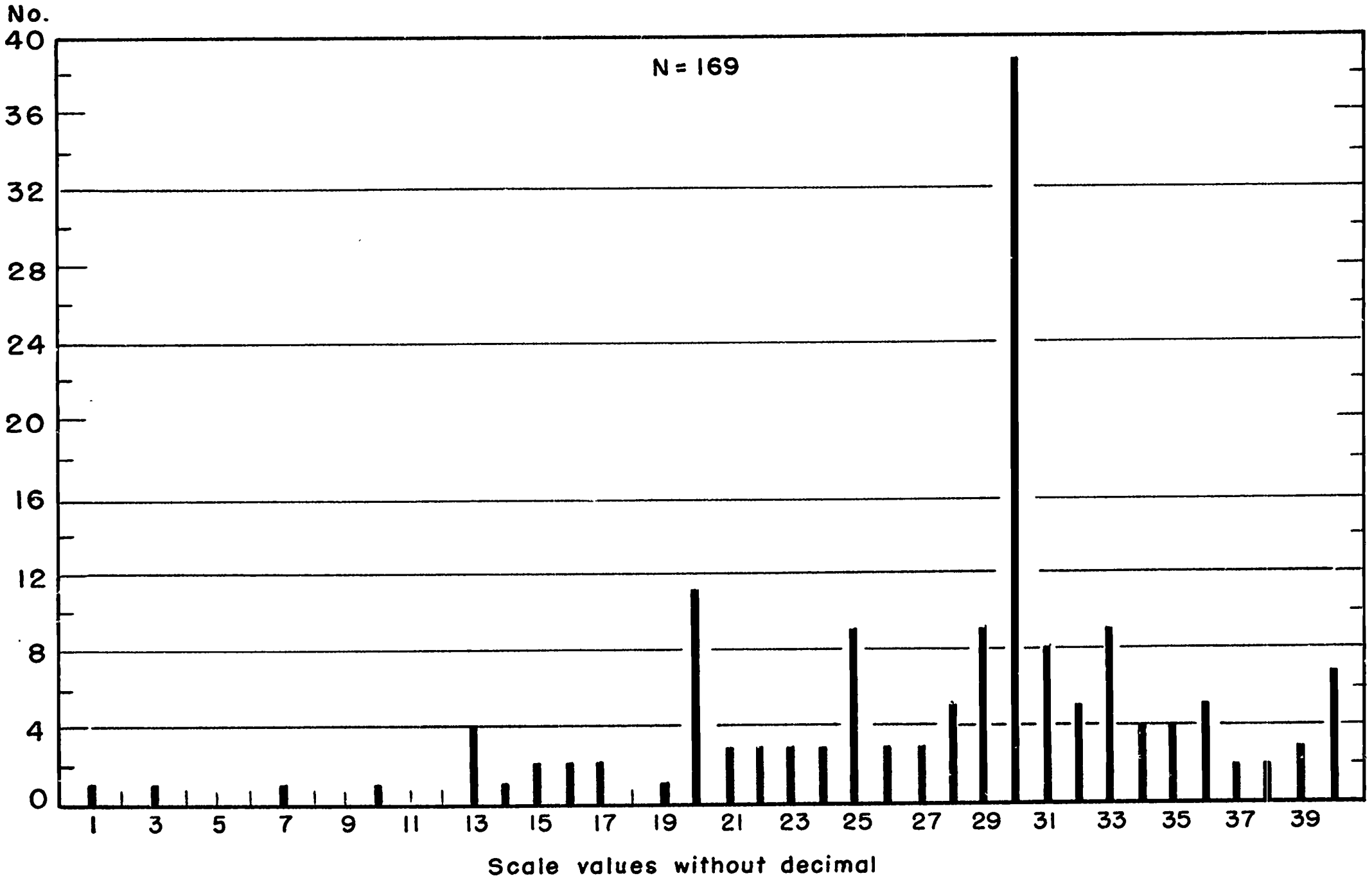

Figure 1. Supervisors' ratings of total teaching performance of vocational agriculture teachers.

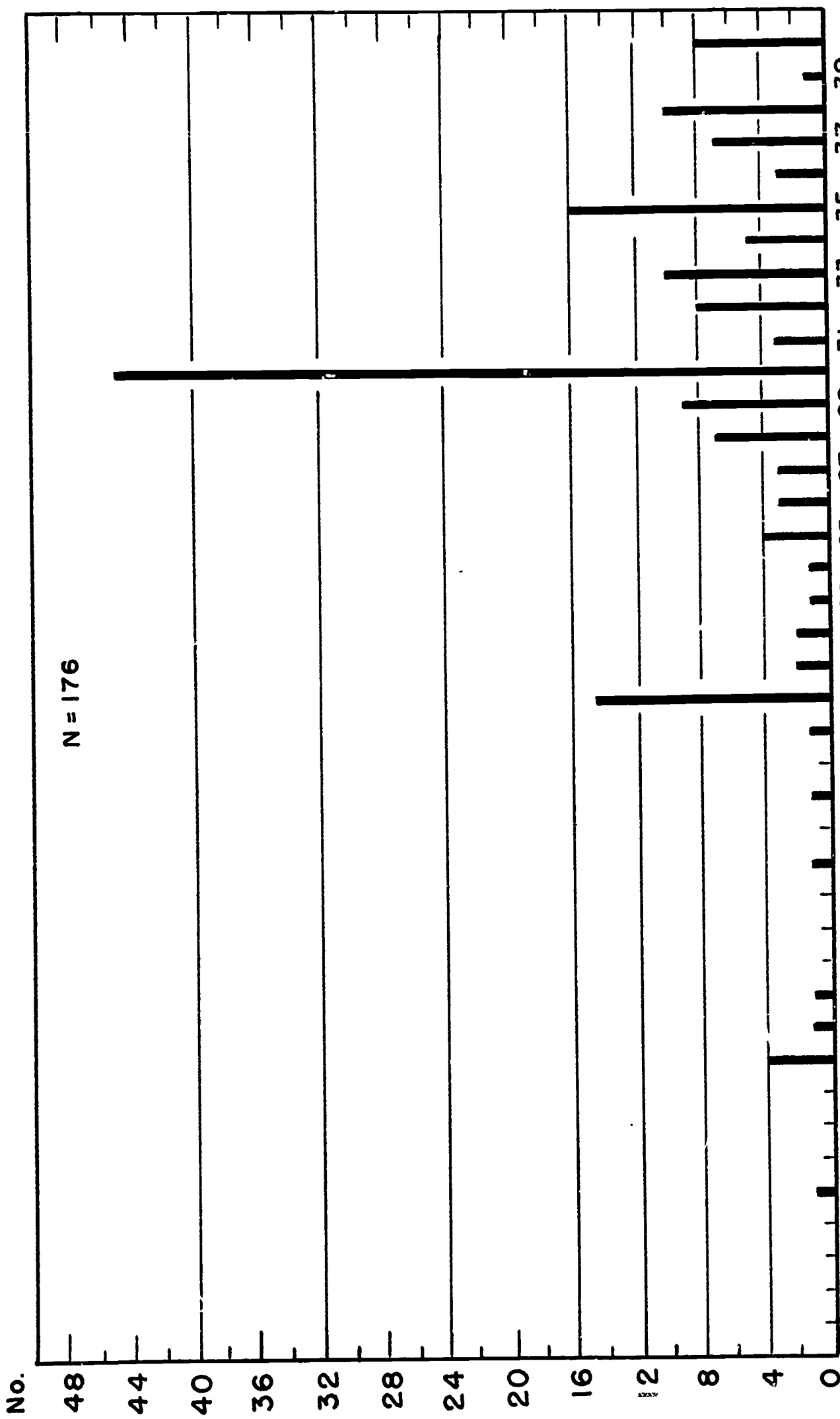

Figure 2. Principals' ratings of total teaching performance of vocational agriculture teachers.

Table 4. Range of grade point averages of teachers in respective disciplines, according to group.

Discipline	Low group (Group I)	Middle group (Group II)	High group (Group III)
English	1.0 - 1.8	1.9 - 2.2	2.3 - 3.5
Mathematics	0.3 - 1.9	2.0	2.2 - 4.0
Biological sciences	1.0 - 1.9	2.0 - 2.3	2.4 - 4.0
Physical sciences	1.1 - 2.2	2.3 - 2.7	2.8 - 4.0
Social sciences	1.0 - 2.0	2.1 - 2.6	2.7 - 4.0
Speech	1.0 - 2.0	---------	2.2 - 4.0
General education	1.0 - 2.2	2.3 - 2.8	2.9 - 4.0
Agricultural education	1.8 - 2.9	3.0 - 3.4	3.5 - 4.0
Student teaching	3.0	---------	4.0
Agricultural economics	1.7 - 2.5	2.6 - 3.0	3.1 - 4.0
Agricultural engineering	1.3 - 2.6	2.7 - 3.0	3.1 - 4.0
Animal sciences	1.6 - 2.7	2.8 - 3.2	3.3 - 4.0
Plant and soil sciences	1.7 - 2.5	2.6 - 3.1	3.2 - 4.0
All subjects	2.02- 2.50	2.51- 2.83	2.84- 3.57

Teaching Performance and Total Undergraduate Achievement

Table 5 represents a summary of analyses of variance of teaching performance, according to supervisors' and principals' ratings, in each teaching function and according to each subject area. The F values are among the three groups in each case, except for speech and student teaching, each of which involved two groups.

An examination of total teaching performance (overall rating), with groups divided according to total grade point average (overall GPA) in Table 5 shows no differences among the groups according to analysis of variance. This is also true for ratings by both supervisors and principals in each of the teaching functions. Further examination of the data concerning total grade point average and teaching performance, in Table 7, shows very slight difference between mean ratings of overall teaching performance by supervisors and principals.

In several cases, Group I, i.e., the low group academically, was rated highest by supervisors and principals. On several other functions, mean ratings increase from Group I to Group II to Group III; in the case of supervisors' ratings of teachers' work in adult education, the mean rating of Group I exceeds that of both Group II and Group III. In nine cases, the mean ratings of Group I are greater than the respective mean ratings of Group II. And, yet in none of the teaching functions are supervisors' or principals' ratings significantly different between groups. In brief, data in Table 5 provide no basis for concluding that a difference in teaching performance existed among the three groups of teachers based on undergraduate total grade point average.

Is there any correlation between teaching performance and undergraduate total grade point average? According to data in Table 6, none of the correlations differ significantly from zero, with the exception of supervisors' ratings of teachers' performance in program planning and total grade point average which, as one case out of twenty, could be accounted for by chance.

Tests for homogeneity of variance of groups showed that in several cases there was significantly greater variation among Groups I and III than Group II. According to principals, Group I was more homogeneous in professional standards, and supervised farming, but Group II varied less in the case of classroom teaching. According to supervisors, Group II varied less than either of the other groups in school relationships, community relationships, and in total performance. Other differences were not significant.

What is not different in the data in Table 5 may be more important than the few differences found. For example, while one might not expect differences in school relationships and community relationships, based on undergraduate academic achievement, professional standards and professional improvement would seem to be more characteristic of the better student than the individual who performed less well. These data do not show this distinction.

Table 5. F values of supervisors' and principals' ratings of teachers, based on three groups divided into approximately equal groups according to undergraduate grade point average of respective discipline.

