FACTORS ASSOCIATED WITH THE OCCURRENCE OF EFFECTIVE LOCAL FARM MECHANICS PROGRAMS IN VOCATIONAL AGRICULTURE IN OKLAHOMA

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CHAPTER I

INTRODUCTION

Successful farming today requires ever increasing economies in the use of land, labor and capital. More and more must be produced per acre of land, dollar of investment, and hour of labor input. The successful farmer of today, and particularly the successful farmer of the future, must be especially able to profitably produce each unit of production with ever decreasing costs in terms of resource inputs.

A high degree of competency in farm mechanics is coming to be of ever increasing importance, if the farmer is to meet the economic demand for less costly production. It seems that the answer to the cost-price squeeze, in which the farmer currently finds himself, might be partially found by reducing the cost per unit of production without, at the same time, necessarily increasing the total number of units of production. In these times of surplus farm commodities and declining farmer income, it becomes imperative that farmers find ways by which they can increase their incomes without increasing production. It seems that an increased emphasis upon, and a higher degree of competency in farm mechanics might do much to decrease the farmers cost of production by cutting down on the cost of repair and maintenance of farm buildings and farm equipment.

Harris makes the following comments regarding the need for more emphasis upon farm mechanics training:

> Today farming is big business in capital outlay as well as in operating costs. In many states, farm buildings and equipment represent over one-half of the total farm investment, while on some individual farms this investment is as high as 75%. Farm people are constantly facing an "ever-tightening price-cost squeeze"; therefore, in order to have a decent standard of living, the farm family must increase the efficiency of their farming operations. If the farm boy or adult is able to do the unspecialized construction, repair or service jobs on the buildings and equipment, the production cost will be reduced. For example, the average yearly cost of repairs and depreciation on farm tractors varies from 5 to 17% of original cost, an average of 11%. For a farmer with two tractors costing $2,000 each, this would amount to $440.00 per year. With extra good care this figure could be cut in half ($220); or with extremely poor care this figure could easily be doubled ($880). Many professional craftsmen and technicians say that about one-half of their work on farm buildings and equipment could be done by the farmer if he had some training in doing the simpler jobs.[1]

The State Board of Control for Vocational Education, Michigan State Department of Education makes the following statement: "A good farm mechanics program not only contributes to, but is essential for, effective and economical production as we know it at the present time".[2]

Although the farms of today are highly mechanized, most farmers are not receiving the maximum benefit from such mechanization because they are not sufficiently educated in the proper use and maintenance of their farm machinery and equipment.

Many of our vocational agriculture teachers in departments not characterized by successful programs of instruction in farm mechanics, have expressed one or more of the following opinions concerning the farm

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[1]Roland Harris, "Farm Mechanics Today", Agricultural Education Magazine, XXVII, No. 12 (June, 1955), p. 267.

[2]The State Board of Control for Vocational Education, Michigan State Department of Education, Farm Shop Work in Michigan Vocational Agriculture Departments, (Bulletin No. 261, Lansing, Michigan, 1940), p. 18.

mechanics phase of vocational agriculture: (1) a need does not exist in their community; (2) the teacher himself is not sufficiently trained in farm mechanics skills and understandings; (3) facilities are unavailable and unattainable; and (4) the administration is not convinced of the need.

All of the above opinions are probably subject to debate as to their validity and/or resistance to correction. However, Harris states that:

> If the agriculture teacher is interested (1) in helping in-school and out-of-school people deal with farm problems intelligently, (2) in providing ways and means for farm people to develop into more useful citizens, (3) in utilizing available facilities and resources of the community, and (4) making the school become a center for mental and social development of the people it serves, then the program of vocational agriculture must include a strong program of farm mechanics.[3]

It is to promote this end that this study is undertaken.

Statement of Problem

It is a common assumption among teachers of vocational agriculture that there are certain factors which are associated with the probability of developing successful programs of instruction in farm mechanics. However, there is much diversity of opinion as to just what factors are significant and the relative significance of each. It is to clarify this issue that this study is undertaken.

The central problem of this research study is to determine what factors are associated to a greater degree with the occurrence of above-average instructional programs in farm mechanics, than with the occurrence of below-average programs of instruction in farm mechanics.

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[3]Harris, p. 275.

Definition of Terms

The term "farm mechanics instruction" and the term "farm shop work" are often used interchangeably in vocational agriculture. Farm mechanics instruction, however, is a much more inclusive term than is farm shop work. In this study the term "farm mechanics instruction" includes instruction in all the unspecialized mechanical activities performed on the farm and in the farm home. It shall include the following areas: (1) farm shop work, (2) farm power and machinery, (3) farm buildings and conveniences, (4) rural electrification, and (5) the engineering and mechanical phases of soil and water management.

The term "factors" is used in this study to refer to certain background characteristics of selected vocational agriculture teachers, certain physical characteristics of the particular high schools in which the individual teachers are presently teaching, and certain economic characteristics of the service area of the school districts which may be related to or associated with the success of instructional programs in farm mechanics.

The term "significant factor" is used in this study to refer to those factors which, after an appropriate statistical treatment of data, are found to be significatly associated at the five per cent level.

Scope of the Study

This study is concerned with the problem of ascertaining which of certain selected factors are associated to a greater degree with the occurrence of above-average programs of instruction in farm mechanics, than with below-average programs of instruction in farm mechanics.

In order to resolve the thesis problem a study was conducted involving the collecting and statistically analyzing of data, and the development of certain findings and conclusions.

The scope of this study was limited to random samplings of the vocational agriculture departments in the state of Oklahoma in which the current teacher or teachers had completed two or more years of teaching in their current department. The scope of this study was further limited when the departments in each of the supervisory districts were rated by the supervisors as above-average, average, or below-average according to the quality of the instructional programs in farm mechanics. Thirty departments from each of the above-average and the below-average groups were randomly selected to be included in this study. These were selected from each of the supervisory districts on the basis of the ratio of the number of departments in each district to the total number of departments in the population.

It was felt that by stratifying each of the two populations into the five supervisory districts for sampling purposes, more representative samples could be drawn. This procedure was deemed advisable due to the differences existing between the various districts in socio-economic conditions, types and sizes of farms, population density, climate, and topography.

Basic Assumptions

This study is conditioned by the following assumptions:

1. That district supervisors of vocational agriculture are sufficiently well informed concerning the instructional program in farm mechanics of each department in their

respective districts to enable them to rate the various departments as above-average, average, or below-average according to the effectiveness of the instructional program in farm mechanics.

2. That each vocational agriculture teacher interviewed in connection with the study is sufficiently well informed concerning his school and community to enable him to answer, with a fair degree of accuracy, the questions in the interview schedule.

Need For The Study

It is not a difficult task to identify effective programs of instruction in farm mechanics, but when one begins to analyze a given situation in an attempt to find out which of the many factors occurring with a given situation can be adjudged to be associated with that situation, he is faced with a real problem. Only through the medium of a scientific study can a person establish that certain factors are probably associated with the area under study.

Realizing, or course, that we cannot infer causation from association; we can, never-the-less, learn from those associations what factors probably need to exist, or need not to exist, in order for an effective program of instruction to evolve in a given situation.

The information which this study will provide may be most useful to: (1) teacher trainers in planning and directing more effective courses of study in agricultural education, (2) district supervisors in counseling and directing teachers who have problems in developing effective instructional programs in farm mechanics, and (3) vocational agriculture teachers in becoming aware of what are the associative factors in

developing a program of instruction in farm mechanics. By knowing the associative factors teachers, teacher trainers and supervisors can concentrate on alleviating or utilizing the effect of those factors which may be real.

CHAPTER II

REVIEW OF LITERATURE

The Role Of Farm Mechanics In The Total Program Of Vocational Agriculture

Within the relatively short lifetime of many of our high school vocational agriculture students, we have achieved a degree of agricultural mechanization that was almost undreamed of even as late as the early 1930's. Gray stated at the end of World War II:

> "Now we are on the threshold of a new era of farm mechanization. Many machines are now in the experimental stage; --- others are on the draftsman's boards and are more than a dream, because farmers, --- have determined that there is a need for them".[1]

Fourteen years later, in 1960, we are no longer on that threshold, but are rapidly expanding at an ever increasing rate, the mechanization of our farms.

Much of the new equipment on successful farms, as well as on the average farm of today, is of such kind and such efficiency as to excite the imagination of man. The now commonplace self-propelled combine, which can harvest more grain in a days time than a man with a scyth could harvest in a lifetime; the mechanical cotton picker which picks lint from the open boll; the pipe-line milker and bulk coolers which can milk

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[1] R. B. Gray, "Some New Farm Machines", in Yearbook of Agriculture, (1943-1947), p. 815.

and store the milk from a cow every three minutes; the field ensilage harvester which has taken much of the drugery out of putting up silage; the tractors which can till 20 to 60 acres per day; the completely automated, push-button steer feeding systems which enable one man to feed a thousand or more head of steers; and the many other highly mechanized farm conveniences call for a new and imperative emphasis upon farm mechanics training in all-day, young and adult farmer programs of vocational agriculture.

Can any vocational agriculture teacher with any appreciable degree of foresight, and with the usual amount of hindsight, fail to sense the urgency of better and more comprehensive programs of instruction in farm mechanics, especially in the areas of farm power and machinery, farm structures, and farm electrification? I do not believe so!

When a teacher considers that in many of the better farming areas, farm buildings and farm equipment represent from 50 to 75 per cent of the total farm investment; he surely cannot help but realize the importance of the role of a comprehensive program of instruction in farm mechanics in the total program of vocational agriculture.

Studies, Investigations, And Other Related Literature

Although a great many studies and investigations have been conducted in the general area of farm mechanics, a thorough search of all the Summaries of Studies in Agriculture Education; and of all the issues of the Agriculture Education Magazine since 1950, failed to discover any studies of a nature similar to this one, except for a non-statistical study by Curtis.[2]

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[2]Charlie M. Curtis, "Some Factors Affecting Teaching of Farm Mechanics", (Unpub. Doctoral Dissertation, Louisiana State University, 1958)

Curtis, in a study conducted in Louisiana in 1958, attempted to determine some of the factors affecting the teaching of farm mechanics. However, because Curtis did not use a random sampling technique, nor did he statistically analyze the data gathered; sound inferences, based upon his study, cannot be made.

In spite of the weakness of the Curtis study, as far as a basis for inference, his findings are true measures of the sample population, and as such are of considerably more value than mere supposition, or data gathered from the more informal types of information regarding factors associated with the teaching of farm mechanics.

Curtis[3] found that among the teachers included in his study that the length of tenure of a teacher in his present department did not affect the quality of his instructional program in farm mechanics. Curtis also found that teachers of vocational agriculture, included in his study, lacked sufficient training for teaching farm power and machinery, and electrification; and that the majority of the teachers allot from one-fourth to one-third of the total class time of all-day boys for instruction in farm mechanics.

Price, in a statistical study of young adult farmer classes in Oklahoma and Pennsylvania, found that:

> . . . the evidence secured by treatment of data gather from departments included in this study definitely would indicate that the occurrence of organized instructional programs for young adult farmers is associated with a substantial inventory of superior farm mechanics facilities and equipment.[4]

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[3]Ibid., pp. 76-77.

[4]Robert R. Price, "Factors Associated With The Occurrence of Local Young Adult Farmer Instructional Programs In Vocational Agriculture In The States of Oklahoma and Pennsylvania", (Unpublished Doctoral Dissertation, Pennsylvania State University, 1955), pp. 131-132.

Price[5] also found that there were significantly superior high school programs of instruction in farm mechanics in operation in those departments providing systematic instruction for young adult farmers, than in those departments not providing young adult farmer instruction.

Province[6] found no significant difference in the average acres of land per farm between the service areas of departments of vocational agriculture adjudged to be above-average and those adjudged to be below-average. Although the Province study was concerned with the total program of vocational agriculture, such a program is the sum total of all its parts, among which is the farm mechanics phase; which is the concern of the present study. Therefore, some of the findings of the Province study are pertinent to the present study.

In a study conducted in Missouri, and as reported by Weston[7], it was found that: (1) Farmers in general, usually do perform the same farm mechanical jobs regardless of where they live, with the exception of a few soil and water management activities in areas where drainage is one of the major problems. (2) The degree of farm ownership has no effect upon the farm mechanics jobs performed. (3) Farmers desire the same type of farm mechanics training regardless of where they live or of their tenure status. (4) No significant differences exist in the kinds of farm

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[5]Ibid., p. 172.

[6]Elmer A. Province, "Characteristics of Farms And Farming In The Service Area of Fifty Above-Average and Fifty Below-Average Departments of Vocational Agriculture", (Unpub. Masters Thesis, Oklahoma State University, 1955).

[7]Curtis Weston, "Farm Mechanics Jobs". County Agent and Vo-Ag Teacher Magazine, (May, 1960), pp. 52-55.

mechanics jobs which farmers are performing between the 11 economic areas in Missouri. This study, as reported by Weston, tends to refute the assumption, made by some teachers of vocational agriculture, that a need for an instruction program in farm mechanics does not exist in their individual communities because of the particular type of farming, or because of the economic situation that exists.

CHAPTER III

DESIGN OF THE STUDY

The purpose of this chapter is to describe the procedure used in conducting this study. The description will include a statement of the hypotheses to be tested, the sampling method, a description of the subject groups, method of obtaining the data, and the methods used in the analysis of the data.

The Hypotheses Tested

The hypotheses in this study were formulated as null hypotheses in order to facilitate testing by the application of appropriate tests of significance. Hagood and Price make the following statement regarding the null hypothesis:

> . . . we can by statistical methods come nearer to proving that something is <u>not</u> true about a universe than that something is true. This means that we often shall use a negativistic approach. If we want to establish one hypothesis, we shall not test it directly but shall form the opposite hypothesis, which we shall call the null hypothesis, and test it on the basis of the evidence from our sample.[1]

Garrett states that:

> Experimenters have found the null hypothesis a useful tool in testing the reliability of differences. In

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[1]Margaret J. Hagood and Daniel O. Price, <u>Statistics for Sociologists</u> (New York, 1952), p. 237.

> its simplest form, this hypothesis asserts that there is no true difference between two population means, and that the difference found between sample means is, therefore, accidental and unimportant. The nullhypothesis is akin to the legal principle that a man is innocent until he is proved guilty. It constitutes a challenge; and the function of an experiment is to give the facts a chance to refute (or fail to refute) this challenge.[2]

Wert, Neidt and Ahmann make the following statement regarding the use of the null hypothesis:

> The null hypothesis . . . becomes the statement of a research issue which may be evaluated by an appropriate test of significance. In addition to informing others of the issue in any research study, the hypothesis serves to direct the efforts of the investigator in the collection of appropriate evidence. . . . Without a hypothesis to guide the collection and analysis of evidence, a research study may be reduced to sheer activity. The foregoing statement should not be interpreted to mean that new hypotheses cannot be formulated during the course of an investigation, or that an original hypothesis should never be abandoned or changed; rather the interpretation should be that the research effort becomes more efficient as hypothesis to be tested are recognized in the planning stages of each step in the research project.[3]

Tate adds:

> In statistics, an hypothesis which is tested for possible rejection under the assumption that it is true is called a null hypothesis. Essentially the null hypothesis assumes a particular value of a population parameter, and the hypothesis is tested by determining whether the sample in hand could reasonable have arisen in sampling from a population actually having this assumed parameter value. If so, the hypothesis is tenable. This does not mean that the hypothesis is proved, but only that it is acceptable, perhaps one of several acceptable hypotheses.[4]

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[2]Henry E. Garrett, Statistics In Psychology And Education, (New York, 1953), p. 213.

[3]James E. Wert, Charles O. Neidt, and J. Stanley Ahmann, Statistical Methods, (New York, 1954), p. 124.

[4]Merle W. Tate, Statistics In Education, (New York, 1955), pp. 380-381.

The major hypothesis of this study is that with regard to certain selected personal characteristics of teachers, certain selected characteristics of schools, and certain selected physical and economic characteristics of the individual school service areas; significant differences do not exist between those departments of vocational agriculture adjudged to have above-average programs of instruction in farm mechanics, and those departments of vocational agriculture adjudged to have below-average programs of instruction in farm mechanics.

The following hypotheses were tested in an attempt to resolve the major hypothesis:

A. No significant differences exist between those departments of vocational agriculture having above-average programs of instruction in farm mechanics, and those departments having below-average programs with regard to the following personal background characteristics of the teachers:

(1) age,

(2) years of teaching experience in vocational agriculture,

(3) years of teaching experience in present vocational agriculture department,

(4) number of college hours credit in farm mechanics,

(5) specific areas covered by farm mechanics courses,

(6) number of college hours credit in other courses of a mechanical nature,

(7) specific areas covered by other college courses of a mechanical nature,

(8) teachers receiving organized civilian mechanical training below the college level,

(9) teachers receiving mechanical training in the armed forces,

(10) teachers having well equipped farm shops on their home farms while they were enrolled in high school,

(11) teachers receiving farm mechanics training while enrolled in high school, and

(12) teachers receiving other shop training while enrolled in high school.

B. No significant differences exist between those departments of vocational agriculture having above-average programs of instruction in farm mechanics, and those departments having below-average programs with regard to the following characteristics of the individual schools and departments of vocational agriculture:

(1) average enrollment in high school for the last two school years,

(2) average enrollment in all-day classes in vocational agriculture for the last two school years,

(3) length of the class period for vocational agriculture I, II, III, and IV,

(4) departments having young farmer classes,

(5) average enrollment in young farmer classes for the last two school years,

(6) departments having adult farmer classes,

(7) average enrollment in adult farmer classes for the last two school years,

(8) departments having a shop available for use,

(9) departments sharing shop facilities with other high school departments,

(10) departments in which a shop was already available when the present teacher began teaching there,

(11) departments in which the local school administration provides a budget for the financing of farm mechanics instruction,

(12) available shop floor space per student enrolled in the largest class,

(13) number of hours in the four year time allotment for farm mechanics instruction, and

(14) whether or not the department uses the station method or a modified version in teaching farm mechanics.

C. No significant differences exist between those departments of vocational agriculture having above-average programs of instruction in farm mechanics, and those departments having below-average programs with regard to the following economic characteristics of the service area of the individual high schools:

(1) average acres per farm,

(2) the estimated average value of cultivated land per acre,

(3) the estimated average value of pasture land per acre,

(4) the average number of beef cattle per farm,

(5) the average number of dairy cattle per farm,

(6) the average number of swine per farm,

(7) the average number of poultry per farm,

(8) percentage of farms having pressure water systems,

(9) percentage of farm homes having modern plumbing systems,

(10) percentage of farms having tractors,

(11) average number of tractors per farm,

(12) percentage of farms having trucks,

(13) percentage of farms having combines and/or other large items of harvest equipment,

(14) percentage of farms having irrigation systems,

(15) percentage of farms having farm shop facilities,

(16) percentage of farms having electric and/or acetylene welders,

(17) major crops of the service area of the school, and

(18) the major animal enterprises of the service area of the school.

Sample Characteristics and Methodology

As of July 1, 1959 there were 312 departments of vocational agriculture in Oklahoma in which the current teacher had two or more consecutive years of teaching in his present department. The district supervisors of vocational agriculture were asked to rate the 312 departments as above-average, average, and below-average according to the effectiveness of the program of instruction in farm mechanics.

Although samples were to be drawn only from the above-average and the below-average groups, it was thought advisable to rate the departments into the three groups and to use the average group as a buffer group. The purpose of having this so-called buffer group was to help alleviate the effect of human errors in grouping. It was thought if the 312 departments were rated only into above-average and below-average groups that the cutting line between the two groups would be infinitely fine, and the effect of errors in grouping would be quite high. For example, if a particular department were to appear in the

above-average sample which was, in actuality, below-average, then it would be compared with the group in which it actually should have been placed. On the other hand by rating the departments as above-average, average, and below-average groups; and by sampling only from the above-average and the below-average groups, it is highly improbable that the mis-rated department would have been carried across the average group, which includes approximately 40 per cent of the departments, and placed in the above-average group. Thus, the average group becomes a buffer group to help insure against a department appearing in the opposite group to the one in which it actually should be.