Teaching function	Overall GPA		English		Mathematics		Biological sc.		Physical sc.		Social sc.	
	Supr	Prin	Supr	Prin	Supr	Prin	Supr	Prin	Supr	Prin	Supr	Prin
Classroom teaching	1.02	0.36	0.27	0.62	0.34	1.25	1.69	0.30	2.69	2.59	0.28	0.98
Program planning	0.99	0.44	0.88	0.27	0.11	1.19	1.63	1.74	1.89	1.36	0.01	0.02
Supervised farming	0.23	0.47	0.33	2.35	0.31	0.75	0.54	0.76	1.45	3.49[c]	0.41	0.84
Farm mechanics	0.39	0.78	0.01	0.22	0.46	0.28	0.68	1.76	0.54	3.24[c]	0.14	0.62
F.F.A.	0.54	0.81	1.25	0.31	0.65	0.60	0.87	2.24	1.75	0.96	0.07	0.08
Young/adult farmer ed.	0.49	0.37	0.18	2.04	1.11	0.01	0.19	1.24	0.36	0.20	0.48	0.32
School relationships	0.53	0.01	0.99	0.42	0.25	0.47	0.93	0.11	2.49	2.31	0.52	0.40
Community relations	0.43	0.04	0.19	0.94	0.62	0.48	0.47	0.25	2.29	2.90	0.02	0.11
Prof. standards & impr.	0.98	1.50	0.63	0.58	1.01	1.32	0.11	0.05	0.17	1.97	0.70	0.45
TOTAL PERFORMANCE	0.21	0.30	0.49	0.88	0.45	0.81	0.01	0.12	2.16	3.38[c]	0.01	0.48

Teaching function	Gen. educ.		Agri. educ.		Agri. econ.		Agri. engin.		Animal sc.		Plant & soil sc.	
	Supr	Prin	Supr	Prin	Supr	Prin	Supr	Prin	Supr	Prin	Supr	Prin
Classroom teaching	0.75	0.35	0.60	2.63	0.54	0.24	3.50[c]	0.34	0.30	0.33	0.23	5.12[a]
Program planning	0.02	1.37	2.96	3.81[b]	0.10	0.05	1.87	0.66	0.02	0.14	0.24	0.33
Supervised farming	0.21	0.41	1.71	4.00[c]	0.02	0.67	1.58	0.70	0.17	0.14	0.41	0.41
Farm mechanics	0.06	0.11	1.04	1.17	1.87	0.85	2.12	0.06	1.37	1.65	0.22	1.11
F.F.A.	0.15	1.05	0.49	0.99	0.69	4.02[c]	1.27	0.03	0.06	1.62	0.53	0.74
Young/adult farmer ed.	0.14	1.87	0.12	1.73	3.73[b]	1.91	0.03	0.34	2.37	1.57	0.13	1.43
School relationships	0.10	0.39	2.64	2.36	0.60	0.02	0.76	0.57	0.39	0.34	0.68	1.19
Community relations	0.11	0.16	0.72	1.29	2.22	0.08	0.83	0.20	0.44	0.24	0.18	0.17
Prof. standards & impr.	0.05	0.06	2.16	2.78	2.46	0.89	1.12	0.89	2.48	0.59	0.50	0.59
TOTAL PERFORMANCE	0.29	0.30	1.27	2.39	0.21	0.50	1.27	0.46	0.41	0.43	0.29	2.61

[a] Difference significant at 2.5 percent level.

[b] Difference significant at 5 percent level but not 2.5 percent level; since distribution of neither group is abnormal, difference is considered significant.

[c] Difference significant at 5 but not 2.5 percent level; since distribution of one or both groups is abnormal, difference is considered not significant.

Table 6. Correlations of undergraduate grade point averages and ratings of teaching performance by supervisors and principals

	Total G.P.A.		English		Mathematics		Biological sc.		Physical sc.	
	Supr.	Prin.	Supr.	Prin.	Supr.	Prin.	Supr.	Prin.	Supr.	Prin.
Classroom teaching	.14	.14	.09	.05	-.36*	-.20*	.14	.22*	.17*	.09
Program planning	.23*	.10	.14	.02	-.36*	-.20*	.20*	.25*	.15	.07
Supervised farming	.02	.08	-.04	.07	-.36*	-.13	-.02	.25*	.07	.13
Farm mechanics	.13	.05	.08	.01	-.17	-.30*	.15	.20*	.07	.09
F.F.A.	.11	.04	.08	-.10	-.32*	-.17	.11	.27*	.08	.11
Young/adult farmer ed.	-.05	-.14	-.37*	-.25*	-.05	-.32*	-.05	.11	-.04	-.07
School relationships	.03	.01	.08	.03	-.31*	.01	.02	.11	.07	-.02
Community relations	-.01	-.03	.02	-.01	-.39*	-.11	.00	.13	.09	.08
Prof. standards & impr.	.04	-.11	-.01	-.11	-.47*	-.30*	.03	.11	.01	.00
TOTAL PERFORMANCE	.06	.08	.06	.00	-.29*	-.09	.04	.24*	.06	.08

	Social sc.		Gen. educ.		Agric. ed.		Agric. econ.		Agric. engr.	
	Supr.	Prin.	Supr.	Prin.	Supr.	Prin.	Supr.	Prin.	Supr.	Prin.
Classroom teaching	.04	.16*	.07	-.07	.20*	.13	-.14	.01	.18*	.07
Program planning	.16*	.07	.01	-.13	.35*	.03	-.10	.01	.20*	.10
Supervised farming	-.01	.08	-.19*	-.39*	.20*	.11	-.17*	-.01	.12	.09
Farm mechanics	.14	.14	-.08	-.20*	.30*	.09	-.25*	-.02	.17*	-.03
F.F.A.	.05	.06	.15	-.17*	.20*	-.08	-.22*	-.02	.07	.00
Young/adult farmer ed.	-.06	-.08	.03	-.54*	.10	-.16*	-.23*	-.15	-.01	-.01
School relationships	.00	-.08	.05	-.18*	.23*	.01	-.28*	-.01	.03	-.04
Community relations	.01	.01	-.01	-.40*	.14	-.02	-.32*	-.04	.03	.00
Prof. standards & impr.	.02	-.02	-.10	-.36*	.32*	-.09	-.30*	-.11	.11	-.09
TOTAL PERFORMANCE	.05	.13	-.06	-.23*	.13	.01	-.22*	-.01	.06	.04

	Animal sc.		Plant & soil sc.		Stud. tching		Speech		Other agric.		Misc.	
	Supr.	Prin.	Supr.	Prin.	Supr.	Prin.	Supr.	Prin.	Supr.	Prin.	Supr.	Prin.
Classroom teaching	-.04	.03	-.09	.13	.02	.21*	.05	.05	.38*	.45*	.30*	.04
Program planning	.03	.05	.00	.08	.27*	.17*	.21*	.22*	.42*	.49*	.30*	.04
Supervised farming	.00	.05	-.19*	.08	-.03	.19*	-.11	-.02	.23*	.39*	.43*	-.19*
Farm mechanics	-.03	.02	.03	.10	.01	.16*	-.07	-.03	.33*	.47*	.16*	-.17*
F.F.A.	-.04	-.01	-.04	-.04	.09	.13	.08	.25*	.21*	.39*	.17*	-.03
Young/adult farmer ed.	-.19*	-.14	-.13	-.05	.02	-.01	-.03	-.04	.20*	.23*	.14	-.10
School relationships	.08	-.03	-.13	.05	.00	.09	-.11	-.13	.15	.25*	.27*	-.11
Community relations	-.10	-.07	-.14	.01	-.04	.09	.02	-.17*	.21*	.36*	.22*	-.04
Prof. standards & impr.	-.18*	-.13	-.19*	-.04	.07	.02	-.03	.08	.41*	.39*	.35*	.00
TOTAL PERFORMANCE	.00	.02	-.08	.08	.05	.19*	-.10	.13	.36*	.51*	.26*	-.20*

*Significant at the 5 percent level

Table 7. Analysis of teaching performance, based on ratings by supervisors and principals, of teachers grouped according to undergraduate total grade point average.

Teaching function	Supervisors' ratings, by group				Principals' ratings, by group			
	Low GPA Group I	Middle GPA Group II	High GPA Group III	F ratio	Low GPA Group I	Middle GPA Group II	High GPA Group III	F ratio
CLASSROOM TEACHING								
Number	55	55	55		58	59	57	
Mean rating	2.81	2.79	2.97		2.91	2.97	3.01	
Variance	.37	.46	.61		.42	.30	.51	
Low vs high gp				1.63[c]				1.22
Low vs middle gp				1.25				1.38
Middle vs high gp				1.31				1.68[b]
PROGRAM PLANNING								
Number	55	56	55		59	59	57	
Mean rating	2.62	2.61	2.80		2.85	2.90	2.98	
Variance	.67	.45	.68		.56	.56	.60	
Low vs high gp				1.03				1.06
Low vs middle gp				1.49				1.00
Middle vs high gp				1.53				1.06
SUPERVISED FARMING								
Number	53	56	55		57	58	57	
Mean rating	2.68	2.61	2.71		2.71	2.85	2.77	
Variance	.57	.46	.71		.39	.44	.84	
Low vs high gp				1.25				2.15[a]
Low vs middle gp				1.25				1.13
Middle vs high gp				1.56				1.91[a]
FARM MECHANICS								
Number	54	54	55		56	58	56	
Mean rating	2.73	2.60	2.69		2.84	2.85	3.01	
Variance	,49	.54	.71		.61	.56	.62	
Low vs high gp				1.46				1.01
Low vs middle gp				1.11				1.10
Middle vs high gp				1.31				1.11
F.F.A.								
Number	55	56	54		58	59	57	
Mean rating	2.69	2.74	2.84		3.01	3.03	3.17	
Variance	.58	.64	.56		.67	.47	.46	
Low vs high gp				1.03				1.05
Low vs middle gp				1.10				1.01
Middle vs high gp				1.14				1.05
ADULT EDUCATION								
Number	53	53	54		56	56	56	
Mean rating	2.54	2.38	2.50		2.69	2.56	2.69	
Variance	.72	.62	.98		.88	.80	.91	
Low vs high gp				1.36				1.03
Low vs middle gp				1.16				1.10
Middle vs high gp				1.57				1.14
SCHOOL RELATIONSHIPS								
Number	55	56	55		59	59	57	
Mean rating	2.95	3.06	3.09		3.08	3.09	3.09	
Variance	.85	.28	.57		.71	.76	1.06	
Low vs high gp				1.48[a]				1.50
Low vs middle gp				3.00[a]				1.08
Middle vs high gp				2.02[a]				1.39
COMMUNITY RELATIONS								
Number	55	56	55		59	58	57	
Mean rating	2.95	2.84	2.96		3.00	3.02	2.98	
Variance	.64	.37	.64		.67	.73	.75	
Low vs high gp				1.00[a]				1.13
Low vs middle gp				1.73[a]				1.10
Middle vs high gp				1.73[a]				1.02
PROF. STANDARDS								
Number	55	56	55		59	59	57	
Mean rating	2.92	2.74	2.91		3.10	2.88	2.91	
Variance	.49	.50	.72		.40	.58	.73	
Low vs high gp				1.47				1.82[a]
Low vs middle gp				1.01				1.44
Middle vs high gp				1.45				1.26
OVERALL RATING								
Number	53	56	54		57	57	56	
Mean rating	2.75	2.77	2.84		2.94	2.99	3.04	
Variance	.62	.30	.69		.46	.36	.50	
Low vs high gp				1.11[a]				1.09
Low vs middle gp				2.05[a]				1.29
Middle vs high gp				2.27[a]				1.41

See footnotes, Table 5.

Teaching Performance and English

An analysis of marks in student teaching and marks in other subjects of students in the College of Education at the University of Maryland in 1962 showed that grades in student teaching correlated more highly with grades in freshman English than any other subject.

Data in the present study do not lead to this conclusion. According to data in Table 5, there are no significant differences in teaching performance among the three groups of teachers, based on marks in English. In brief, the F value does not provide reason for suggesting that undergraduate achievement in English will provide a basis for subsequent prediction of performance in teaching.

Examination of pertinent data in Table 6 shows both positive and negative correlations between grades in English and teaching performance. These are significant only in the case of supervisors' ratings of young and adult farmer instruction, and the difference is negative.

With respect to variation, when grouped according to English grades, supervisors' ratings showed that Group II varied significantly less than either Group I or Group III, or both, in total teaching performance, school relationships, adult education, and farm mechanics. Principals' ratings revealed such differences in F.F.A. and program planning, but in only one of the other two groups, in each case. These data are shown in Table 8.

While differences, at least according to supervisors' ratings, are sufficient to suggest that something other than chance was operative, the data are not adequate for conclusive generalization.

Table 8. Analysis of teaching performance, based on ratings by supervisors and principals, of teachers grouped according to undergraduate grade point average in English.

Teaching function	Supervisors' ratings, by group				Principals' ratings, by group			
	Low GPA Group I	Middle GPA Group II	High GPA Group III	F ratio	Low GPA Group I	Middle GPA Group II	High GPA Group III	F ratio
CLASSROOM TEACHING								
Number	57	55	53		61	57	56	
Mean rating	2.80	2.90	2.87		2.89	3.01	3.00	
Variance	.40	.44	.63		.48	.30	.44	
Low vs high gp				1.59[c]				1.08
Low vs middle gp				1.11				1.58
Middle vs high gp				1.43				1.47
PROGRAM PLANNING								
Number	58	55	53		62	57	56	
Mean rating	2.57	2.75	2.72		2.85	2.95	2.93	
Variance	.70	.46	.64		.57	.41	.74	
Low vs high gp				1.09				1.31
Low vs middle gp				1.51				1.38
Middle vs high gp				1.39				1.80[a]
SUPERVISED FARMING								
Number	58	54	52		60	57	55	
Mean rating	2.63	2.74	2.64		2.63	2.93	2.78	
Variance	.52	.49	.74		.46	.55	.63	
Low vs high gp				1.42				1.35
Low vs middle gp				1.06				1.18
Middle vs high gp				1.50				1.14
FARM MECHANICS								
Number	57	54	52		58	57	55	
Mean rating	2.67	2.68	2.66		2.93	2.84	2.93	
Variance	.61	.35	.80		.61	.61	.57	
Low vs high gp				1.31[b]				1.08
Low vs middle gp				1.75[a]				1.00
Middle vs high gp				2.29				1.07
F. F. A.								
Number	58	55	52		62	56	56	
Mean rating	2.63	2.80	2.86		3.05	3.13	3.03	
Variance	.60	.52	.65		.65	.41	.53	
Low vs high gp				1.07				1.23[a]
Low vs middle gp				1.17				1.60
Middle vs high gp				1.26				1.30
ADULT EDUCATION								
Number	58	53	49		60	55	53	
Mean rating	2.42	2.48	2.52		2.70	2.79	2.44	
Variance	.80	.57	.98		1.02	.60	.91	
Low vs high gp				1.22				1.12
Low vs middle gp				1.40[b]				1.69[c]
Middle vs high gp				1.70				1.51
SCHOOL RELATIONSHIPS								
Number	58	55	53		62	57	56	
Mean rating	2.92	3.12	3.06		3.01	3.10	3.17	
Variance	.68	.31	.71		.91	.86	.73	
Low vs high gp				1.04[a]				1.25
Low vs middle gp				2.20[a]				1.05
Middle vs high gp				2.31[a]				1.18
COMMUNITY RELATIONS								
Number	58	55	53		62	57	55	
Mean rating	2.88	2.96	2.91		2.90	2.99	3.12	
Variance	.53	.45	.68		.78	.83	.50	
Low vs high gp				1.28				1.54
Low vs middle gp				1.18				1.07
Middle vs high gp				1.52				1.64[c]
PROF. STANDARDS								
Number	58	55	53		62	57	56	
Mean rating	2.87	2.93	2.77		2.93	3.05	2.90	
Variance	.56	.49	.67		.53	.59	.61	
Low vs high gp				1.19				1.14
Low vs middle gp				1.14				1.11
Middle vs high gp				1.35				1.03
OVERALL RATING								
Number	56	55	52		60	55	55	
Mean rating	2.72	2.86	2.79		2.90	3.04	3.04	
Variance	.50	.39	.70		.44	.35	.51	
Low vs high gp				1.39				1.16
Low vs middle gp				1.28[b]				1.25
Middle vs high gp				1.78				1.45

See footnotes, Table 5.

Teaching Performance and Mathematics

The data relating to achievement in mathematics are striking. First, data in Table 5 show that when the sample is analyzed according to grade point average in mathematics, no differences, as reflected by F values, are found in teaching performance according to either supervisors' or principals' ratings.

Examination of correlations between achievement in mathematics and teaching performance shows considerable significant negative correlation. In terms of total teaching performance, supervisors' ratings give a significant negative correlation; principals' ratings do not. But in the nine sub-categories, supervisors' ratings produce significantly negative correlations in all except farm mechanics and adult education, and principals' ratings in all except supervised farming, F.F.A., school relationships, and community relationships.

With respect to homogeneity of variance, no differences were discovered between groups in overall ratings by supervisors and by principals. Within the various functions, Group I, i.e., the low group, was significantly more homogeneous than either or both of Groups I and III in nine out of 20 cases. According to supervisors' ratings, Group I was more homogeneous than either Group II or Group III in classroom teaching, farm mechanics, and community relationships. Principals' ratings show Group I to be more homogeneous than one or both of the other groups in classroom teaching, farm mechanics, school relationships, community relationships, and professional standards. In only one case --- principals' ratings of program planning --- was another group, in this case Group III, more homogeneous than the other groups.

While the data in Table 9 do not show differences in level of performance among groups, when grouped according to undergraduate achievement in mathematics, it is apparent that there is a significant negative correlation between undergraduate academic achievement and teaching performance. Further, the evidence is sufficient to conclude that, although no differences occured in homogeneity of variance, according to ratings of total teaching performance by both supervisors and principals, there are enough cases among the various functions to conclude that teachers in the lowest tercile tended to be most homogeneous.

Table 9. Analysis of teaching performance, based on ratings by supervisors and principals, of teachers grouped according to undergraduate grade point average in mathematics.

Teaching function	Supervisors' ratings, by group				Principals' ratings, by group			
	Low GPA Group I	Middle GPA Group II	High GPA Group III	F ratio	Low GPA Group I	Middle GPA Group II	High GPA Group III	F ratio
CLASSROOM TEACHING								
Number	36	48	42		36	53	46	
Mean rating	2.79	2.88	2.75		3.07	2.85	2.94	
Variance	.35	.48	.66		.30	.54	.38	
Low vs high gp				1.88[a]				1.26
Low vs middle gp				1.37				1.79[a]
Middle vs high gp				1.37				1.42
PROGRAM PLANNING								
Number	36	49	42		36	54	46	
Mean rating	2.63	2.63	2.56		2.95	2.72	2.93	
Variance	.44	.65	.61		.52	.86	.43	
Low vs high gp				1.40				1.20
Low vs middle gp				1.50				1.65[c]
Middle vs high gp				1.07				1.98[a]
SUPERVISED FARMING								
Number	35	48	42		35	53	45	
Mean rating	2.61	2.68	2.55		2.89	2.70	2.75	
Variance	.55	.48	.68		.42	.57	.58	
Low vs high gp				1.23				1.38
Low vs middle gp				1.16				1.35
Middle vs high gp				1.42				1.02
FARM MECHANICS								
Number	36	47	41		36	52	43	
Mean rating	2.55	2.72	2.64		2.91	2.90	2.80	
Variance	.39	.64	.69		.47	.78	.57	
Low vs high gp				1.77[b]				1.20
Low vs middle gp				1.64				1.65[b]
Middle vs high gp				1.08				1.37
F. F. A.								
Number	36	49	42		35	54	46	
Mean rating	2.83	2.72	2.62		2.96	3.11	2.97	
Variance	.55	.61	.70		.67	.54	.50	
Low vs high gp				1.26				1.34
Low vs middle gp				1.10				1.24
Middle vs high gp				1.14				1.08
ADULT EDUCATION								
Number	35	47	40		35	51	43	
Mean rating	2.40	2.54	2.28		2.59	2.57	2.56	
Variance	.60	.64	.93		.74	1.03	.88	
Low vs high gp				1.55				1.18
Low vs middle gp				1.06				1.38
Middle vs high gp				1.47				1.17
SCHOOL RELATIONSHIPS								
Number	36	49	42		36	54	46	
Mean rating	3.08	2.97	2.97		3.24	3.08	3.08	
Variance	.50	.68	.62		.40	.90	.78	
Low vs high gp				1.24				1.92[a]
Low vs middle gp				1.36				2.22[a]
Middle vs high gp				1.09				1.15
COMMUNITY RELATIONS								
Number	36	49	42		36	53	46	
Mean rating	2.91	2.94	2.77		3.05	2.90	3.03	
Variance	.33	.61	.73		.47	.81	.65	
Low vs high gp				2.21[a]				1.37
Low vs middle gp				1.85[a]				1.71[a]
Middle vs high gp				1.19				1.25
PROF. STANDARDS								
Number	36	49	42		36	54	46	
Mean rating	2.87	2.87	2.66		3.10	2.84	2.88	
Variance	.41	.67	.67		.32	.77	.57	
Low vs high gp				1.64[c]				1.78[b]
Low vs middle gp				1.64[c]				2.40[a]
Middle vs high gp				1.00				1.35
OVERALL RATING								
Number	35	49	42		34	52	46	
Mean rating	2.71	2.83	2.69		3.10	2.93	2.94	
Variance	.49	.50	.63		.31	.29	.29	
Low vs high gp				1.28				1.39
Low vs middle gp				1.02				1.06
Middle vs high gp				1.25				1.18

See footnotes, Table 5.

Teaching Performance and Biological Sciences

In this analysis, the biological sciences include botany, zoology, microbiology, entomology, and like courses, but not the applied animal and plant sciences normally found in colleges of agriculture.

Data in Table 5 show that analysis of variance reflects no differences among the three groups based on marks in biological sciences.

According to data in Table 6, a significant correlation exists between academic achievement in the biological sciences and teaching performance in certain functions. This occurs only in the case of program planning, according to supervisors, but in principals' ratings, significant correlations exist between marks and total performance, in classroom teaching, program planning, supervised farming, farm mechanics, and F.F.A. work.

Differences in variation among groups are few, as shown in Table 10. According to supervisors' ratings, Group I was significantly more homogeneous than Group III in total teaching performance, and Group III varied more than either Groups I or II in school relationships. Principals' ratings showed Group II to be more homogeneous than either or both Groups I and III in total teaching performance, professional standards, community relationships, and school relationships.

In summary, it appears safe to conclude that with respect to undergraduate academic achievement in the basic biological sciences there is significant negative correlation with teaching performance, insofar as principals'

ratings are concerned. Further, principals' ratings provide some basis for concluding that the "average" group was more homogeneous in teaching performance, enough to conclude that something other than chance was operative.

Teaching Performance and Physical Sciences

In this study, physical sciences included chemistry, physics, astronomy, geology, and related subjects, i.e., the basic physical sciences and not the applied such as engineering.

Analyses of variance showed no significant differences in the case of physical science achievement. Principals' ratings of teachers' total teaching performance and performance in supervised farming and program planning are significant at the 5 percent level but in the case of each, one or more of the three groups was found to be distributed abnormally on the criterion measure. Since the differences are not significant at the 2.5 percent level, it is concluded that no differences exist.

An examination of correlations in Table 6 shows that only in the case of supervisors' ratings of classroom teaching performance is there a significant correlation between teaching performance and academic achievement in physical sciences, and in this single case, the r of .17 is barely significant. Doubtless this may be due to chance.

In homogeneity of variance, there is a sharp change, compared with division of groups according to previously discussed disciplines (Table 11.)

Table 10. Analysis of teaching performance, based on ratings by supervisors and principals, of teachers grouped according to undergraduate grade point average in biological sciences.

Teaching function	Supervisors' ratings, by group				Principals' ratings, by group			
	Low GPA Group I	Middle GPA Group II	High GPA Group III	F ratio	Low GPA Group I	Middle GPA Group II	High GPA Group III	F ratio
CLASSROOM TEACHING								
Number	60	53	52		61	55	58	
Mean rating	2.84	2.75	2.99		2.93	2.95	3.01	
Variance	.37	.45	.62		.38	.34	.50	
Low vs high gp				1.67[c]				1.32
Low vs middle gp				1.20				1.11
Middle vs high gp				1.39				1.46
PROGRAM PLANNING								
Number	61	53	52		61	55	59	
Mean rating	2.55	2.69	2.81		2.76	2.98	2.99	
Variance	.58	.49	.72		.63	.45	.61	
Low vs high gp				1.25				1.04
Low vs middle gp				1.18				1.39
Middle vs high gp				1.47				1.33
SUPERVISED FARMING								
Number	61	53	50		59	54	59	
Mean rating	2.67	2.59	2.75		2.72	2.74	2.88	
Variance	.55	.50	.70		.51	.46	.69	
Low vs high gp				1.28				1.35
Low vs middle gp				1.11				1.12
Middle vs high gp				1.42				1.51
FARM MECHANICS								
Number	60	52	51		60	52	58	
Mean rating	2.69	2.58	2.75		2.75	2.95	3.01	
Variance	.42	.66	.67		.57	.60	.60	
Low vs high gp				1.59				1.06
Low vs middle gp				1.55				1.05
Middle vs high gp				1.02				1.00
F.F.A.								
Number	61	52	52		60	55	59	
Mean rating	2.71	2.70	2.88		2.91	3.11	3.19	
Variance	.59	.58	.60		.61	.46	.49	
Low vs high gp				1.01				1.26
Low vs middle gp				1.02				1.34
Middle vs high gp				1.03				1.07
ADULT EDUCATION								
Number	60	52	48		58	54	56	
Mean rating	2.43	2.46	2.53		2.49	2.76	2.69	
Variance	.72	.70	.94		.90	.80	.85	
Low vs high gp				1.31				1.06
Low vs middle gp				1.02				1.13
Middle vs high gp				1.33				1.07
SCHOOL RELATIONSHIPS								
Number	61	53	52		61	55	59	
Mean rating	2.99	3.15	2.96		3.04	3.12	3.10	
Variance	.43	.44	.85		1.05	.55	.89	
Low vs high gp				1.99[a]				1.22[a]
Low vs middle gp				1.04				1.90[a]
Middle vs high gp				1.92[a]				1.61
COMMUNITY RELATIONS								
Number	61	53	52		61	54	59	
Mean rating	2.95	2.83	2.96		2.96	2.98	3.06	
Variance	.48	.53	.65		.93	.40	.78	
Low vs high gp				1.35				1.20[a]
Low vs middle gp				1.09				2.33[a]
Middle vs high gp				1.24				1.94[a]
PROF. STANDARDS								
Number	61	53	52		61	55	59	
Mean rating	2.84	2.90	2.83		2.94	2.96	2.99	
Variance	.46	.66	.62		.73	.36	.63	
Low vs high gp				1.33				1.16[a]
Low vs middle gp				1.43				2.01[a]
Middle vs high gp				1.07				1.74[a]
OVERALL RATING								
Number	60	51	52		57	55	58	
Mean rating	2.78	2.79	2.79		2.96	3.00	3.02	
Variance	.41	.45	.76		.43	.32	.56	
Low vs high gp				1.83[a]				1.28
Low vs middle gp				1.08				1.35
Middle vs high gp				1.69[c]				1.73[a]

See footnotes, Table 5.