Since plans for the study called for the writer to visit each department in the two samples, and to interview each teacher personally, it was considered as hardly feasible, in terms of time and expense, to include all the departments in the two populations of the study. Therefore, as an alternative, samples of 30 were drawn from each of the above-average and the below-average groups. To assure a geographical distribution in the samples, the two populations were stratified according to the five supervisory districts of vocational agriculture in Oklahoma. The 30 departments in each of the above-average and the below-average groups were randomly selected, using a table of random numbers, from the five supervisory districts on a proportional basis. The number selected from each district was determined by the ratio of the number of departments in each individual district to the total number of departments in the population. Thus the sampling technique was one of stratified random sampling.

The departments randomly selected from the group adjudged to be above-average according to the effectiveness of their programs of instruction in farm mechanics shall, for the remainder of this study be referred to as Group One. Those departments randomly selected from the group adjudged to be below-average shall be referred to as Group Two.

Procedure For Collection Of The Data

The personal interview technique was selected as the most appropriate one for obtaining the data for this study. It was felt that greater accuracy in answering could be achieved through personal interviews than through the use of questionnaires. In order to assure uniformity in interview procedure, the investigator conducted all the interviews personally.

The interview schedule used in obtaining the data necessary for testing the hypotheses in this study was constructed with the assistance of the teacher training staff in agricultural education at the Oklahoma State University, and the district supervisors of vocational agriculture of the state of Oklahoma. The items included in the interview schedule are ones which numerous teachers of vocational agriculture have considered as having possible association with successful programs of instruction in farm mechanics.

The tentative interview schedule was used in interviewing three teachers of vocational agriculture, who were not included in this study, in order to check it for clarity. After the schedule was

formulated into its final form[5] it was used in interviewing the 60 teachers of vocational agriculture included in this study.

Treatment of Data

The tabulated data obtained in this study were subjected to appropriate statistical tests in order to determine whether significant differences were evident between the two groups. The "t" test of significance was used in testing quantitative data, and the chi-square test was used in testing qualitative data. The level of significance required for the rejection of the null hypothesis was set at the five per cent level for this study.

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[5] See Appendix.

CHAPTER IV

PRESENTATION AND ANALYSIS OF DATA, AND SIGNIFICANCE OF FINDINGS

The data presented in this chapter were secured through personal visitation in each of the 60 departments of vocational agriculture, and by personally interviewing each of the 60 teachers in those departments. These departments were selected by a stratified random sampling technique which ensured geographical distribution over the state of Oklahoma. The five strata used were the five supervisory districts of vocational agriculture. Proportional samples were selected from each of the five districts to assure a more representative sample.

All departments of vocational agriculture in Oklahoma, in which the present teacher had two or more years of tenure, were rated by the district supervisors as either above-average, average, or below-average according to the effectiveness of the instructional program in farm mechanics. From each of the above-average and the below-average groups, 30 departments were selected according to the stratified random sampling technique described in the previous paragraph. Those departments in the above-average group shall be referred to as Group One and those departments in the below-average group shall be referred to as Group Two.

After the desired data were secured through the personal interview technique, the data were tabulated and statistically treated in order to determine if significant differences existed between the two groups in regard to the factors tested.

The principle null hypothesis upon which this study is based is that with regard to certain personal background characteristics of teachers, certain characteristics of the individual schools and departments of vocational agriculture, and certain economic characteristics of the service areas of the individual schools, no significant differences exist between the two groups of departments.

In connection with all tabular presentation of data within this chapter, two asterisks (**) immediately after any digits indicate a statistical difference between the two groups which is highly significant, or significant at the one per cent level. One asterisk (*) appearing immediately after the digits is indicative of a significant difference at the five per cent level. When no asterisk appears, it will be an indication that the difference, if any, between the two groups was possibly due to sampling fluctuations. Unless the appropriate statistical treatments proved the difference to be significant at the five per cent or the one per cent level, the null hypothesis under test was not rejected.

Data Regarding Personal Background Characteristics Of The Teacher

Data regarding personal background characteristics of the teachers include the following 20 selected factors: (1) age of teachers; (2) years taught vocational agriculture; (3) years taught in present department; (4) college hours credit in farm mechanics courses; (5) teachers having college training in arc and acetylene welding; (6) teachers having college training in cold metal work; (7) teachers having college training in farm carpentry; (8) teachers having college training in electrical wiring; (9) teachers having college training in hot metal work; (10) teachers having college training in farm machinery courses; (11) college

hours credit in other courses of a mechanical nature; (12) teachers with college training in farm structures courses; (13) teachers with college training in soil and water conservation structures; (14) teachers with college training in farm surveying; (15) teachers receiving college training in irrigation practices; (16) teachers receiving organized civilian mechanical instruction below the college level; (17) teachers receiving instruction of a mechanical nature in the armed forces; (18) teachers having well-equipped farm shops on their home farms while they were enrolled in high school; (19) teachers receiving farm mechanics instruction while they were enrolled in high school; and (20) teachers receiving other shop training while they were enrolled in high school.

Ages of teachers of vocational agriculture. The question of the effect of age in the teaching of farm mechanics is one of long-standing, with much diversity of opinion. However, in referring to the data presented in Table I, it is found that no significant difference exists between the mean ages of the two groups. It will be noted that the mean age of the teachers in Group One is 36.43 years, while the teachers of Group Two have a mean age of 38.40 years. The difference of 1.97 years between the mean ages of the two groups has a t-value of 1.08, which is considerably below the 2.00 value required for significance at the five per cent level. Therefore, the null hypothesis cannot be rejected.

TABLE I

FREQUENCY DISTRIBUTION OF THE AGES OF VOCATIONAL AGRICULTURAL TEACHERS HAVING ABOVE-AVERAGE AND THOSE HAVING BELOW-AVERAGE PROGRAMS OF INSTRUCTION IN FARM MECHANICS

Class Interval, ages in years	Above-Average Departments		Below-Average Departments	
	Number	Per cent	Number	Per cent
55-58	0	0.00	2	6.66
51-54	1	3.33	0	0.00
47-50	1	3.33	3	10.00
43-46	0	0.00	3	10.00
39-42	6	20.00	6	20.00
35-38	10	33.33	6	20.00
31-34	10	33.33	3	10.00
27-30	0	0.00	6	20.00
23-26	2	6.66	1	3.33
Totals	30	100.00	30	100.00
Mean age of teachers in each group		36.43		38.40
Difference between the mean ages of the two groups			- 1.97	
t-value of difference between the mean ages			- 1.08	

Years of teaching experience in vocational agriculture. The data presented in Table II indicates that the mean years of experience in teaching vocational agriculture for Group One is 10.00 years, while the mean of Group Two is 11.80 years. It will be noted that 40 per cent of the teachers in Group One have completed less than eight years of teaching vocational agriculture, while only 26.67 per cent of the teachers in Group Two have less than eight years of experience. The mean difference

of 1.80 years of teaching experience, in favor of Group Two, has a t-value of only 0.54 which is not significant at the five per cent level. Therefore, the null hypothesis cannot be rejected.

TABLE II

FREQUENCY DISTRIBUTION OF THE YEARS OF TEACHING EXPERIENCE IN VOCATIONAL AGRICULTURE

Class Interval, Years Completed	Above-Average Departments		Below-Average Departments	
	Number	Per cent	Number	Per cent
29-Plus	1	3.33	2	6.67
26-28	0	0.00	0	0.00
23-25	1	3.33	1	3.33
20-22	1	3.33	2	6.67
17-19	0	0.00	1	3.33
14-16	0	0.00	2	6.67
11-13	6	20.00	6	20.00
8-10	12	40.00	8	26.67
5-7	5	16.67	2	6.67
2-4	4	13.33	6	20.00
Totals	30	100.00	30	100.00
Mean years of teaching experience in vocational agriculture of the two groups		10.00		11.80
Difference between the mean years of teaching experience			- 1.80	
t-value of difference between the mean years of teaching			- 0.54	

Years of teaching experience in the present department of vocational agriculture. It is an accepted fact that it takes a considerable amount of time to establish any effective educational program. However, the point of disagreement lies in the years of tenure required to develop a successful program. Table III indicates that 60 per cent of the teachers

TABLE III

FREQUENCY DISTRIBUTION OF YEARS OF TEACHING EXPERIENCE IN PRESENT VOCATIONAL AGRICULTURE DEPARTMENT

Class Interval, Years Completed	Above-Average Departments		Below-Average Departments	
	Number	Per cent	Number	Per cent
29-31	0	0.00	1	3.33
26-28	0	0.00	0	0.00
23-25	2	6.67	1	3.33
20-22	0	0.00	0	0.00
17-19	0	0.00	0	0.00
14-16	0	0.00	0	0.00
11-13	6	20.00	8	26.67
8-10	4	13.33	5	16.67
5-7	9	30.00	4	13.33
2-4	9	30.00	11	36.67
Totals	30	100.00	30	100.00
Mean years of teaching in present department		7.93		8.50
Difference between the mean years teaching in present department			- 0.57	
t-value of difference between mean years teaching			- 0.37	

in Group One developed successful programs of instruction in farm

mechanics in seven or less years. We find that only 40 per cent of the teachers in Group Two have seven or less years of experience in their present departments. The teachers in Group One have a mean of 7.93 years of experience in their present departments, while those of Group Two show a mean of 8.50 years. The mean difference of 0.57 years, in favor of Group Two, has a t-value of 0.37 which is not significant at the five per cent level. Therefore, the null hypothesis cannot be rejected.

TABLE IV

FREQUENCY DISTRIBUTION OF COLLEGE HOURS OF CREDIT IN FARM MECHANICS COURSES

Class Interval, Hours Completed	Above-Average Departments		Below-Average Departments	
	Number	Per cent	Number	Per cent
13-15	1	3.33	3	10.00
10-12	6	20.00	8	26.67
7-9	15	50.00	14	46.67
4-6	8	26.67	5	16.67
Totals	30	100.00	30	100.00
Mean hours credit in farm mechanics courses		8.07		8.77
Difference between the mean hours credit			- 0.70	
t-value of difference between mean hours credit			- 0.30	

College hours of credit in farm mechanics courses. The data in

Table IV would appear to refute the assumption held by many teachers, that those teachers having the more effective programs of farm mechanics have more hours of college credit in farm mechanics. However, the data show no significant difference in the mean number of hours credit in farm mechanics courses taken by the two groups of teachers. Group One has a mean of 8.07 hours credit, while Group Two has a mean of 8.77 hours credit in farm mechanics courses. While there is a mean difference of 0.70 hours, in favor of Group Two, the t-value of 0.30 is not significant at the five per cent level. Therefore, the null hypothesis may be considered tenable.

TABLE V

TEACHERS WHO HAVE COLLEGE TRAINING IN ARC AND ACETYLENE WELDING

	Above-Average Departments		Below-Average Departments	
	Number	Per cent	Number	Per cent
Yes	28	93.33	26	86.67
No	2	6.67	4	13.33
Totals	30	100.00	30	100.00
Chi-square value of the degree of association between groups		0.18		

Teachers having college training in arc and acetylene welding. As shown in Table V, 93.33 per cent of the teachers in Group One had received college training in arc and acetylene welding, while 86.67 per cent of the teachers in Group Two had received such training. The

chi-square value of the degree of association between the two groups of 0.18 is greatly below the 3.84 value required for significance at the five per cent level. Therefore, the null hypothesis may be considered as tenable.

TABLE VI

TEACHERS WHO HAVE COLLEGE TRAINING IN COLD METAL WORK

	Above-Average Departments		Below-Average Departments	
	Number	Per cent	Number	Per cent
Yes	30	100.00	30	100.00
No	0	0.00	0	0.00
Totals	30	100.00	30	100.00
Chi-square value of the degree of association between groups		0.00		

Teachers having college training in cold metal work. Table VI shows that all of the teachers in both Group One and Group Two had received college training in cold metal work. With a chi-square value of 0.00 we may conclude that there is no difference between the two groups with regard to having college training in cold metal work, therefore, the null hypothesis cannot be rejected.

Teachers having college training in farm carpentry. Table VII indicates that 73.33 per cent of the teachers in Group Two had received college training in farm carpentry, whereas 56.67 per cent of the teachers in Group One had received such training. The apparent difference of

16.66 per cent is not significant, as the chi-square value of 0.04, in favor of Group Two, is greatly below the value required for significance at the five per cent level. Therefore, the null hypothesis cannot be rejected.

TABLE VII

TEACHERS WHO HAVE COLLEGE TRAINING IN FARM CARPENTRY

	Above-Average Departments		Below-Average Departments	
	Number	Per cent	Number	Per cent
Yes	17	56.67	22	73.33
No	13	43.33	8	26.67
Totals	30	100.00	30	100.00

Chi-square value of the degree of association between groups = 0.04

Teachers having college training in electrical wiring. The data in Table VIII show that 80 per cent of the teachers in Group Two had received college training in electrical wiring, whereas 76.67 per cent of the teachers in Group One had received such training. The chi-square value of 0.09, in favor of Group Two, is not significant at the five per cent level. Therefore, the null hypothesis is tenable.

TABLE VIII

TEACHERS WHO HAVE COLLEGE TRAINING IN ELECTRICAL WIRING

	Above-Average Departments		Below-Average Departments	
	Number	Per cent	Number	Per cent
Yes	23	76.67	24	80.00
No	7	23.33	6	20.00
Totals	30	100.00	30	100.00

Chi-square value of the degree of association between groups = 0.09

TABLE IX

TEACHERS WHO HAVE COLLEGE TRAINING IN HOT METAL WORK

	Above-Average Departments		Below-Average Departments	
	Number	Per cent	Number	Per cent
Yes	30	100.00	30	100.00
No	0	0.00	0	0.00
Totals	30	100.00	30	100.00

Chi-square value of the degree of association between groups 0.00

Teachers having college training in hot metal work. Table IX indicates no difference between Group One and Group Two in regard to college training in hot metal work, as 100 per cent of both groups indicated having had such training. Therefore, the null hypothesis cannot be rejected.

TABLE X

TEACHERS WHO HAVE COLLEGE TRAINING IN FARM MACHINERY COURSES

	Above-Average Departments		Below-Average Departments	
	Number	Per cent	Number	Per cent
Yes	23	76.67	21	70.00
No	7	23.33	9	30.00
Totals	30	100.00	30	100.00
Chi-square value of the degree of association between groups		0.15		

Teachers having college courses in farm machinery. As shown in Table X, 76.67 per cent of the teachers in Groupe One had taken college courses in farm machinery, and 70 per cent of the teachers in Group Two had taken such courses. With a chi-square value of only 0.15, it can be seen that the observed difference is greatly below that required for significance at the five per cent level. Therefore, the null hypothesis cannot be rejected.

TABLE XI

FREQUENCY DISTRIBUTION OF COLLEGE HOURS CREDIT IN OTHER COURSES OF A MECHANICAL NATURE

Class Interval, Hours Completed	Above-Average Departments		Below-Average Departments	
	Number	Per cent	Number	Per cent
7-8	0	0.00	1	3.33
5-6	1	3.33	5	16.67
3-4	8	26.67	5	16.67
1-2	11	36.67	11	36.67
0	10	33.33	8	26.67
Totals	30	100.00	30	100.00
Mean hours credit		2.03		2.43
Difference between the mean hours credit of the two groups			- 0.40	
t-value of difference between the mean hours credit of the two groups			- 0.89	

College hours credit in other courses of a mechanical nature. The data presented in Table XI show that the teachers in Group One had a mean of 2.03 hours credit in other college courses of a mechanical nature, and teachers in Group Two had a mean of 2.43 hours credit in such courses. The difference of 0.40 in the mean hours credit, in favor of Group Two, has a t-value of 0.88 which is not significant at the five per cent level. Therefore, the null hypothesis cannot be rejected.

TABLE XII

TEACHERS HAVING COLLEGE TRAINING IN FARM STRUCTURES

	Above-Average Departments		Below-Average Departments	
	Number	Per cent	Number	Per cent
Yes	4	13.33	4	13.33
No	26	86.67	26	86.67
Totals	30	100.00	30	100.00
Chi-square value of the degree of association between groups		0.00		

Teachers having college courses in farm structures. The data presented in Table XII show that only 13.33 per cent of the teachers in both Group One and Group Two had taken any college courses dealing with farm structures. Though the data show no difference between the two groups, they are revealing in that they do point up an area in which nearly all teachers are in need of either college training or in-service training. Since the data show no difference the null hypothesis is tenable.

Teachers having college training in farm surveying. Table XIII indicates that 73.33 per cent of the teachers in Group Two had received college training in farm surveying, while only 43.33 per cent of the teachers in Group One had received such training. The chi-square value of 5.55, in favor of Group Two, is significant at the five per cent level.

Therefore, the null hypothesis is rejected. This finding is somewhat surprising and upon first consideration is rather difficult to understand. However, the investigator feels that this significant difference should not be taken to mean that college training in farm surveying has an adverse effect upon the teaching of farm mechanics. A more plausable explanation of this finding might be that due to the relatively low credit hour requirement in agriculture engineering for teacher certification in vocational agriculture, teachers electing to take the course in farm surveying may be doing so at the expense of securing more breadth of usable training throughout the total area of farm mechanics. It further seems plausable that teachers who have had training in farm surveying may tend to over emphasize that area of farm mechanics, and in doing so possibly neglect other areas. Obviously this would result in an unbalanced program which would likely be scored low.

TABLE XIII

TEACHERS WITH COLLEGE TRAINING IN FARM SURVEYING

	Above-Average Departments		Below-Average Departments	
	Number	Per cent	Number	Per cent
Yes	13	43.33	22	73.33
No	17	56.67	8	26.67
Totals	30	100.00	30	100.00

Chi-square value of the degree of association between groups = 5.55*

Significant at the five per cent level.

In substantiation of the aforegoing explanation, it may be pointed out that Table XI indicates that teachers in Group Two had a mean of only 2.43 college hours credit in mechanical courses other than farm shop and farm machinery. The farm survey course carries two hours of credit, therefore those teachers electing farm surveying had an average total of only 0.43 hour credit in farm structures, soil and water conservation structures other than that in the farm surveying course, and irrigation practices. This would indicate a deficiency in these areas, one of which - farm structures - is thought to be of the utmost importance in developing successful programs of instruction in farm mechanics.

TABLE XIV

TEACHERS WITH COLLEGE TRAINING IN SOIL AND WATER CONSERVATION STRUCTURES

	Above-Average Department		Below-Average Department	
	Number	Per cent	Number	Per cent
Yes	7	23.33	12	40.00
No	23	76.67	18	60.00
Totals	30	100.00	30	100.00

Chi-square value of the degree of association between groups = 1.78

Teachers having college training in soil and water conservation structures. Table XIV shows that only 40 per cent of the teachers in Group Two and only 23.33 per cent of those in Group One had received

college training in soil and water conservation structures. Although the data do not show any significant difference between the two groups, they do reveal another area in which more teachers need training, especially of the in-service type. Since the chi-square value of 1.75, in favor of Group Two, is considerably below that required for significance at the five per cent level, the null hypothesis is tenable.

TABLE XV

TEACHERS WITH COLLEGE TRAINING IN IRRIGATION PRACTICES

	Above-Average Department		Below-Average Department	
	Number	Per cent	Number	Per cent
Yes	7	23.33	7	23.33
No	23	76.67	23	76.67
Totals	30	100.00	30	100.00
Chi-square value of the degree of association between groups		0.00		

Teachers having college training in irrigation practices. The data in Table XV show that only 23.33 per cent of the teachers in both Group One and Group Two had received college training in irrigation practices. The rapid growth of irrigation farming in Oklahoma suggests that the teachers may be needing college training in this area. Since the data show no difference between the two groups, the null hypothesis cannot be rejected.

TABLE XVI

TEACHERS RECEIVING ORGANIZED CIVILIAN MECHANICAL TRAINING BELOW THE COLLEGE LEVEL

	Above-Average Departments		Below-Average Departments	
	Number	Per cent	Number	Per cent
Yes	8	26.67	10	33.33
No	22	73.33	20	66.67
Totals	30	100.00	30	100.00
Chi-square value of the degree of association between groups		= 0.14		

Teachers receiving organized civilian mechanical training below the college level. Table XVI indicates that only eight per cent of the teachers in Group One and only 10 per cent of those in Group Two had received any organized civilian mechanical training below the college level. The chi-square value of 0.14, in favor of Group Two, is greatly below that required for significance at the five per cent level. Thus, the null hypothesis cannot be rejected.