Table 11. Analysis of teaching performance, based on ratings by supervisors and principals, of teachers grouped according to undergraduate grade point average in physical sciences.

Teaching function	Supervisors' ratings, by group				Principals' ratings, by group			
	Low GPA Group I	Middle GPA Group II	High GPA Group III	F ratio	Low GPA Group I	Middle GPA Group II	High GPA Group III	F ratio
CLASSROOM TEACHING								
Number	52	62	50		57	62	54	
Mean rating	2.71	2.84	3.03		2.89	2.88	3.12	
Variance	.51	.44	.48		.33	.58	.27	
Low vs high gp				1.06				1.21[a]
Low vs middle gp				1.17				1.79[a]
Middle vs high gp				1.11				2.16[a]
PROGRAM PLANNING								
Number	53	62	50		57	63	54	
Mean rating	2.51	2.73	2.78		2.84	2.84	3.05	
Variance	.60	.57	.63		.50	.70	.49	
Low vs high gp				1.06				1.03
Low vs middle gp				1.05				1.41
Middle vs high gp				1.11				1.44
SUPERVISED FARMING								
Number	51	62	50		56	61	54	
Mean rating	2.62	2.58	2.82		2.78	2.61	2.97	
Variance	.49	.68	.54		.43	.72	.45	
Low vs high gp				1.10				1.07[c]
Low vs middle gp				1.38				1.68[b]
Middle vs high gp				1.25				1.58
FARM MECHANICS								
Number	52	61	49		56	59	54	
Mean rating	2.59	2.66	2.75		2.83	2.77	3.12	
Variance	.44	.66	.61		.64	.70	.39	
Low vs high gp				1.38				1.66[c]
Low vs middle gp				1.50				1.09[a]
Middle vs high gp				1.09				1.82[a]
F.F.A.								
Number	53	62	49		57	62	54	
Mean rating	2.66	2.69	2.92		3.03	3.01	3.19	
Variance	.68	.57	.49		.52	.74	.32	
Low vs high gp				1.41				1.64[c]
Low vs middle gp				1.21				1.43[a]
Middle vs high gp				1.17				2.33[a]
ADULT EDUCATION								
Number	51	61	47		56	60	51	
Mean rating	2.39	2.46	2.55		2.59	2.70	2.62	
Variance	.76	.76	.78		.85	.98	.76	
Low vs high gp				1.02				1.11
Low vs middle gp				1.01				1.16
Middle vs high gp				1.03				1.29
SCHOOL RELATIONSHIPS								
Number	53	62	50		57	63	54	
Mean rating	2.92	2.95	3.22		3.14	2.90	3.25	
Variance	.69	.65	.28		.60	1.28	.53	
Low vs high gp				2.46[a]				1.12[a]
Low vs middle gp				1.06				2.14[a]
Middle vs high gp				2.32[a]				2.40[a]
COMMUNITY RELATIONS								
Number	53	62	50		56	63	54	
Mean rating	2.80	2.86	3.09		2.93	2.87	3.23	
Variance	.50	.65	.43		.68	.96	.41	
Low vs high gp				1.17				1.65[b]
Low vs middle gp				1.29				1.41[a]
Middle vs high gp				1.50				2.32[a]
PROF. STANDARDS								
Number	53	62	50		57	63	54	
Mean rating	2.81	2.84	2.90		2.99	2.82	3.10	
Variance	.46	.66	.57		.42	.83	.43	
Low vs high gp				1.25				1.04[a]
Low vs middle gp				1.45				1.98[a]
Middle vs high gp				1.16				1.91[a]
OVERALL RATING								
Number	53	59	50		56	60	53	
Mean rating	2.66	2.75	2.95		2.92	2.88	3.18	
Variance	.55	.55	.44		.41	.54	.30	
Low vs high gp				1.23				1.36
Low vs middle gp				1.00				1.31[b]
Middle vs high gp				1.24				1.78[b]

See footnotes, Table 5.

In no case is Group II less homogeneous; with the exception of performance in school relationships, supervisors' ratings produced no significant difference in variation.

According to principals' ratings, on the other hand, Group I was significantly more homogeneous than one or both of the other groups in four cases and Group III was more homogeneous than one or both of the other groups in seven cases. Conversely, variance of Group II was conspicuously greater in one or both of the other groups in eight of the ten functions, based on principals' ratings.

In summary, it appears that teaching performance is unrelated to undergraduate academic achievement in the physical sciences, except that the "average" group showed greater variation in performance.

Teaching Performance and Social Sciences

The social sciences include, for purposes of this study, sociology, rural sociology, psychology, government and politics, history, geography, economics, and other subjects related to these that are normally found in a college of arts and sciences of a university.

To some readers, one of the most surprising outcomes of this study probably is the lack of relationship between undergraduate academic achievement in the social sciences and subsequent teaching performance. In certain other academic categories in this study, most of the individuals studied had taken only a single course, which might be presumed to influence the analysis. But in

Table 12. Analysis of teaching performance, based on ratings by supervisors and principals, of teachers grouped according to undergraduate grade point average in social sciences.

Teaching function	Supervisors' ratings, by group				Principals' ratings, by group			
	Low GPA Group I	Middle GPA Group II	High GPA Group III	F ratio	Low GPA Group I	Middle GPA Group II	High GPA Group III	F ratio
CLASSROOM TEACHING								
Number	73	47	43		79	48	46	
Mean rating	2.88	2.80	2.90		2.89	2.99	3.05	
Variance	.44	.61	.43		.50	.37	.30	
Low vs high gp				1.03				1.68[c]
Low vs middle gp				1.40				1.36
Middle vs high gp				1.44				1.24
PROGRAM PLANNING								
Number	73	47	44		80	48	46	
Mean rating	2.67	2.69	2.69		2.90	2.90	2.92	
Variance	.65	.50	.66		.65	.60	.43	
Low vs high gp				1.03				1.50
Low vs middle gp				1.29				1.08
Middle vs high gp				1.33				1.39
SUPERVISED FARMING								
Number	73	45	44		78	47	46	
Mean rating	2.69	2.58	2.71		2.75	2.90	2.71	
Variance	.55	.71	.50		.54	.48	.67	
Low vs high gp				1.10				1.24
Low vs middle gp				1.29				1.12
Middle vs high gp				1.42				1.39
FARM MECHANICS								
Number	71	46	44		76	48	45	
Mean rating	2.71	2.63	2.69		2.83	2.98	2.94	
Variance	.63	.70	.39		.73	.56	.42	
Low vs high gp				1.59				1.76[c]
Low vs middle gp				1.11[b]				1.32
Middle vs high gp				1.76[b]				1.34
F.F.A.								
Number	73	46	44		80	48	45	
Mean rating	2.74	2.80	2.75		3.05	3.05	3.10	
Variance	.62	.71	.45		.68	.46	.37	
Low vs high gp				1.39				1.81[a]
Low vs middle gp				1.14				1.48
Middle vs high gp				1.57				1.23
ADULT EDUCATION								
Number	73	44	41		76	47	44	
Mean rating	2.48	2.37	2.56		2.70	2.56	2.65	
Variance	.82	.98	.50		.94	.97	.62	
Low vs high gp				1.63				1.52
Low vs middle gp				1.20				1.03
Middle vs high gp				1.94				1.56
SCHOOL RELATIONSHIPS								
Number	73	47	44		80	48	46	
Mean rating	3.05	3.09	2.93		3.05	3.04	3.19	
Variance	.57	.67	.48		.89	.72	.87	
Low vs high gp				1.19				1.03
Low vs middle gp				1.18				1.24
Middle vs high gp				1.41				1.20
COMMUNITY RELATIONS								
Number	73	47	44		79	48	46	
Mean rating	2.93	2.90	2.91		3.03	2.96	3.00	
Variance	.56	.63	.49		.70	.77	.70	
Low vs high gp				1.16				1.01
Low vs middle gp				1.12				1.09
Middle vs high gp				1.30				1.11
PROF. STANDARDS								
Number	73	47	44		80	48	46	
Mean rating	2.89	2.91	2.74		2.97	3.03	2.88	
Variance	.55	.57	.62		.59	.51	.65	
Low vs high gp				1.12				1.11
Low vs middle gp				1.03				1.15
Middle vs high gp				1.09				1.28
OVERALL RATING								
Number	71	47	43		77	47	45	
Mean rating	2.79	2.80	2.79		2.94	3.05	3.02	
Variance	.54	.64	.43		.48	.46	.35	
Low vs high gp				1.25				1.39
Low vs middle gp				1.19				1.06
Middle vs high gp				1.48				1.31

See footnotes, Table 5.

the case of social sciences, 180 of the 182 for whom academic records were available had studied one or more social science courses, and most had completed two to four courses. Hence, this should contribute to conclusive analysis in the case of social sciences.

Data in Table 5 show that, according to analysis of variance, none of the three groups was significantly different. In Table 6, it is clear that only in the case of supervisors' ratings of performance in program planning and principals' ratings of classroom instruction is there significant correlation with grade point averages in the social sciences, and these two correlations are just barely significant at the 5 percent level.

Variation between groups, too, was minimal, as shown in Table 12. In the case of supervisors' ratings, in only one instance was the difference significant (between middle and high groups in farm mechanics) and in principals' ratings differences occurred in only a single instance (low and high groups in F.F.A. work); in neither of these is the difference highly significant. In these three cases, Group III is more homogeneous than one other group.

In brief, it appears that undergraduate academic performance in the social sciences, in this study, provides no basis for concluding differences in teaching performance.

Teaching Performance and Speech

Only 141 teachers had taken a course in speech, and almost all of these had taken only one course. Therefore, division into three approximately equal groups, based on undergraduate grade point average in speech courses, was impossible. Instead they were divided into two groups --- one group consisting of those who had received a "C" grade and the other group of those who had received a "B". This resulted in omitting nine teachers who had received an "A" in speech and seven who had received less than a "C". The numbers resulting appear in Table 15. The numbers differ slightly among functions, due to absence of ratings by principals or supervisors, thereby necessitating deletion of individuals from function to function.

Data in Table 13 show that a high percentage of the F values are significant. The rating of overall teaching performance by both principals and supervisors is highly significant (i.e., at the 1 percent level). The F values of principals' ratings are also significant in the case of total performance, classroom teaching, program planning, and F.F.A. work. Supervisors' ratings produced significant F values in the cases of school relationships, total performance, farm mechanics, and program planning. The F values are significant at the 5 percent level in the cases of classroom teaching, F.F.A. work and community relationships, but not at the 2.5 percent level. Since one or more groups in each of these categories is distributed abnormally, these cannot be considered significant.

Table 13. F-values of supervisors' and principals' ratings of teachers, based on grouping according to undergraduate grade point averages in speech and student teaching.

Teaching function	Speech		Student teaching	
	Supervisors	Principals	Supervisors	Principals
Classroom teaching	4.50[c]	7.12[a]	1.86	3.34
Program planning	8.52[a]	6.41[a]	5.80[a]	4.23[c]
Supervised farming	1.57	2.47	0.26	3.86
Farm mechanics	4.17[b]	3.37	0.55	4.55[b]
F.F.A.	4.70[b]	6.04[a]	1.62	4.10[c]
Adult education	1.88	0.44	0.80	2.78
School relationships	6.91[a]	0.73	3.98[b]	4.79[b]
Community relationships	4.91[c]	3.14	0.97	1.18
Professional standards	3.50	2.48	1.10	1.80
TOTAL PERFORMANCE	7.65[a]	8.72[a]	4.27[c]	5.89[a]

See footnotes, Table 5.

Table 14 gives the z values for the differences between groups. In classroom teaching, the academically superior group was rated significantly higher by principals in teaching performance. In program planning, both supervisors and principals rated the academically superior group higher. In farm mechanics, supervisors also rated the academically superior group higher. In F.F.A. work, principals rated the academically superior group higher. In school relationships, supervisors rated the academically superior group higher. And, finally, in total teaching performance, both supervisors and principals rated the academically superior group higher.

Table 14. Differences between means, based on grouping according to undergraduate academic achievement in speech.

Teaching function	z value of difference between means of groups: Supervisors' ratings	Principals' ratings
Classroom teaching	2.11[c]	2.62[a]
Program planning	2.87[a]	2.51[a]
Supervised farming programs	1.27	1.56
Farm mechanics	2.06[b]	1.83
F.F.A.	2.16[c]	2.45[a]
Adult education	1.38	.66
School relationships	2.55[a]	.86
Community relationships	2.17[c]	1.78
Professional standards	1.85	1.60
TOTAL PERFORMANCE	2.78[a]	2.89[a]

See footnotes, Table 5.