Teachers receiving instruction of a mechanical nature in the armed forces. The data in Table XVII reveal that 33.33 per cent of the teachers in Group One had received instruction of a mechanical nature while serving in the armed forces, while only 16.67 per cent of the teachers in Group Two had received such training. Although there is a considerable

difference in these percentages, the chi-square value of 1.42, in favor of Group One, is not significant at the five per cent level. Therefore, the null hypothesis may be considered as tenable.

TABLE XVII

TEACHERS RECEIVING INSTRUCTION OF A MECHANICAL NATURE IN THE ARMED FORCES

	Above-Average Departments		Below-Average Departments	
	Number	Per cent	Number	Per cent
Yes	10	33.33	5	16.67
No	20	66.67	25	83.33
Totals	30	100.00	30	100.00
Chi-square value of the degree of association between groups		1.42		

Teachers having well equipped farm shops on their home farms while enrolled in high school. The data presented in Table XVIII show that only seven per cent of the teachers in Group One and only eight per cent of those teachers in Group Two had well equipped farm shops on their home farms while they were enrolled in high school. The chi-square value of 0.09, in favor of Group Two, is not significant at the five per cent level. Therefore, the null hypothesis cannot be rejected.

TABLE XVIII

TEACHERS HAVING WELL EQUIPPED FARM SHOPS ON THEIR HOME FARMS WHILE THEY WERE ENROLLED IN HIGH SCHOOL

	Above-Average Departments		Below-Average Departments	
	Number	Per cent	Number	Per cent
Yes	7	23.33	8	26.67
No	23	76.67	22	73.33
Totals	30	100.00	30	100.00

Chi-square value of the degree of association between groups = 0.09

TABLE XIX

TEACHERS RECEIVING FARM MECHANICS INSTRUCTION IN HIGH SCHOOL

	Above-Average Departments		Below-Average Departments	
	Number	Per cent	Number	Per cent
Yes	8	26.67	7	23.33
No	22	73.33	23	76.67
Totals	30	100.00	30	100.00

Chi-square value of the degree of association between groups 0.09

Teachers receiving farm mechanics instruction while enrolled in high school. Table XIX reveals that only 26.67 per cent of the teachers in Group One, and only 23.33 per cent of those in Group Two, had received any farm mechanics instruction while enrolled in high school. While this table provides no information as to the quality of instruction received, it does reveal that in regard to the number of teachers receiving such instruction, no significant difference exists between the two groups. Therefore, the null hypothesis cannot be rejected.

TABLE XX

TEACHERS RECEIVING OTHER SHOP TRAINING WHILE ENROLLED IN HIGH SCHOOL

	Above-Average Departments		Below-Average Departments	
	Number	Per cent	Number	Per cent
Yes	8	26.67	16	53.33
No	22	73.33	14	46.67
Totals	30	100.00	30	100.00
Chi-square value of the degree of association between groups		= 4.44		

Teachers receiving other shop training while enrolled in high school. The data presented in Table XX reveal that 53.33 per cent of the teachers in Group Two had received other shop training while enrolled in high school, while only 26.67 per cent of those teachers in

Group One had received such instruction. The difference of 26.67 per cent between the two groups has a chi-square value of 4.44, in favor of Group Two. A chi-square value of this magnitude is significant at the five per cent level. Therefore, the null hypothesis must be rejected.

Data Regarding the Characteristics of the School Enrollment, School Physical Plant, School Policies, and Characteristics Pertaining to the Vocational Agriculture Department

The characteristics concerning the school and the vocational agriculture department were categorized into the following fourteen items of consideration: (1) average enrollment in high school during the last two years; (2) average enrollment in vocational agriculture during the last two years; (3) hours of instruction per week for each all-day class in vocational agriculture; (4) departments of vocational agriculture having young farmer classes; (5) average enrollment in young farmer classes; (6) departments having adult farmer classes; (7) average enrollment in adult farmer classes; (8) departments having shop facilities available for use; (9) departments sharing shop facilities with other departments in the local high school; (10) departments in which a shop was available at the time of the present teacher's initial employment in the department; (11) departments in which the school administration provides a budget for financing the farm mechanics program; (12) available shop floor space per student enrolled in the largest of the all-day classes in vocational agriculture; (13) four-year time allotment for farm mechanics instruction; and (14) departments in which the station method, or a modified version, is used in teaching farm mechanics.

TABLE XXI

FREQUENCY DISTRIBUTION OF THE AVERAGE ENROLLMENT IN HIGH SCHOOL DURING THE LAST TWO YEARS

Class Interval, Average Enrollment	Above-Average Departments		Below-Average Departments	
	Number	Per cent	Number	Per cent
276-Plus	3	10.00	4	13.33
251-275	0	0.00	2	6.67
226-250	2	6.67	1	3.33
201-225	4	13.33	1	3.33
176-200	1	3.33	3	10.00
151-175	2	6.67	2	6.67
126-150	4	13.33	4	13.33
101-125	1	3.33	0	0.00
76-100	6	20.00	6	20.00
51-75	7	23.33	7	23.33
Totals	30	100.00	30	100.00
Mean average enrollment		166.67		183.00
Difference between the mean average enrollments			- 26.37	
t-value of difference between the mean average enrollments			- 0.75	

Average enrollment in high school during the last two school years. The data presented in Table XXI show that the average enrollment in the high schools of Group One was 166.67, while the average enrollment in the high schools of Group Two was 183. The difference of 26.37, in the favor of Group Two, has a t-value of only 0.75 which is not significant at the five per cent level. Therefore, the null hypothesis cannot be rejected.

TABLE XXII

FREQUENCY DISTRIBUTION OF THE AVERAGE ENROLLMENT IN ALL-DAY CLASSES IN VOCATIONAL AGRICULTURE FOR THE LAST TWO SCHOOL YEARS

Class Interval, Average Enrollment	Above-Average Departments		Below-Average Departments	
	Number	Per cent	Number	Per cent
66-Plus	2	6.67	0	0.00
61-65	0	0.00	0	0.00
56-60	0	0.00	0	0.00
51-55	3	10.00	4	13.33
46-50	5	16.67	0	0.00
41-45	5	16.67	4	13.33
36-40	2	6.67	7	23.33
31-35	5	16.67	7	23.33
26-30	5	16.67	6	20.00
21-25	3	10.00	2	6.67
Totals	30	100.00	30	100.00
Mean average enrollment		40.57		37.20
Difference between the mean average enrollments			3.37	
t-value of difference between the mean average enrollments			1.21	

Average enrollment in all-day classes for the last two years. The data in Table XXII show that Group One has a mean average enrollment of 40.57, while Group Two has a mean average of 37.20. The difference of 3.37 between the means of the two groups has a t-value of 1.20 which is well below that required for significance at the five per cent level. Therefore, the null hypothesis may be considered as tenable.

TABLE XXIII

AVERAGE HOURS OF INSTRUCTION PER WEEK FOR EACH ALL-DAY CLASS IN VOCATIONAL AGRICULTURE

Hours Per Week	Above-Average Departments		Below-Average Departments	
	Number	Per cent	Number	Per cent
6	8	26.67	2	6.67
5	22	73.33	28	93.33
Totals	30	100.00	30	100.00
Chi-square value of the degree of association between groups		3.00		

Average hours of instruction per week for each all-day class in vocational agriculture. Table XXIII indicates that 73.33 per cent of the all-day classes of vocational agriculture in the departments of Group One met for five hours of instruction per week, and 93.33 per cent of the all-day classes in Group Two met for five hours per week. The chi-square value of 3.00, in favor of Group One, is not significant at the five per cent level. Therefore, the null hypothesis cannot be rejected. This table refers to the total hours of instruction per week in vocational agriculture, not just to the farm mechanics phase of vocational agriculture.

TABLE XXIV

VOCATIONAL AGRICULTURE DEPARTMENTS HAVING YOUNG FARMER CLASSES

	Above-Average Departments		Below-Average Departments	
	Number	Per cent	Number	Per cent
Yes	13	43.33	17	56.67
No	17	56.67	13	43.33
Totals	30	100.00	30	100.00
Chi-square value of the degree of association between groups		= 1.06		

Vocational agriculture departments having young farmer classes. The data presented in Table XXIV indicate that only 43.33 per cent of the departments in Group One have young farmer classes, and only 56.67 per cent of those in Group Two have such classes. The 13.34 difference in percentage, in favor of Group Two, has a chi-square value of only 1.06 which is considerably below that required for significance at the five per cent level. Therefore, the null hypothesis cannot be rejected. The data presented in this table indicate that there is a need for the expansion of young farmer instruction.

TABLE XXV

FREQUENCY DISTRIBUTION OF THE AVERAGE ENROLLMENT IN YOUNG FARMER CLASSES FOR THE LAST TWO YEARS

Class Interval, Number Enrolled	Above-Average Departments		Below-Average Departments	
	Number	Per cent	Number	Per cent
31-35	0	0.00	1	3.33
26-30	0	0.00	0	0.00
21-25	1	3.33	0	0.00
16-20	0	0.00	3	10.00
11-15	5	16.67	4	13.33
6-10	6	20.00	8	26.67
1-5	1	3.33	0	0.00
0	17	56.67	14	46.67
Totals	30	100.00	30	100.00
Mean average enrollment in young farmer classes		4.77		7.27
Difference between the mean average emrollment			= 2.50	
t-value of difference between the mean average enrollment			= 1.28	

Average enrollment in young farmer classes. The data in Table XXV show that the mean average enrollment in young farmer classes for the last two years for Group One is only 4.77, while the mean average for Group Two is 7.27. The difference of 2.50, in favor of Group Two, has a t-value of 1.28 which is not significant at the five per cent level. Therefore the null hypothesis cannot be rejected.

TABLE XXVI

VOCATIONAL AGRICULTURE DEPARTMENTS HAVING ADULT FARMER CLASSES

	Above-Average Departments		Below-Average Departments	
	Number	Per cent	Number	Per cent
Yes	28	93.33	28	93.33
No	2	6.67	2	6.67
Totals	30	100.00	30	100.00
Chi-square value of the degree of association between groups		0.00		

Vocational agriculture departments having adult farmer classes. The data presented in Table XXVI indicates that 93.33 per cent of both Group One and Group Two conduct adult farmer classes. The chi-square value of 0.00 indicates no difference, therefore the null hypothesis cannot be rejected.

Average enrollment in adult farmer classes for the last two years. As show in Table XXVII, the mean average enrollment in the adult farmer classes of Group One is 23.25, while Group Two has a mean average enrollment of 20.83 in adult farmer classes. The difference of 2.42 in the means of the two groups has a t-value of 0.54, in favor of Group One. This value is not significant at the five per cent level, therefore, the null hypothesis cannot be rejected.

TABLE XXVII

FREQUENCY DISTRIBUTION OF THE AVERAGE ENROLLMENT IN ADULT FARMER CLASSES FOR THE LAST TWO SCHOOL YEARS

Class Interval, Number Enrolled	Above-Average Departments		Below-Average Departments	
	Number	Per cent	Number	Per cent
46-Plus	1	3.33	1	3.33
41-45	0	0.00	1	3.33
36-40	4	13.33	4	13.33
31-35	1	3.33	0	0.00
26-30	0	0.00	1	3.33
21-25	2	6.67	2	6.67
16-20	7	23.33	6	20.00
11-15	11	36.67	6	20.00
6-10	2	6.67	1	3.33
1-5	0	0.00	2	6.7
0	2	6.67	6	20.00
Totals	30	100.00	30	100.00
Mean average enrollment		23.25		20.83
Difference between the mean average enrollments			2.42	
t-value of difference between the mean average enrollments			0.54	

Vocational agriculture departments having shop facilities available. The data presented in Table XXVIII show that 100 per cent of the departments in Group One have shop facilities available, while only 76.67 per cent of those departments in Group Two have such facilities available.

TABLE XXVIII

VOCATIONAL AGRICULTURE DEPARTMENTS HAVING SHOP FACILITIES AVAILABLE

	Above-Average Departments		Below-Average Departments	
	Number	Per cent	Number	Per cent
Yes	30	100.00	23	76.67
No	0	0.00	7	23.33
Totals	30	100.00	30	100.00
Chi-square value of the degree of association between groups		4.43*		

*Significant at the five per cent level.

The difference of 23.33 per cent, in favor of Group One, in departments having shop facilities available, is significant at the five per cent level as it has a chi-square value of 4.43. Therefore, the null hypothesis is rejected.

At this point the investigator suggests that the reader compare the data in the above table with that reported in Table XXX, concerning the percentage of vocational agricultural departments in which a shop was already available at the time of the present teacher's initial employment in the department. Such a comparison is likely to be found interesting.

TABLE XXIX

VOCATIONAL AGRICULTURE DEPARTMENTS SHARING SHOP FACILITIES WITH OTHER DEPARTMENTS IN THE HIGH SCHOOL

	Above-Average Departments		Below-Average Departments	
	Number	Per cent	Number	Per cent
Yes	4	13.33	6	26.08
No	26	86.67	17	73.92
Totals	30	100.00	30	100.00
Chi-square value of the degree of association between groups		= 0.94		

Vocational agriculture departments sharing shop facilities with other departments in the high school. Table XXIX indicates that only 13.33 per cent of the vocational agriculture departments in Group One shared shop facilities with other high school departments, whereas 26.08 per cent of those departments in Group Two shared shop facilities. However, the chi-square value of 0.94, in favor of Group Two, is not significant at the five per cent level. Therefore, the null hypothesis cannot be rejected. While sharing shop facilities is certainly not conducive to successful programs of farm mechanics, it is encouraging to note that successful programs can be conducted, as shown by the four departments in Group One, in spite of the handicap of having to share facilities.

TABLE XXX

VOCATIONAL AGRICULTURE DEPARTMENTS IN WHICH SHOP SPACE WAS ALREADY AVAILABLE WHEN THE PRESENT TEACHER BEGAN TEACHING IN THE DEPARTMENT

	Above-Average Departments		Below-Average Departments	
	Number	Per cent	Number	Per cent
Yes	9	30.00	17	56.67
No	21	70.00	13	43.33
Totals	30	100.00	30	100.00

Chi-square value of the degree of association between groups = 4.34*

*Significant at the five per cent level.

Vocational agriculture departments in which shop space was already available when the present teacher began teaching in the department. The data presented in Table XXX show that only 30 per cent of the vocational agriculture departments in Group One had shop space already available at the time of the present teacher's initial employment in the department, whereas 56.67 per cent of those in Group Two had shop space available. The chi-square value of 4.34, in favor of Group Two, is significant at the five per cent level. Therefore, the the null hypothesis must be rejected. The data presented in this

table suggests that the presence or absence of shop space at the time of the teacher's initial employment is not a critical factor in determining success in developing farm mechanics programs. This finding is somewhat contrary to the generally accepted idea that if teachers have facilities available they will use them.

TABLE XXXI

VOCATIONAL AGRICULTURE DEPARTMENTS FOR WHICH THE LOCAL SCHOOL ADMINISTRATION PROVIDES A BUDGET FOR FINANCING FARM MECHANICS INSTRUCTION

	Above-Average Departments		Below-Average Departments	
	Number	Per cent	Number	Per cent
Yes	4	13.33	0	0.00
No	26	86.67	23	100.00
Totals	30	100.00	30	100.00
Chi-square value of the degree of association between groups		0.63		

Vocational agriculture departments for which the local school administration provides a budget for the financing of farm mechanics instruction. Table XXXI indicates that only 13.33 per cent of those departments in Group One and none of the departments in Group Two were provided with a budget for the operation of the farm mechanics instructional program. The chi-square value of 0.63, in favor of Group One, is not significant at the five per cent level. Therefore,

the null hypothesis cannot be rejected. Although the data in this table show that very few departments have a farm mechanics budget, this does not indicate that the local administration does not provide financial assistance. Many of the departments are well financed as the need arises, rather than on a budget basis. This is a common procedure in the operation of instructional programs in a great many of our secondary schools.

TABLE XXXII

FREQUENCY DISTRIBUTION OF THE AVAILABLE SHOP FLOOR SPACE PER STUDENT ENROLLED IN LARGEST CLASS

Class Interval, In Square Feet	Above-Average Departments		Below-Average Departments	
	Number	Per cent	Number	Per cent
241-260	1	3.33	0	0.00
221-240	1	3.33	1	3.33
201-220	1	3.33	0	0.00
181-200	1	3.33	1	3.33
161-180	1	3.33	0	0.00
141-160	3	10.00	1	3.33
121-140	1	3.33	1	3.33
101-120	3	10.00	2	6.67
81-100	6	20.00	4	13.33
61-80	7	23.33	4	13.33
41-60	4	13.33	7	23.33
21-40	1	3.33	1	3.33
1-20	0	0.00	1	3.33
Totals	30	100.00	23	100.00
Mean square feet of floor space per student in largest class		109.83		89.04
Difference between the means of the square feet of floor space			20.79	
t-value of difference between the means			1.36	

Available shop floor space per student enrolled in the largest class in vocational agriculture. The data presented in Table XXXII show that the mean square feet of floor space per student for the departments in Group One is 109.83, while the departments in Group Two have a mean of 89.04 square feet per student enrolled in the largest class. The difference of 20.79 square feet between the two groups has a t-value of of 1.36, which is not significant at the five per cent level. Therefore, the null hypothesis cannot be rejected. The data presented in this table do not support the assumption, held by many teachers, that the more successful farm mechanics programs are nearly always those located in departments characterized by larger amounts of floor space per student. The data indicate no significant difference between the two groups.

Four year time allocation for instruction in farm mechanics. The data presented in Table XXXIII show that the mean number of hours allocated for instruction in farm mechanics by Group One is 187.17, whereas Group Two allocated a mean of 127.56 hours for instruction in farm mechanics during the four year period. The difference of 59.61 in the mean hours of instruction in farm mechanics by the two groups has a "t" test value of 4.20, in favor of Group One. A "t" test value of this magnitude is significant at the one per cent level, therefore, the null hypothesis is rejected. The data in this table appear to bear out the commonly held opinion that while time along does not ensure success, the allotment of a sufficient amount of time is certainly one of the prerequisites for the establishment of a successful program of instruction in farm mechanics.

The readers attention is called to the fact that the mean of the hours alloted for instruction in farm mechanics by Group Two, in Table XXXIII, was calculated with an N of 23, which is the number of departments in that group having farm mechanics facilities.

TABLE XXXIII

FREQUENCY DISTRIBUTION OF THE FOUR YEAR TIME ALLOCATION FOR INSTRUCTION IN FARM MECHANICS

Class Interval, Hours of Instruction	Above-Average Department		Below-Average Department	
	Number	Per cent	Number	Per cent
326-350	0	0.00	1	4.34
301-325	0	0.00	0	0.00
276-300	2	6.67	0	0.00
251-275	0	0.00	0	0.00
226-250	3	10.00	0	0.00
201-225	5	16.67	1	4.34
176-200	3	10.00	3	13.04
151-175	6	20.00	3	13.04
126-150	4	13.33	4	17.38
101-120	5	16.67	5	21.75
76-100	2	6.67	6	26.08
Totals	30	100.00	23	100.00
Mean hours of instruction		187.17		127.56
Difference between the mean hours of instruction			59.61	
t-value of difference between the mean hours of instruction			4.20**	

**Significant at the one per cent level.

TABLE XXXIV

VOCATIONAL AGRICULTURE DEPARTMENTS IN WHICH THE STATION METHOD, OR A MODIFIED VERSION, IS USED IN TEACHING FARM MECHANICS CLASSES

	Above-Average Departments		Below-Average Departments	
	Number	Per cent	Number	Per cent
Yes	18	60.00	5	21.74
No	12	40.00	18	78.26
Totals	30	100.00	23	100.00
Chi-square value of the degree of association between groups		6.30*		

*Significant at the five per cent level.

Departments in which the station method, or a modified version, is used in teaching farm mechanics. Table XXXIV indicates that 60 per cent of the teachers in the departments of Group One are using the station method, or a modified version, in the teaching of farm mechanics classes; whereas only 21.74 per cent of those in Group Two are using this method. The chi-square value of 6.30, in favor of Group One, is significant at the five per cent level; therefore, the null hypothesis is rejected. Successful teachers are in general agreement that the use of the station method, or a modified version, is certainly a contributing factor in effective programs of instruction, in-as-much as it helps

to ensure well rounded experiences in all of the areas of farm shop, and to a somewhat lesser degree, all of the other areas of the farm mechanics phase of vocational agriculture.