Thus, the evidence is clear that, according to their principals and supervisors, teachers who earned a "B" in speech were, in general, more effective teachers than those who earned a "C".

Data in Table 6 show that correlations do not fully confirm the findings just analyzed. Only in the case of teachers' performance in program planning were supervisors' ratings and speech grades significantly correlated. On principals' ratings and speech grades, correlations were significant only in the cases of program planning, F.F.A. work, and community relations. In the last, the correlation was negative. This anomaly suggests that the data depart sharply from linearity.

Turning to Table 15, one finds few cases of differences in homogeneity of variance. Differences are found in supervisors' ratings of performance in school and community relationships. In both cases, the higher academic group varied less.

The higher academic group was more homogeneous in the cases of principals' ratings of teachers' performances in classroom teaching and program planning.

Teaching Performance and General Education

The term "general education" is used in this study to designate education courses, other than agricultural education. It also includes educational psychology even though the course was taught in a department of psychology. The term "general education" may seem to be a misnomer; however, it is one used by many in agricultural teacher education simply for lack of a more definitive term.

Only 151 out of 182 of the teachers in this study had completed one or more courses in general education. Almost all of those who had not taken at least one course in general education, including educational psychology, had graduated from a single institution.

Most of the teachers studied had completed only one course in general education. This might be considered a limitation in drawing inferences concerning relationships between achievement in this subject and teaching performance.

Table 15. Analysis of teaching performance, based on ratings by supervisors and principals, of teachers grouped according to undergraduate grade point average in speech.

Teaching function	Supervisors' ratings, by group			Principals' ratings, by group		
	Low GPA Group I	High GPA Group II	F ratio	Low GPA Group I	High GPA Group II	F ratio
CLASSROOM TEACHING						
Number	57	70		61	73	
Mean rating	2.68	2.95		2.75	3.06	
Variance	.59	.45		.58	.34	
Low vs high gp			1.31			1.74[b]
PROGRAM PLANNING						
Number	58	70		62	73	
Mean rating	2.44	2.85		2.71	3.06	
Variance	.76	.46		.77	.50	
Low vs high gp			1.65[c]			1.54[b]
SUPERVISED FARMING						
Number	56	70		60	73	
Mean rating	2.53	2.70		2.62	2.83	
Variance	.53	.62		.65	.48	
Low vs high gp			1.18			1.34
FARM MECHANICS						
Number	58	68		60	71	
Mean rating	2.48	2.75		2.71	2.97	
Variance	.57	.58		.75	.57	
Low vs high gp			1.02			1.33
F. F. A.						
Number	58	69		61	73	
Mean rating	2.58	2.87		2.89	3.20	
Variance	.60	.49		.60	.49	
Low vs high gp			1.23			1.21
ADULT EDUCATION						
Number	57	66		60	70	
Mean rating	2.33	2.54		2.55	2.66	
Variance	.82	.68		.90	.69	
Low vs high gp			1.21			1.31
SCHOOL RELATIONSHIPS						
Number	58	70		62	73	
Mean rating	2.78	3.14		2.96	3.10	
Variance	.85	.39		.90	.90	
Low vs high gp			2.19[a]			1.01
COMMUNITY RELATIONS						
Number	58	70		62	73	
Mean rating	2.74	3.02		2.78	3.05	
Variance	.69	.37		.82	.74	
Low vs high gp			1.83[a]			1.10
PROF. STANDARDS						
Number	58	70		62	73	
Mean rating	2.68	2.93		2.83	3.04	
Variance	.66	.44		.69	.54	
Low vs high gp			1.50			1.28
OVERALL RATING						
Number	57	69		58	73	
Mean rating	2.53	2.90		2.75	3.10	
Variance	.55	.52		.56	.35	
Low vs high gp			1.05			1.58[c]

See footnotes, Table 5.

The analysis of variance (Table 5) shows no differences among the groups, in terms of division of groups, based on undergraduate academic achievement in general education.

However, data in Table 6 reveal a strikingly negative correlation between general education marks and teaching performance, significantly so in overall performance and in each of the functions but two in the case of principals' ratings. Supervisors' ratings showed a significantly negative correlation only in the supervised farming function.

No general pattern of differences in within-group variation appears (Table 16). Out of 20 cases, only four show differences. In three of these Group II is more homogeneous than one or both of the others and in one case, Group I is more homogeneous. Hence, this provides inadequate basis for concluding a pattern of differences in variances.

Although the evidence is based almost entirely on principals' ratings alone, the evidence appears sufficient to conclude that significantly negative correlations exist between undergraduate achievement in general education and teaching performance.

Teaching Performance and Agricultural Education

This category included all agricultural education courses, except student teaching. All but one teacher had taken agricultural education courses in college.

Table 16. Analysis of teaching performance, based on ratings by supervisors and principals, of teachers grouped according to undergraduate grade point average in general education.

Teaching function	Supervisors' ratings, by group				Principals' ratings, by group			
	Low GPA Group I	Middle GPA Group II	High GPA Group III	F ratio	Low GPA Group I	Middle GPA Group II	High GPA Group III	F ratio
CLASSROOM TEACHING								
Number	46	45	43		47	48	49	
Mean rating	2.76	2.94	2.89		2.94	2.88	3.00	
Variance	.62	.41	.52		.35	.39	.60	
Low vs high gp				1.18				1.67[c]
Low vs middle gp				1.50				1.11
Middle vs high gp				1.27				1.52
PROGRAM PLANNING								
Number	46	46	43		48	48	49	
Mean rating	2.66	2.65	2.68		2.85	2.75	3.01	
Variance	.49	.43	.74		.60	.53	.67	
Low vs high gp				1.50				1.12
Low vs middle gp				1.16				1.13
Middle vs high gp				1.73[c]				1.26
SUPERVISED FARMING								
Number	46	46	41		48	46	49	
Mean rating	2.59	2.64	2.70		2.79	2.77	2.65	
Variance	.68	.41	.66		.62	.51	.74	
Low vs high gp				1.04				1.20
Low vs middle gp				1.02				1.21
Middle vs high gp				1.63				1.46
FARM MECHANICS								
Number	46	45	41		47	47	46	
Mean rating	2.70	2.68	2.64		2.82	2.89	2.89	
Variance	.63	.46	.83		.55	.66	.71	
Low vs high gp				1.32				1.28
Low vs middle gp				1.37[a]				1.20
Middle vs high gp				1.80[a]				1.07
F.F.A.								
Number	46	46	42		48	48	48	
Mean rating	2.74	2.77	2.83		2.96	2.98	3.15	
Variance	.69	.49	.55		.46	.55	.56	
Low vs high gp				1.25				1.20
Low vs middle gp				1.41				1.18
Middle vs high gp				1.13				1.02
ADULT EDUCATION								
Number	45	45	39		48	46	45	
Mean rating	2.43	2.51	2.52		2.47	2.77	2.43	
Variance	.64	.78	.82		1.10	.67	.78	
Low vs high gp				1.28				1.41
Low vs middle gp				1.21				1.64[c]
Middle vs high gp				1.06				1.17
SCHOOL RELATIONSHIPS								
Number	46	46	43		48	48	49	
Mean rating	3.06	3.08	3.02		2.95	3.12	3.07	
Variance	.38	.54	.72		1.01	.57	1.16	
Low vs high gp				1.88[a]				1.13
Low vs middle gp				1.40				1.77[a]
Middle vs high gp				1.35				2.03[a]
COMMUNITY RELATIONS								
Number	46	46	43		48	47	49	
Mean rating	2.89	2.96	2.91		2.93	3.00	2.89	
Variance	.46	.43	.75		.80	.65	.88	
Low vs high gp				1.63[c]				1.10
Low vs middle gp				1.06				1.24
Middle vs high gp				1.74[c]				1.37
PROF. STANDARDS								
Number	46	46	43		48	48	49	
Mean rating	2.87	2.84	2.81		2.91	2.88	2.93	
Variance	.58	.60	.54		.58	.48	.73	
Low vs high gp				1.07				1.25
Low vs middle gp				1.03				1.22
Middle vs high gp				1.11				1.52
OVERALL RATING								
Number	46	46	42		46	48	48	
Mean rating	2.73	2.85	2.79		2.98	3.00	2.89	
Variance	.58	.35	.67		.46	.39	.57	
Low vs high gp				1.15				1.24
Low vs middle gp				1.69[c]				1.20
Middle vs high gp				1.95[a]				1.48

See footnotes, Table 5.

When teaching performance of the three groups, divided according to achievement in agricultural education, was analyzed, significant differences were found only in two cases --- principals' ratings of performance in program planning and in supervised farming. It should be noted, however, that F values approached significance levels in seven other cases, including principals' overall ratings (Table 5).

In the case of program planning, z test of differences between means of groups produced the following z values:

Group I vs. Group II	2.01
Group I vs. Group III	2.53
Group II vs. Group III	1.19

A four-cell Chi-square test showed that all three groups were normally distributed. Since the differences between Groups I and II and Groups I and III were significantly different at the 5 percent level, examination of means of these groups in Table 17 provides a basis for concluding that the teaching performance of Group II and Group III were both significantly higher than that of Group I. The difference between Groups II and III are not significant.

In the case of principals' ratings of teachers on supervised farming, the following z values between groups were found:

Group I vs. Group II	2.51
Group I vs. Group III	3.13
Group II vs. Group III	.68

Groups II and III were abnormally distributed; however, since the differences between Groups I and II and Groups I and III are significantly different at the 2.5 percent level, it is concluded that significant differences exist.

Table 17. Analysis of teaching performance, based on ratings by supervisors and principals, of teachers grouped according to undergraduate grade point average in agricultural education.

Teaching function	Supervisors' ratings, by group				Principals' ratings, by group			
	Low GPA Group I	Middle GPA Group II	High GPA Group III	F ratio	Low GPA Group I	Middle GPA Group II	High GPA Group III	F ratio
CLASSROOM TEACHING								
Number	30	86	48		33	91	49	
Mean rating	2.74	2.91	2.86		2.75	2.99	3.07	
Variance	.48	.40	.63		.26	.41	.49	
Low vs high gp				1.32				1.90[a]
Low vs middle gp				1.19				1.60[c]
Middle vs high gp				1.58[c]				1.19
PROGRAM PLANNING								
Number	31	86	48		34	91	49	
Mean rating	2.39	2.77	2.73		2.62	2.93	3.08	
Variance	.57	.50	.70		.64	.45	.69	
Low vs high gp				1.22				1.08
Low vs middle gp				1.14				1.43
Middle vs high gp				1.39				1.54[b]
SUPERVISED FARMING								
Number	29	86	48		32	91	48	
Mean rating	2.46	2.75	2.68		2.45	2.82	2.91	
Variance	.47	.54	.64		.49	.48	.67	
Low vs high gp				1.38				1.36
Low vs middle gp				1.14				1.03
Middle vs high gp				1.20				1.39
FARM MECHANICS								
Number	31	83	48		31	89	49	
Mean rating	2.58	2.64	2.81		2.72	2.92	2.98	
Variance	.67	.58	.50		.41	.60	.70	
Low vs high gp				1.35				1.71[b]
Low vs middle gp				1.15				1.48
Middle vs high gp				1.17				1.16
F. F. A.								
Number	31	85	48		34	90	49	
Mean rating	2.65	2.81	2.77		2.94	3.14	3.02	
Variance	.63	.56	.62		.44	.47	.72	
Low vs high gp				1.01				1.66[b]
Low vs middle gp				1.12				1.07
Middle vs high gp				1.11				1.55[b]
ADULT EDUCATION								
Number	30	84	45		33	87	47	
Mean rating	2.52	2.49	2.43		2.49	2.77	2.51	
Variance	.51	.74	1.00		.85	.81	.93	
Low vs high gp				1.96[a]				1.09
Low vs middle gp				1.44				1.04
Middle vs high gp				1.36				1.14
SCHOOL RELATIONSHIPS								
Number	31	86	43		34	91	49	
Mean rating	2.77	3.12	3.08		2.79	3.12	3.22	
Variance	1.07	.43	.38		.91	.75	.89	
Low vs high gp				2.78[a]				1.02
Low vs middle gp				2.51[a]				1.21
Middle vs high gp				1.11				1.19
COMMUNITY RELATIONS								
Number	31	86	48		34	90	49	
Mean rating	2.80	2.98	2.91		2.79	3.05	3.05	
Variance	.59	.45	.63		.57	.69	.85	
Low vs high gp				1.08				1.50
Low vs middle gp				1.29				1.21
Middle vs high gp				1.39				1.24
PROF. STANDARDS								
Number	31	86	48		34	91	49	
Mean rating	2.62	2.93	2.91		2.69	3.01	3.05	
Variance	.70	.45	.61		.57	.60	.49	
Low vs high gp				1.15				1.16
Low vs middle gp				1.57[a]				1.06
Middle vs high gp				1.37				1.23
OVERALL RATING								
Number	31	85	46		33	88	48	
Mean rating	2.62	2.82	2.89		2.77	3.06	3.02	
Variance	.65	.46	.53		.40	.38	.54	
Low vs high gp				1.22				1.36
Low vs middle gp				1.40				1.03
Middle vs high gp				1.15				1.40

See footnotes, Table 5.