Data Regarding the Economic Characteristics of the Service Area of the School Districts

Data regarding the economic characteristics of the service area of the school districts include the following selected items: (1) average acres per farm; (2) average value of cultivated land per acre; (3) average value of pasture land per acre; (4) average number of beef cattle per farm; (5) average number of dairy cattle per farm; (6) average number of swine per farm; (7) average number of poultry per farm; (8) per cent of farms having pressure water systems; (9) per cent of farms having modern plumbing systems; (10) per cent of farms having tractors; (11) average number of tractors per farm; (12) per cent of farms having trucks, not including pickups; (13) per cent of farms having combines and/or other large items of harvest equipment; (14) per cent of farms having irrigation systems; (15) per cent of farms having farm mechanics facilities which are used; (16) per cent of farms having electric and/or acetylene welders; and (17-25) per cent of vocational agriculture departments in whose service areas wheat, cotton, forage crops, grain sorghums, peanuts, corn, beef, dairying, swine, or poultry production are major enterprises.

Average acres per farm in the service area of the school district. The data in Table XXXV show that the mean average acres per farm in the service area of the school districts in Group One is 319.07, and the mean of Group Two is 318.67 acres. The 0.40 acre difference in the

TABLE XXXV

FREQUENCY DISTRIBUTION OF THE AVERAGE ACRES PER FARM IN THE SERVICE AREA OF THE SCHOOL DISTRICT

Class Interval, Acres	Above-Average Departments		Below-Average Departments	
	Number	Per cent	Number	Per cent
901-Plus	1	3.33	1	3.33
851-900	1	3.33	0	0.00
801-850	0	0.00	0	0.00
751-800	0	0.00	0	0.00
701-750	0	0.00	0	0.00
651-700	0	0.00	0	0.00
601-650	1	3.33	0	0.00
551-600	1	3.33	0	0.00
501-550	0	0.00	0	0.00
451-500	0	0.00	2	6.67
401-450	1	3.33	1	3.33
351-400	2	6.67	3	10.00
301-350	3	10.00	6	20.00
251-300	4	13.33	2	6.67
201-250	6	20.00	5	16.67
151-200	9	30.00	5	16.67
101-150	1	3.33	5	16.67
Totals	30	100.00	30	100.00
Mean average acres per farm for the two groups		319.07		318.67
Difference between the mean average acres per farm of the two groups			0.60	
t-value of difference between the mean average acres per farm of the two groups			0.00	

mean average acres per farm of the two groups has a t-value of 0.00, and therefore the null hypothesis may be accepted as tenable.

TABLE XXXVI

FREQUENCY DISTRIBUTION OF THE ESTIMATED VALUE OF CULTIVATED LAND PER ACRE IN THE SERVICE AREA OF THE SCHOOL

Class Interval, Dollars per Acre	Above-Average Departments		Below-Average Departments	
	Number	Per cent	Number	Per cent
$271-300	2	6.67	1	3.33
241-270	1	3.33	1	3.33
211-240	0	0.00	0	0.00
181-210	5	16.67	3	10.00
151-180	1	3.33	3	10.00
121-150	5	16.67	4	13.33
91-120	8	26.67	6	20.00
61-90	3	10.00	8	26.67
31-60	3	10.00	4	13.33
1-30	2	6.67	0	0.00
Totals	30	100.00	30	100.00
Mean average value of cultivated land per acre		$135.00		$121.00
Difference between the mean average value of cultivated land per acre			$14.00	
t-value of difference between the means			0.76	

Estimated value of cultivated land per acre in the service area of the school. The data in Table XXXVI indicate that the mean average value of cultivated land per acre for the school districts in Group One is $135.00, with the school districts in Group Two having a mean

average value of $121.00 per acre. The difference of $14.00 per acre in the mean average value of land between the two groups has a t-value of only 0.76, which is greatly below the t-value of 2.00 needed for significance at the five per cent level. Therefore, the null hypothesis cannot be rejected.

TABLE XXXVII

FREQUENCY DISTRIBUTION OF THE ESTIMATED VALUE PER ACRE OF PASTURE LAND IN THE SERVICE AREA OF THE SCHOOL

Class Interval, Dollars per Acre	Above-Average Departments		Below-Average Departments	
	Number	Per cent	Number	Per cent
$91-100	4	13.33	1	3.33
81-90	0	0.00	2	6.67
71-80	5	16.67	4	13.33
61-70	2	6.67	3	10.00
51-60	2	6.67	6	20.00
41-50	5	16.67	3	10.00
31-40	8	26.67	4	13.33
21-30	2	6.67	6	20.00
11-20	1	3.33	1	3.33
Totals	30	100.00	30	100.00
Mean average value of pasture land per acre		$58.00		$54.00
Difference between the means of the average values per acre			$4.00	
t-value of difference between the means			0.67	

Estimated average value per acre of pasture land in the service area of the school district. The data presented in Table XXXVII show that the mean average value of pasture land in Group One is $58.00 per acre, whereas Group Two has a mean average value of $54.00 per acre. The difference of $4.00 per acre in the mean average value between the two groups has a t-value of 0.67, which is not significant at the five per cent level. Therefore, the null hypothesis cannot be rejected.

The term "pasture land" as used in Table XXXVII refers to grassland on which there is no or only scattered trees. Heavy timber land or waste land of any kind is not considered in calculating the average value of pasture land.

Estimated average number of beef cattle per farm in the service area of the school. An examination of the data presented in Table XXXVIII reveals that Group One has a mean average of 33.87 head of beef cattle per farm in the service area of the school, whereas Group Two has a mean average of 33.50 head of beef cattle per farm in the service area of the school. The difference of 0.37 between the mean average number of beef cattle per farm of the two groups has a t-value of only 0.04, which is not significant at the five per cent level. Therefore, the null hypothesis may be considered as tenable.

TABLE XXXVIII

FREQUENCY DISTRIBUTION OF THE ESTIMATED AVERAGE NUMBER OF BEEF CATTLE PER FARM IN THE SERVICE AREA OF THE SCHOOL

Class Interval, Head per Farm	Above-Average Departments		Below-Average Departments	
	Number	Per cent	Number	Per cent
121-132	1	3.33	1	3.33
109-120	0	0.00	0	0.00
97-108	1	3.33	1	3.33
85-96	0	0.00	0	0.00
73-84	1	3.33	0	0.00
61-72	1	3.33	0	0.00
49-60	2	6.67	2	6.67
37-48	2	6.67	2	6.67
25-36	8	26.67	13	43.33
13-24	7	23.33	5	16.67
1-12	7	23.33	6	20.00
Totals	30	100.00	30	100.00
Mean average number of beef cattle per farm		33.80		33.50
Difference between the means			0.37	
t-value of differs between means			0.04	

TABLE XXXIX

FREQUENCY DISTRIBUTION OF THE ESTIMATED AVERAGE NUMBER OF DAIRY CATTLE PER FARM IN THE SERVICE AREA OF THE SCHOOL

Class Interval, Head per Farm	Above-Average Departments		Below-Average Departments	
	Number	Per cent	Number	Per cent
17-18	1	3.33	0	0.00
15-16	2	6.67	1	3.33
13-14	0	0.00	0	0.00
11-12	0	0.00	3	10.00
9-10	3	10.00	4	13.33
7-8	1	3.33	1	3.33
5-6	7	23.33	3	10.00
3-4	6	20.00	9	30.00
1-2	6	20.00	6	20.00
0	4	13.33	3	10.00
Totals	30	100.00	30	100.00
Mean average number of dairy cattle per farm		5.07		5.07
Difference between the means			0.00	
t-value of difference between means			0.00	

Estimated average number of dairy cattle per farm in the service area of the school. The data presented in Table XXXIX show that both Group One and Group Two have a mean average of 5.07 dairy cattle per farm in the service area of the school. Since the data do not reveal any difference between the two groups, the null hypothesis is therefore considered tenable.

TABLE XL

FREQUENCY DISTRIBUTION OF THE ESTIMATED AVERAGE NUMBER OF SWINE PER FARM IN THE SERVICE AREA OF THE SCHOOL

Class Interval, Head per Farm	Above-Average Departments		Above-Average Departments	
	Number	Per cent	Number	Per cent
25-Plus	1	3.33	4	13.33
23-24	0	0.00	0	0.00
21-22	0	0.00	0	0.00
19-20	1	3.33	2	6.67
17-18	0	0.00	1	3.33
15-16	1	3.33	1	3.33
13-14	0	0.00	0	0.00
11-12	2	6.67	2	6.67
9-10	3	10.00	5	16.67
7-8	2	6.67	1	3.33
5-6	11	36.67	6	20.00
3-4	5	16.67	3	10.00
1-2	4	13.33	5	16.67
Totals	30	100.00	30	100.00
Mean average number of swine per farm		7.27		10.90
Difference between the means			- 3.63	
t-value of difference between means			- 1.68	

Estimated average number of swine per farm in the service area of the school. The data presented in Table XL show that the farms in Group One have a mean average of 7.27 head of swine per farm, while those in Group Two have a mean average of 10.90 head per farm. The difference of 3.63 head of swine per farm, in favor of Group Two, has a t-value of 1.68, which is well below the 2.00 value required for significance at the five per cent level. Therefore, the null hypothesis cannot be rejected.

TABLE XLI

FREQUENCY DISTRIBUTION OF THE ESTIMATED AVERAGE NUMBER OF POULTRY PER FARM IN THE SERVICE AREA OF THE SCHOOL

Class Interval, Head per Farm	Above-Average Departments		Below-Average Departments	
	Number	Per cent	Number	Per cent
226-Plus	1	3.33	1	3.33
201-225	0	0.00	0	0.00
176-200	0	0.00	1	3.33
151-175	0	0.00	0	0.00
126-150	0	0.00	0	0.00
101-120	0	0.00	1	3.33
76-100	2	6.67	1	3.33
51-75	0	0.00	1	3.33
26-50	5	16.67	3	10.00
1-25	20	66.67	20	66.67
0	2	6.67	2	6.67
Totals	30	100.00	30	100.00
Mean average number of poultry per farm		42.17		33.17
Difference between the means			9.00	
t-value of difference between means			0.45	

Estimated average number of poultry per farm in the service area of the school. The data presented in Table XLI show that the farms in Group One have a mean average of 42.17 head of poultry per farm, while Group Two has a mean average of 33.17 head of poultry per farm. The difference of 9.00 head per farm, in favor of Group One, has a t-value of 0.45 which is not significant at the five per cent level. Therefore, the null hypothesis cannot be rejected.