Examination of mean scores in Table 17 shows that Groups II and III are significantly higher than Group I.

In Table 6, principals' ratings produced no significantly positive correlations. The only significant correlation --- in young and adult farmer instruction --- was negative and just barely significant.

Correlations between supervisors' ratings and achievement in agricultural education were positively significant in all cases except overall teaching performance, community relations and young and adult farmer education. It is, perhaps, not surprising to find that supervisors' ratings would correlate with academic achievement in agricultural education; what is surprising is that the correlation is not significant in the cases of total teaching performance and in young and adult farmer education.

Perhaps surprising, too, is the lack of within-group variation. Referring again to Table 17, one sees no significant differences in variation between groups in total teaching performance as rated by both principals and supervisors. In the case of supervisors' ratings of teachers' performance in school relationships, it is clear that Group I varied significantly less than Groups II and III, and in adult education Group I less than Group III. In F.F.A. work, according to principals' ratings, there was significantly greater variation in Group III than in either Group I or II. And in farm mechanics, there was also greater variation in teaching performance, according to principals, in Group III than in Group I.

In classroom teaching, Group I was significantly less than Group III, based on principals' ratings.

In summary, although z values show differences in two categories, this is insufficient to conclude generally that differences in teaching performance exist among the groups. However, the extent of positive significant correlations between undergraduate academic achievement and teaching performance, even though all are based on supervisors' ratings, suggest that a positive relationship does exist. A tentative conclusion regarding homogeneity of variance would suggest that Group III varied more than Group I or II.

Teaching Performance and Student Teaching

Since most teachers in the study had received only a single mark in student teaching, it was not possible to divide the sample into three approximately equal groups based on achievement in student teaching. Most had received an "A" or a "B" in student teaching. The sample was divided into two groups, one composed of those with a 3.0 grade point average (in a few cases this consisted of marks in two student teaching courses) and those with 4.0 grade point average. This resulted in omitting 15 whose grade point average was less than 3.0 and 15 whose grade point average was between 3.0 and 4.0.

Data in Table 13 show that achievement in student teaching differentiated the two groups to a considerable extent.

In eight cases, F values were significantly different at the 5 percent level, but, due to abnormal distribution of the dependent variable in the case of principals' ratings of program planning, F.F.A. work, and school relationships, and supervisors' ratings of total performance, these F values cannot be considered significantly different. Thus, significant differences in F values are found in supervisors' ratings of program planning and school relationships, and in principals' ratings of farm mechanics instruction, school relationships and total teaching performance.

In those instances where significant F values were found, the z values, shown in Table 19, revealed that the group having the higher undergraduate academic achievement was performing higher as teachers.

Referring to Table 6, one finds significantly positive correlations in only six cases, five of them based on principals' ratings. Only in program planning did supervisors' ratings correlate significantly with student teaching achievement. According to principals, achievement in student teaching and teaching performance correlated significantly in overall teaching performance, in classroom teaching, program planning, supervised farming, and farm mechanics instruction.

What about variation? Does the subsequent teaching performance of "A" student teachers and "B" student teachers differ in variation, according to supervisors and principals? Apparently not. F ratios in Table 18 show that only in the case of supervisors' ratings of performance in school relationships

Table 18. Analysis of teaching performance, based on ratings by supervisors and principals, of teachers grouped according to undergraduate grade point average in student teaching.

Teaching function	Supervisors' ratings, by group			Principals' ratings, by group		
	Low GPA Group I	High GPA Group II	F ratio	Low GPA Group I	High GPA Group II	F ratio
CLASSROOM TEACHING						
Number	80	52		81	59	
Mean rating	2.79	2.97		2.87	3.08	
Variance	.35	.52		.48	.35	
Low vs high gp			1.06			1.38
PROGRAM PLANNING						
Number	80	53		82	59	
Mean rating	2.56	2.88		2.75	3.03	
Variance	.56	.53		.63	.57	
Low vs high gp			1.06			1.10
SUPERVISED FARMING						
Number	79	53		81	59	
Mean rating	2.64	2.71		2.64	2.89	
Variance	.63	.58		.52	.54	
Low vs high gp			1.08			1.02
FARM MECHANICS						
Number	79	52		80	58	
Mean rating	2.63	2.74		2.78	3.06	
Variance	.72	.51		.67	.49	
Low vs high gp			1.43			1.36
F.F.A.						
Number	79	53		82	58	
Mean rating	2.72	2.89		2.93	3.19	
Variance	.57	.62		.58	.49	
Low vs high gp			1.08			1.19
ADULT EDUCATION						
Number	77	50		81	55	
Mean rating	2.44	2.58		2.47	2.74	
Variance	.90	.61		.91	.76	
Low vs high gp			1.46			1.20
SCHOOL RELATIONSHIPS						
Number	80	53		82	59	
Mean rating	2.93	3.19		2.93	3.26	
Variance	.70	.35		.85	.66	
Low vs high gp			2.00[a]			1.29
COMMUNITY RELATIONS						
Number	80	53		81	59	
Mean rating	2.86	2.98		2.92	3.08	
Variance	.63	.42		.62	.74	
Low vs high gp			1.50			1.19
PROF. STANDARDS						
Number	80	53		82	59	
Mean rating	2.79	2.93		2.83	3.02	
Variance	.64	.52		.66	.58	
Low vs high gp			1.24			1.13
OVERALL RATING						
Number	80	52		79	58	
Mean rating	2.69	2.97		2.86	3.14	
Variance	.63	.42		.44	.38	
Low vs high gp			1.49			1.14

See footnotes, Table 5.

do the variances of the two differ significantly. It should be noted that of the subject variables studied, in none of the others was so little difference in variation found. Compared to the variances of groups divided according to other subjects, the variances shown in Table 18 are not unusually low; hence, the lack of differences between within-group variation of the two groups is not due to very low variances.

It is apparent that the number of functions in which significant differences are found is sufficient to conclude that something other than chance accounted for the difference, and thereby provide a basis for suggesting, with limitations, that student teaching achievement has a meaningful relationship with subsequent performance as a teacher.

Surprising to many agricultural teacher educators is the failure of student teaching achievement to discriminate in classroom teaching. It is probably a fair assumption that despite the fact that student teaching marks are based on the total experience, classroom teaching is the controlling basis for the mark in student teaching. Hence, one might expect student teaching to discriminate on subsequent performance in the classroom.

Teaching Performance and Agricultural Economics

According to Table 2, all of the teachers whose transcripts were obtained had completed at least one course in agricultural economics.

When teachers were divided according to undergraduate academic achievement in agricultural economics, analysis of variance showed differences

Table 19. Differences between mean ratings, based on grouping of teachers according to undergraduate academic achievement in student teaching.

Teaching function	z value of difference between means of groups	
	Supervisors' ratings	Principals' ratings
Classroom teaching	1.38	1.89
Program planning	2.44[a]	2.09[c]
Supervised farming	.51	1.98[b]
Farm mechanics	.77	2.20[b]
F.F.A.	1.27	2.07[c]
Adult education	.94	1.70
School relationships	2.15[b]	2.25[a]
Community relationships	.83	1.08
Professional standards	1.08	1.36
TOTAL PERFORMANCE	2.17[c]	2.47[a]

See footnotes, Table 5.

among groups in only two cases. Supervisors' ratings of teachers' performance in young and adult farmer work showed significant difference. The z values of differences between means of groups computed as follows:

Group I vs. Group II	2.82
Group I vs. Group III	1.19
Group II vs. Group III	1.39

The difference between Groups I and II is clearly significant. Examination of means in Table 20 shows that the mean rating of Group I, i.e., the

the lowest group academically in agricultural economics, is significantly higher than that of Group II. This may seem surprising, but should be clarified when correlations are examined.

Differences among the groups, according to analysis of variance, were found significant in the case of principals' ratings of teachers' performance in F.F.A. work. Tests of differences between means of groups gave the following z values.

Group I vs. Group II	2.57
Group I vs. Group III	.41
Group II vs. Group III	2.17

In these, Group I is abnormally distributed but II and III were normally distributed. Since the F value was significant at the 2.5 percent level, the difference is considered significant. The same applies to the z value of the difference between means of Groups I and II. The z value between Groups II and III is significant at the 5 percent level, and since neither of these groups is abnormally distributed, this difference is accepted as significant. Examination of means of these groups in Table 20 shows that, according to principals, teaching performance of Groups I and III in F.F.A. work was significantly higher than that of Group II.

Data in Table 6 indicate a negative correlation between teaching performance and undergraduate achievement in agricultural economics courses. While the difference, according to principals' ratings, is significant in only one case --- young and adult farmer education --- the differences are significant in all except classroom teaching and program planning in the case of supervisors'

ratings. Interpretation of these data becomes speculative. One might be tempted to suggest that achievement in agricultural economics and mathematics courses would correlate highly; however, in this study the correlation between undergraduate academic achievement in these two courses was only +.22. While this is significantly different from zero, it is not highly significant.

Since considerable young and adult farmer instruction centers about farm management, one might suppose that undergraduate academic achievement in agricultural economics and performance in adult education would correlate positively. This did not occur in this study. Whether it is due to a "real" negative difference or to weakness in validity of the rating is not known. To attempt to conclude further would be speculative.

Differences in homogeneity of variance are inconclusive. According to principals' ratings, Group I was more homogeneous than one or both of the other groups in two cases, yet Group II and Group III were also significantly more homogeneous in one case each. Supervisors' ratings show Group I and Group II to be more homogeneous than Group III in one function, but in another function Group I was more homogeneous and Group III in a third. The lack of a pattern provides no basis for generalization.

Teaching Performance and Agricultural Engineering

All teachers in the study had completed one or more agricultural engineering courses. It should be pointed out that in almost all cases these courses were of the agricultural mechanics type, usually dealing with farm shop skills, farm power and machinery, irrigation and water control,

Table 20. Analysis of teaching performance, based on ratings by supervisors and principals, of teachers grouped according to undergraduate grade point average in agricultural economics.

Teaching function	Supervisors' ratings, by group				Principals' ratings, by group			
	Low GPA Group I	Middle GPA Group II	High GPA Group III	F ratio	Low GPA Group I	Middle GPA Group II	High GPA Group III	F ratio
CLASSROOM TEACHING								
Number	63	55	47		63	61	50	
Mean rating	2.81	2.94	2.82		3.01	2.93	2.94	
Variance	.42	.41	.66		.32	.51	.40	
Low vs high gp				1.58				1.25
Low vs middle gp				1.02				1.61[b]
Middle vs high gp				1.61[c]				1.29
PROGRAM PLANNING								
Number	63	56	47		64	61	50	
Mean rating	2.71	2.64	2.67		2.92	2.88	2.92	
Variance	.62	.54	.66		.45	.72	.56	
Low vs high gp				1.06				1.26
Low vs middle gp				1.15				1.60[b]
Middle vs high gp				1.22				1.28
SUPERVISED FARMING								
Number	61	56	47		62	61	49	
Mean rating	2.68	2.66	2.66		2.85	2.70	2.78	
Variance	.52	.57	.67		.41	.58	.71	
Low vs high gp				1.29				1.74[b]
Low vs middle gp				1.09				1.43
Middle vs high gp				1.18				1.22
FARM MECHANICS								
Number	62	54	47		61	59	50	
Mean rating	2.82	2.59	2.57		2.98	2.80	2.92	
Variance	.43	.59	.73		.62	.62	.53	
Low vs high gp				1.72[b]				1.17
Low vs middle gp				1.35				1.00
Middle vs high gp				1.24				1.17
F. F. A.								
Number	63	56	46		64	60	50	
Mean rating	2.82	2.66	2.79		3.20	2.86	3.15	
Variance	.63	.51	.64		.49	.63	.40	
Low vs high gp				1.01				1.23
Low vs middle gp				1.25				1.29[b]
Middle vs high gp				1.25				1.59
ADULT EDUCATION								
Number	60	53	47		63	57	48	
Mean rating	2.68	2.23	2.48		2.78	2.46	2.68	
Variance	.70	.73	.82		.71	.99	.85	
Low vs high gp				1.17				1.20
Low vs middle gp				1.05				1.40
Middle vs high gp				1.12				1.17
SCHOOL RELATIONSHIPS								
Number	63	56	47		64	61	50	
Mean rating	3.11	2.98	2.98		3.07	3.10	3.09	
Variance	.59	.53	.58		.75	.68	1.15	
Low vs high gp				1.02				1.53
Low vs middle gp				1.12				1.11
Middle vs high gp				1.10				1.70[c]
COMMUNITY RELATIONS								
Number	63	56	47		64	60	50	
Mean rating	3.07	2.79	2.87		3.03	2.98	2.99	
Variance	.51	.44	.70		.74	.58	.85	
Low vs high gp				1.37				1.15
Low vs middle gp				1.16				1.26
Middle vs high gp				1.59				1.46
PROF. STANDARDS								
Number	63	56	47		64	61	50	
Mean rating	3.01	2.82	2.69		3.06	2.90	2.90	
Variance	.42	.47	.85		.50	.56	.70	
Low vs high gp				2.02[a]				1.41
Low vs middle gp				1.10				1.12
Middle vs high gp				1.83[a]				1.25
OVERALL RATING								
Number	61	56	46		62	59	49	
Mean rating	2.81	2.81	2.73		3.05	2.93	2.99	
Variance	.57	.42	.63		.44	.43	.44	
Low vs high gp				1.11				1.00
Low vs middle gp				1.35				1.02
Middle vs high gp				1.50				1.02

See footnotes, Table 5.

electricity and, in a few cases, farm structures. Few of the courses were "engineering" in the sense of machinery design and the more theoretical type courses. In a few cases, teachers had completed courses in mechanical, electrical and other engineering fields; these were recorded under "miscellaneous" courses, not analyzed here.

None of the F values in Table 5 can be considered significant. Supervisors' ratings of classroom teaching produce an F value significant at the 5 percent level but not at the 2.5 percent level, and since two of the three groups were not distributed normally, this statistic is considered not significant.

Generally, the data in Table 6 do not show significant correlation between undergraduate academic achievement in agricultural engineering and teaching performance. This is entirely true in the case of principals' ratings; in the case of supervisors' ratings, significant correlations were found in classroom teaching, program planning, and farm mechanics, but none of these was highly significant.

Within group variation was found in a number of cases, although not in overall teaching performance ratings by either supervisors or principals (Table 21). Again, overall teaching performance ratings by either supervisors or principals disagreed.

According to principals' ratings, Group I was more homogeneous than either one or both of the other groups in classroom teaching, supervised

Table 21. Analysis of teaching performance, based on ratings by supervisors and principals, of teachers grouped according to undergraduate grade point average in agricultural engineering.

Teaching function	Supervisors' ratings, by group				Principals' ratings, by group			
	Low GPA Group I	Middle GPA Group II	High GPA Group III	F ratio	Low GPA Group I	Middle GPA Group II	High GPA Group III	F ratio
CLASSROOM TEACHING								
Number	48	57	60		50	60	64	
Mean rating	2.78	2.72	3.04		2.92	3.02	2.95	
Variance	.50	.53	.38		.30	.38	.52	
Low vs high gp				1.30				1.70[b]
Low vs middle gp				1.06				1.26
Middle vs high gp				1.38				1.38
PROGRAM PLANNING								
Number	48	58	60		51	60	64	
Mean rating	2.53	2.65	2.82		2.81	2.96	2.94	
Variance	.67	.63	.49		.51	.50	.69	
Low vs high gp				1.36				1.36
Low vs middle gp				1.05				1.01
Middle vs high gp				1.29				1.37
SUPERVISED FARMING								
Number	46	58	60		49	59	64	
Mean rating	2.56	2.61	2.81		2.76	2.87	2.71	
Variance	.69	.54	.52		.35	.57	.69	
Low vs high gp				1.33				1.97[a]
Low vs middle gp				1.28				1.63[b]
Middle vs high gp				1.03				1.21
FARM MECHANICS								
Number	48	56	59		49	58	63	
Mean rating	2.55	2.61	2.83		2.93	2.88	2.90	
Variance	.71	.59	.43		.47	.54	.76	
Low vs high gp				1.66[b]				1.62[b]
Low vs middle gp				1.21				1.16
Middle vs high gp				1.37				1.40
F.F.A.								
Number	47	58	60		51	59	64	
Mean rating	2.61	2.82	2.82		3.07	3.08	3.05	
Variance	.71	.65	.43		.45	.62	.53	
Low vs high gp				1.64[b]				1.18
Low vs middle gp				1.08				1.37
Middle vs high gp				1.51				1.16
ADULT EDUCATION								
Number	45	57	58		48	58	62	
Mean rating	2.46	2.46	2.49		2.65	2.72	2.57	
Variance	.91	.62	.84		.78	.82	.97	
Low vs high gp				1.08				1.24
Low vs middle gp				1.46				1.05
Middle vs high gp				1.35				1.18
SCHOOL RELATIONSHIPS								
Number	48	58	60		51	60	64	
Mean rating	2.98	2.97	3.13		3.17	2.99	3.11	
Variance	.67	.68	.38		.45	.92	1.07	
Low vs high gp				1.77[b]				2.36[a]
Low vs middle gp				1.03				2.03[a]
Middle vs high gp				1.81				1.16
COMMUNITY RELATIONS								
Number	48	58	60		50	60	64	
Mean rating	2.88	2.84	3.01		3.04	2.95	3.02	
Variance	.61	.67	.38		.39	.80	.89	
Low vs high gp				1.59[b]				2.32[a]
Low vs middle gp				1.11				2.06[a]
Middle vs high gp				1.75[b]				1.12
PROF. STANDARDS								
Number	48	58	60		51	60	64	
Mean rating	2.73	2.86	2.95		3.07	2.88	2.95	
Variance	.64	.62	.46		.32	.62	.74	
Low vs high gp				1.37				2.28[a]
Low vs middle gp				1.03				1.92[a]
Middle vs high gp				1.33				1.19
OVERALL RATING								
Number	48	55	60		50	57	63	
Mean rating	2.72	2.71	2.91		2.98	2.94	3.05	
Variance	.66	.50	.45		.32	.49	.48	
Low vs high gp				1.46				1.50
Low vs middle gp				1.32				1.51
Middle vs high gp				1.10				1.01

See footnotes, Table 5.

farming, farm mechanics, school relationships, community relationships, and professional standards.

According to supervisors, Group III was more homogeneous than one or both of the other groups in farm mechanics, F.F.A. work, school relationships, and community relationships.

Thus, with regard to homogeneity of variance, supervisors and principals contradict one another in their appraisals of these teachers' performances.

Teaching Performance and Animal Science

Animal science included, in this study, courses in dairy science, poultry science, veterinary science, and other animal science areas.

According to data in Table 5, there were no significant differences among the three groups, when divided according to undergraduate achievement in animal science. None of the F values was significant.

Data in Table 6 also provide little basis for suggesting any significant relationship between undergraduate achievement in animal science courses and teaching performance. Only in the cases of supervisors' ratings on young and adult farmer education and professional standards and improvement are there significant correlations and both of these are negative.

An examination of data in Table 22 shows that while differences exist between groups on homogeneity of variance, in only one case is that difference

Table 22. Analysis of teaching performance, based on ratings by supervisors and principals, of teachers grouped according to undergraduate grade point average in animal science.

Teaching function	Supervisors' ratings, by group				Principals' ratings, by group			
	Low GPA Group I	Middle GPA Group II	High GPA Group III	F ratio	Low GPA Group I	Middle GPA Group II	High GPA Group III	F ratio
CLASSROOM TEACHING								
Number	55	61	48		57	64	52	
Mean rating	2.90	2.80	2.87		2.95	2.92	3.02	
Variance	.38	.48	.61		.37	.39	.46	
Low vs high gp				1.62[c]				1.26
Low vs middle gp				1.27				1.06
Middle vs high gp				1.27				1.19
PROGRAM PLANNING								
Number	55	61	49		58	64	52	
Mean rating	2.67	2.68	2.65		2.87	2.93	2.93	
Variance	.58	.54	.72		.48	.56	.71	
Low vs high gp				1.25				1.47
Low vs middle gp				1.07				1.16
Middle vs high gp				1.33				1.27
SUPERVISED FARMING								
Number	53	61	49		56	63	52	
Mean rating	2.65	2.63	2.71		2.75	2.77	2.82	
Variance	.44	.71	.58		.42	.53	.75	
Low vs high gp				1.32				1.81[a]
Low vs middle gp				1.60[b]				1.27
Middle vs high gp				1.22				1.43
FARM MECHANICS								
Number	54	60	48		55	63	51	
Mean rating	2.81	2.58	2.63		2.91	2.77	3.03	
Variance	.53	.61	.58		.66	.57	.53	
Low vs high gp				1.10				1.25
Low vs middle gp				1.15				1.16
Middle vs high gp				1.04				1.08
F.F.A.								
Number	55	61	48		58	63	52	
Mean rating	2.77	2.76	2.72		3.11	2.93	3.16	
Variance	.57	.57	.65		.56	.59	.41	
Low vs high gp				1.12				1.38
Low vs middle gp				1.00				1.06
Middle vs high gp				1.12				1.46
ADULT EDUCATION								
Number	53	61	45		56	63	48	
Mean rating	2.66	2.30	2.45		2.79	2.49	2.67	
Variance	.61	.80	.86		.80	.90	.86	
Low vs high gp				1.41				1.07
Low vs middle gp				1.31				1.12
Middle vs high gp				1.08				1.05
SCHOOL RELATIONSHIPS								
Number	55	61	49		58	64	52	
Mean rating	3.09	2.96	3.05		3.01	3.15	3.07	
Variance	.75	.50	.46		.75	.67	1.15	
Low vs high gp				1.64[b]				1.15
Low vs middle gp				1.49				1.11
Middle vs high gp				1.10				1.70[c]
COMMUNITY RELATIONS								
Number	55	61	49		58	64	51	
Mean rating	2.98	2.85	2.90		2.97	3.05	2.95	
Variance	.61	.52	.53		.78	.54	.86	
Low vs high gp				1.14				1.11
Low vs middle gp				1.17				1.44
Middle vs high gp				1.03				1.61[c]
PROF. STANDARDS								
Number	55	61	49		58	64	52	
Mean rating	3.02	2.81	2.70		3.04	2.90	2.93	
Variance	.44	.51	.75		.43	.49	.85	
Low vs high gp				1.73[b]				2.00[a]
Low vs middle gp				1.17				1.16
Middle vs high gp				1.48				1.73[b]
OVERALL RATING								
Number	53	61	48		57	60	52	
Mean rating	2.83	2.72	2.81		2.95	2.96	3.06	
Variance	.52	.60	.46		.46	.37	.49	
Low vs high gp				1.12				1.08
Low vs middle gp				1.16				1.26
Middle vs high gp				1.30				1.34

See footnotes, Table 5.

highly significant (i.e., at the 1 percent level). That case was principals' ratings of teachers' professional standards and improvement, in which Group I was considerably more homogeneous.

According to supervisors' ratings, classroom teaching, supervised farming, professional standards, and school relationships were groups significantly different in homogeneity from one or both of the other groups; Group I differed in the first three functions and in the last, Group III differed.

In summary, ratings of teachers when grouped according to animal science grades provide no basis for generalizing differentiation in teaching performance.

Teaching Performance and Plant and Soil Science

In this study, the category "plant and soil science" included courses in crops, soils, horticulture, floriculture, plant pathology, forestry and related subjects.

When teachers were grouped according to undergraduate academic achievement in plant and soil science, analysis of variance showed significant difference only in the case of principals' ratings of teachers' performance in classroom teaching.

When ratings for the three groups were tested for significance of differences between means, the following z values were found:

Group I vs. Group II	1.83
Group I vs. Group III	1.31
Group II vs. Group III	3.28

The difference between Group II and Group III is clear. Although Group II is not normally distributed, both the F value and the z value above are significant at the 2.5 percent level and both are therefore accepted as significant. Examination of Table 23 shows that the mean rating of classroom teaching performance of Group III is significantly higher than that of Group II.

An examination of Table 6 shows that correlations between teaching performance and undergraduate achievement in plant and soil science generally do not differ significantly from zero. There are two exceptions: supervisors' ratings of performance in supervised farming and ratings of professional standards and improvement, both negatively correlated.

Table 23 shows, in a number of teaching functions, that Group I was more homogeneous than either one or both of the other groups. Supervisors' ratings so indicated in the cases of professional standards, farm mechanics, and classroom teaching. So did principals' ratings in the cases of school relationships. However, principals' ratings showed Group III to be more homogeneous than either one or both of the other groups in the cases of the total performance, adult education, farm mechanics, and classroom teaching. The highly significant F ratio in principals' ratings of classroom teaching performance is largely accounted for in the high homogeneity of variance of ratings for Group III.

Table 23. Analysis of teaching performance, based on ratings by supervisors and principals, of teachers grouped according to undergraduate grade point average in plant and soil science.

Teaching function	Supervisors' ratings, by group				Principals' ratings, by group			
	Low GPA Group I	Middle GPA Group II	High GPA Group III	F ratio	Low GPA Group I	Middle GPA Group II	High GPA Group III	F ratio
CLASSROOM TEACHING								
Number	54	60	51		54	65	55	
Mean rating	2.83	2.91	2.82		3.01	2.78	3.14	
Variance	.28	.55	.62		.37	.58	.18	
Low vs high gp				2.19[a]				1.99[a]
Low vs middle gp				1.96[a]				1.58[c]
Middle vs high gp				1.12				3.14[a]
PROGRAM PLANNING								
Number	54	61	51		54	66	55	
Mean rating	2.62	2.69	2.72		2.87	2.89	2.98	
Variance	.57	.62	.62		.54	.69	.47	
Low vs high gp				1.09				1.15
Low vs middle gp				1.09				1.29
Middle vs high gp				1.00				1.49
SUPERVISED FARMING								
Number	53	60	51		52	65	55	
Mean rating	2.67	2.73	2.59		2.73	2.76	2.85	
Variance	.43	.62	.69		.40	.62	.63	
Low vs high gp				1.59[c]				1.57[c]
Low vs middle gp				1.43				1.56[b]
Middle vs high gp				1.11				1.01
FARM MECHANICS								
Number	51	61	51		51	65	54	
Mean rating	2.61	2.70	2.70		2.91	2.80	3.01	
Variance	.44	.70	.59		.57	.76	.41	
Low vs high gp				1.34[b]				1.41
Low vs middle gp				1.60[b]				1.32[a]
Middle vs high gp				1.19				1.85
F.F.A.								
Number	54	60	51		54	66	54	
Mean rating	2.67	2.78	2.83		3.15	2.99	3.08	
Variance	.52	.69	.56		.49	.67	.41	
Low vs high gp				1.09				1.20
Low vs middle gp				1.32				1.38
Middle vs high gp				1.22				1.65[c]
ADULT EDUCATION								
Number	51	61	48		51	65	52	
Mean rating	2.49	2.43	2.50		2.75	2.49	2.73	
Variance	.64	.90	.77		.82	1.08	.59	
Low vs high gp				1.21				1.38
Low vs middle gp				1.42				1.31[a]
Middle vs high gp				1.17				1.82
SCHOOL RELATIONSHIPS								
Number	54	61	51		54	66	55	
Mean rating	3.01	2.96	3.13		3.10	2.97	3.23	
Variance	.63	.53	.54		.63	1.07	.74	
Low vs high gp				1.16				1.18[b]
Low vs middle gp				1.19				1.71[b]
Middle vs high gp				1.02				1.45
COMMUNITY RELATIONS								
Number	54	61	51		54	66	54	
Mean rating	2.90	2.89	2.97		2.98	2.97	3.06	
Variance	.51	.52	.63		.64	.78	.72	
Low vs high gp				1.23				1.12
Low vs middle gp				1.02				1.22
Middle vs high gp				1.20				1.08
PROF. STANDARDS								
Number	54	61	51		54	66	55	
Mean rating	2.93	2.85	2.78		3.04	2.89	2.98	
Variance	.34	.63	.75		.47	.64	.61	
Low vs high gp				2.23[a]				1.31
Low vs middle gp				1.89[a]				1.37
Middle vs high gp				1.18				1.05
OVERALL RATING								
Number	52	60	51		53	63	54	
Mean rating	2.73	2.80	2.84		3.00	2.86	3.14	
Variance	.46	.62	.50		.43	.54	.29	
Low vs high gp				1.09				1.51
Low vs middle gp				1.37				1.24
Middle vs high gp				1.25				1.87[a]

See footnotes, Table 5.

CONCLUSIONS

Results of this study do not provide bases for categorical generalizations with respect to a number of questions. For this reason and due to the contradictory differences that have been found in various studies relating to the question, the data have been presented in this report in some detail in order that the reader may examine for himself the bases for conclusions.

In order to deal with the question concerning the "average" teacher, it was necessary to divide teachers into three groups, based on academic achievement in the discipline examined. It should be recognized that this grouping process resulted in considerable loss in efficiency. Hence, tests of significance in analysis of variance bear some built-in error which could not be avoided if the purpose was to be accomplished. In many cases, correlations between teaching performance and academic achievement represent a more precise measure, however, some of these lack linearity.

Group Differences

When ratings of teachers, grouped according to undergraduate academic achievement, were compared it was found that, with the exception of achievement in speech and student teaching, none of the other disciplines discriminated. The few significant differences in other groupings could have been due to chance.

Although differences in the cases of speech and student teaching undergraduate achievement did not occur for all functions, the incidence of

differences was beyond that which might be accounted for by chance. Therefore, it is concluded that teachers of agriculture who excell in speech courses and in student teaching, perform better as teachers, according to their principals and district supervisors of vocational agriculture.

Relationships

The incidence of significant correlations was such as to justify conclusion that significantly positive relationships existed between teaching performance and undergraduate academic achievement in biological sciences, agricultural education, and student teaching. Conversely, significantly negative relationships existed between teaching performance and undergraduate academic achievement in mathematics, general education, and agricultural economics.

Variation

The patterns of differences in homogeneity of variance are so diverse as to provide inadequate basis for positive generalization, when viewing the results in their entirety. Based on principals' ratings, there was greater homogeneity of variance among Groups I and II than Group III. But according to supervisors' ratings, the incidence of greater homogeneity of variance was distributed roughly equally among the three groups.

More specifically, according to principals' ratings, Group I tended to be more homogeneous when groups were divided according to undergraduate

academic achievement in mathematics and agricultural engineering. Group II was more homogeneous when groups were divided according to undergraduate academic achievement in physical sciences, biological sciences, and English.

According to supervisors' ratings, Group II was more homogeneous in the cases of groupings according to undergraduate academic achievement in English and total grade point average; Group I in mathematics, biological science, plant and soil science, animal science, and agricultural economics; and Group III in physical science, agricultural engineering, general education, and speech.

Hypotheses

For testing, the hypotheses listed on page 10 were converted to the null form.

Hypothesis 1 -- There is no significant correlation between performance in teaching vocational agriculture and undergraduate academic achievement.

Conclusion -- This is partly accepted and partly rejected. It is accepted in the case of total grade point average and grade point average in most academic disciplines. However, a significant positive correlation was found between teaching performance and academic achievement in biological sciences, agricultural education, and student teaching; a significant negative correlation was found between teaching performance and undergraduate academic achievement in mathematics, general education (pedagogy), and agricultural economics.

The null hypothesis here and the conclusions also apply to the fourth hypothesis on page 10. From the standpoint of positive relationships, that hypothesis is supported, in part, i.e., in the cases of agricultural education and student teaching. But if one considers negative correlations, the entire hypothesis is rejected.

Hypothesis 2 -- There is no significant difference in teaching performance when teachers are grouped by tercile based on undergraduate academic achievement.

Conclusion -- With the exception of student teaching and speech, in which two groups each were used instead of three, this hypothesis was sustained.

It should be noted that the long held assumption among many principals and supervisors of vocational agriculture that the "average" student is likely to become the best teacher is not sustained by results in this study.

Hypothesis 3 -- There is no significant difference in the variation of teaching performance among teachers grouped according to undergraduate academic achievement.

Conclusion -- As a whole, this hypothesis is sustained. There are exceptions for various disciplines, but contradictions between ratings by principals and supervisors negate conclusions in most instances. For example, when grouped according to academic achievement in agricultural engineering, ratings by principals showed the low group to be most homogeneous, while supervisors' ratings showed the high group to be most homogeneous. In total

performance, supervisors' ratings showed the "average" group to be most homogeneous, but principals did not support this. Only when teachers were grouped according to achievement in English and mathematics did supervisors and principals agree substantially concerning homogeneity of variance; in the case of English, the average group was shown to be most homogeneous and in mathematics, the low group was most homogeneous.

Interpretations

Results and conclusions of this study have been set forth in some detail, especially for students of the problem under investigation. But what do the results of this study mean to practitioners? Do they mean that, for the most part, undergraduate academic achievement in college is unrelated to teaching performance? If one could be confident of the validity and reliability of the marking in college courses, of the device used in the study to measure teaching performance, and of the ratings by principals and supervisors, then such a statement would not be greatly in error. However, results of this study must be added to those of other studies in arriving at an answer to this question.

As noted in Part I, there is a trend toward eliminating from teacher education programs students who do not earn a grade point average of 2.3 or 2.5 at the lower level in college. Do findings in this study negate the assumption that such persons are less likely to succeed as teachers? No.

The question could not be investigated in this study since presumably such programs had eliminated many such persons who did not complete teacher education, did not enter teaching, and hence could not be included in the sample.

SUMMARY

The study was designed to determine the relationships between teaching, in terms of total performance and performance in nine functions of teaching agriculture, and undergraduate academic achievement in toto and in each of 12 disciplines.

The sample consisted of a 25 percent random cluster sampling of agricultural education graduates in the United States during 1959 and 1960 who, at the time of the study, were teaching agriculture. These individuals had completed 2 1/2 and 3 1/2 years of teaching respectively. Complete or almost complete data were obtained for 188 teachers.

Undergraduate academic achievement was taken from each teacher's transcript. Measures of teaching performance were obtained from ratings by teachers' principals and district supervisors of vocational agriculture. The rating scale was designed to determine total performance in teaching and performance in each of nine functions of the job of teaching agriculture.

One of the objectives was to determine whether teacher performance differed when all teachers were grouped into low, middle and high groups according to undergraduate academic achievement. Based on analysis of variance, no differences were found except when teachers were grouped according to achievement in speech and student teaching, in which cases they were divided into two groups, instead of three, because most teachers had received only one

mark in each. In speech and student teaching, those who had received higher marks were rated, for the most part, higher as teachers by their principals and supervisors.

With respect to relationship of teaching performance to academic achievement, values were positively significant in the cases of biological sciences, agricultural education and student teaching. On the other hand, a significant negative correlation was found in the cases of mathematics, general education (pedagogy) and agricultural economics. Significant differences were not found in English, physical sciences, social sciences, humanities, plant and soil sciences, animal sciences, agricultural engineering, and total grade point average.

The question of homogeneity of variance of teaching performance when comparing low, middle and high groups, in terms of academic achievement, was analyzed. When teachers were divided according to achievement in English, the middle third appeared to vary least; such was the case when they were divided based on mathematics grades. In others, the least variation occurred often among the low group and about equally often among the high group. The lack of consistency in variation provides no basis for suggesting any difference, generally, in the variation among low, middle and high groups.

Findings of this study show only minor relationship between undergraduate academic achievement and teaching performance. However, they are not inconsistent with those of similar studies of smaller groups of agriculture teachers and teachers of other subjects.

If there is a general relationship between undergraduate academic achievement and performance in teaching vocational agriculture, this study did not establish it. At the same time, one should remember that the failure of this study to establish such a relationship conclusively does not "prove" that such a relationship does not exist.

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APPENDIX

Name of teacher _____ School and address _____

GUIDE FOR RATING TEACHERS OF VOCATIONAL AGRICULTURE

Instructions: Indicate your overall rating and rating on each of the nine functions by checking the dot along the continuum which represents your appraisal of current or most recently observed performance of the above named teacher. Please complete the overall rating first. Then, complete the rating of each of the nine functions below, without referring to the overall rating; the nine functions are not necessarily of equal weight.

	Excellent	Good	Fair	Poor	Unsatisfactory
OVERALL RATING	!	!	!	!	!

	Excellent	Good	Fair	Poor	Unsatisfactory
CLASSROOM TEACHING ---------- Methods used, stimulation of students, relation of teaching to s.f.p., materials used, adapting teaching to pupil needs, skill in techniques of teaching.	!	!	!	!	!
PROGRAM PLANNING ---------- Long range program plans, course of instruction, advisory council.	!	!	!	!	!
SUPERVISED FARMING PROGRAMS -------- Completeness and quality of sfps. and of farm placement programs, on-farm instruction, use of sfps. as teaching device.	!	!	!	!	!
FARM MECHANICS INSTRUCTION ---------- Orgn. of shop & program, instructional procedures, relation of shop tng. to agricultural science and mgt., shop safety.	!	!	!	!	!
FUTURE FARMERS OF AMERICA ---------- Member-centered program, use of FFA as a teaching tool, FFA balanced with remainder of vo-ag program.	!	!	!	!	!
YOUNG AND/OR ADULT FARMER PROGRAMS Recruiting, orgn. and procedures in planning courses, teaching procedures, reactions of enrollees.	!	!	!	!	!
RELATIONSHIPS IN THE SCHOOL ---------- With administrators, supervisors, with other teachers, how regarded by other teachers, participation in total school program.	!	!	!	!	!
COMMUNITY RELATIONSHIPS ---------- Community understanding of teacher and his job and support, teacher participation in community agricultural & civic activities, involvement of people in program.	!	!	!	!	!
PROFESSIONAL STANDARDS & IMPROVEMENT Participation in professional orgn. in activities to improve knowledge of agriculture and of teaching.	!	!	!	!	!