TABLE XLII

FREQUENCY DISTRIBUTION OF THE PERCENTAGE OF FARMS HAVING PRESSURE WATER SYSTEMS

Class Interval, Per cent	Above-Average Departments		Below-Average Departments	
	Number	Per cent	Number	Per cent
91-100	8	26.67	9	30.00
81-90	10	33.33	9	30.00
71-80	5	16.67	5	16.67
61-70	0	0.00	2	6.67
51-60	4	13.33	0	0.00
41-50	2	6.67	2	6.67
31-40	0	0.00	0	0.00
21-30	1	3.33	1	3.33
11-20	0	0.00	0	0.00
1-1-	0	0.00	2	6.67
Totals	30	100.00	30	100.00
Mean percentage of farms having pressure water systems		80.27		77.67
Difference between the means			2.60	
t-value of difference between means			0.46	

Percentage of farms having pressure water systems. The data in Table XLII show that the mean percentage of farms having pressure water systems is 80.27 for Group One, and 77.67 for Group Two. The difference of 2.60 per cent between the means of the two groups has a t-value of only 0.46, in favor of Group One, which is not significant at the five per cent level. Therefore, the null hypothesis cannot be rejected.

TABLE XLIII

FREQUENCY DISTRIBUTION OF THE PERCENTAGE OF FARM HOMES HAVING MODERN PLUMBING SYSTEMS

Class Interval, Per cent	Above-Average Departments		Below-Average Departments	
	Number	Per cent	Number	Per cent
91-100	3	10.00	1	3.33
81-90	7	23.33	7	23.33
71-80	6	20.00	9	30.00
61-70	3	10.00	2	6.67
51-60	1	3.33	4	13.33
41-50	3	10.00	1	3.33
31-40	4	13.33	1	3.33
21-30	2	6.67	2	6.67
11-20	1	3.33	0	0.00
1-10	0	0.00	3	10.00
Totals	30	100.00	30	100.00
Mean percentage of farms having modern plumbing systems		67.40		64.20
Difference between the means			3.20	
t-value of difference between the means			0.09	

Percentage of farm homes having modern plumbing systems. The data presented in Table XLIII show that the mean percentage of farm homes having modern plumbing systems is 67.40 for Group One and 64.20 for Group Two. The percentage difference of 3.20 between the means of the two groups has a t-value of only 0.09, in favor of Group One, which is greatly below the level of significance required at the five per cent level. Therefore, the null hypothesis cannot be rejected.

TABLE XLIV

FREQUENCY DISTRIBUTION OF THE PERCENTAGE OF FARMS HAVING TRACTORS

Class Interval, Per cent	Above-Average Departments		Below-Average Departments	
	Number	Per cent	Number	Per cent
91-100	22	73.33	21	70.00
81-90	4	13.33	3	10.00
71-80	2	6.67	3	10.00
61-70	2	6.67	1	3.33
51-60	0	0.00	0	0.00
41-50	0	0.00	0	0.00
31-40	0	0.00	0	0.00
21-30	0	0.00	0	0.00
11-20	0	0.00	2	6.67
Totals	30	100.00	30	100.00
Mean percentage of farms having tractors		94.67		89.30
Difference between the means			5.37	
t-value of difference between means			1.28	

Percentage of farms having tractors. The data presented in Table XLIV show that the mean percentage of farms having tractors is 94.67 for Group One and 89.30 for Group Two. The percentage difference of 5.37 between the two groups has a t-value of 1.28, in favor of Group One, which is well below that required for significance at the five per cent level. Therefore, the null hypothesis cannot be rejected.

TABLE XLV

FREQUENCY DISTRIBUTION OF THE AVERAGE NUMBER OF TRACTORS PER FARM

Class Interval, Average Number per Farm	Above-Average Departments		Below-Average Departments	
	Number	Per cent	Number	Per cent
2.26-2.50	1	3.33	1	3.33
2.01-2.25	0	0.00	0	0.00
1.76-2.00	3	10.00	7	23.33
1.51-1.75	2	6.67	0	0.00
1.26-1.50	10	33.33	9	30.00
1.01-1.25	9	30.00	6	20.00
0.76-1.00	5	16.67	5	16.67
0.51-0.75	0	0.00	0	0.00
0.26-0.50	0	0.00	0	0.00
0.01-0.25	0	0.00	1	3.33
Totals	30	100.00	30	100.00
Mean average number of tractors per farm		1.45		1.42
Difference between the means			0.03	
t-value of difference between means			0.07	

Average number of tractors per farm. The data presented in Table XLV show that the farms in Group One have an average of 1.45 tractors per farm, whereas those in Group Two have an average of 1.42 tractors.

The t-value of 0.07, in favor of Group One, is not significant at the five per cent level; therefore, the null hypothesis is tenable.

TABLE XLVI

FREQUENCY DISTRIBUTION OF THE PERCENTAGE OF FARMS HAVING TRUCKS, NOT INCLUDING PICKUPS

Class Interval, Per cent	Above-Average Departments		Below-Average Departments	
	Number	Per cent	Number	Per cent
91-100	1	3.33	0	0.00
81-90	0	0.00	1	3.33
71-80	1	3.33	1	3.33
61-70	1	3.33	0	0.00
51-60	0	0.00	2	6.67
41-50	5	16.67	5	16.67
31-40	2	6.67	1	3.33
21-30	4	13.33	6	20.00
11-20	3	10.00	4	13.33
1-10	13	43.33	10	33.33
Totals	30	100.00	30	100.00
Mean percentage of farms having trucks		28.20		27.70
Difference between the means			0.50	
t-value of difference between means			0.24	

Percentage of farms having trucks, not including pickups. The data presented in Table XLVI show that the mean percentage of farms having farm trucks in Group One is 28.20, while the mean of Group Two is 27.70. The mean difference of 0.50 per cent between the two groups has a t-value of 0.24, in favor of Group One, which is not significant at the five per cent level. Therefore, the null hypothesis cannot be rejected.

TABLE XLVII

FREQUENCY DISTRIBUTION OF THE PERCENTAGE OF FARMS HAVING COMBINES AND/OR OTHER LARGE ITEMS OF HARVEST MACHINERY

Class Interval, Per cent	Above-Average Departments		Below-Average Departments	
	Number	Per cent	Number	Per cent
91-100	2	6.67	1	3.33
81-90	2	6.67	4	13.33
71-80	5	16.67	2	6.67
61-70	1	3.33	1	3.33
51-60	3	10.00	3	10.00
41-50	3	10.00	5	16.67
31-40	2	6.67	2	6.67
21-30	2	6.67	3	10.00
11-20	1	3.33	5	16.67
1-10	9	30.00	4	13.33
Totals	30	100.00	30	100.00
Mean percentage of farms having large harvest machinery		45.50		45.50
Difference between the means			0.00	
t-value of difference between means			0.00	

Percentage of farms having combines and/or other large items of harvest machinery. The data presented in Table XLVII show that the mean percentage of farms having combines and/or other large items of harvest machinery is 45.50 for both Group One and Group Two. Since there is no apparent difference in the mean percentages of the two groups, the null hypothesis may be considered as tenable.

TABLE XLVIII

FREQUENCY DISTRIBUTION OF THE PERCENTAGE OF FARMS HAVING IRRIGATION SYSTEMS

Class Interval, Per cent	Above-Average Departments		Below-Average Departments	
	Number	Per cent	Number	Per cent
19-20	1	3.33	0	0.00
17-18	0	0.00	0	0.00
15-16	1	3.33	1	3.33
13-14	0	0.00	0	0.00
11-12	0	0.00	0	0.00
9-10	1	3.33	2	6.67
7-8	0	0.00	1	3.33
5-6	0	0.00	2	6.67
3-4	2	6.67	3	10.00
1-2	12	40.00	7	23.33
0	13	43.33	14	46.67
Totals	30	100.00	30	100.00
Mean percentage of farms having irrigation systems		2.37		2.47
Difference between the means			- 0.10	
t-value of difference between means			- 0.09	

Percentage of farms having irrigation systems. The data in Table XLVIII show that the mean percentage of farms having irrigation systems in Group One is 2.37, whereas the mean of Group Two is 2.47. The t-value of the difference between the means is 0.09, in favor of Group Two, which is not significant at the five per cent level. Therefore, the null hypothesis cannot be rejected.

TABLE XLIX

FREQUENCY DISTRIBUTION OF FARMS HAVING FARM MECHANICS FACILITIES WHICH THEY USE

Class Interval. Per cent	Above-Average Departments		Below-Average Departments	
	Number	Per cent	Number	Per cent
61-Plus	3	10.00	2	6.67
56-60	1	3.33	0	0.00
51-55	1	3.33	0	0.00
46-50	3	10.00	1	3.33
41-45	0	0.00	0	0.00
36-40	1	3.33	3	10.00
31-35	2	6.67	1	3.33
26-30	0	0.00	1	3.33
21-25	1	3.33	1	3.33
16-20	2	6.67	2	6.67
11-15	2	6.67	5	16.67
6-10	3	10.00	6	20.00
1-5	10	33.33	7	23.33
0	1	3.33	1	3.33
Totals	30	100.00	30	100.00
Mean percentage of farms having farm mechanics facilities in use		24.87		19.77
Difference between the means			5.10	
t-value of difference between means			2.74**	

**Significant at the one per cent level.

Percentage of farms having farm mechanics facilities which are used. The data presented in Table XLIX show that the mean percentage of farms having farm mechanics facilities in Group One is 24.87, and in Group Two is 19.77. The difference of 5.10 in the mean percentages of the two groups has a t-value of 2.74, in favor of Group One. A t-value of this magnitude is significant at the one per cent level, therefore, the null hypothesis must be rejected. It would be somewhat

enteresting to speculate on the possible influence of the vocational agriculture teacher, through his community service program, on the establishment of farm mechanics facilities.

TABLE L

FREQUENCY DISTRIBUTION OF THE PERCENTAGE OF FARMS HAVING ELECTRIC AND/OR ACETYLENE WELDERS

Class Interval. Per cent	Above-Average Departments		Below-Average Departments	
	Number	Per cent	Number	Per cent
41-Plus	2	6.67	2	6.67
36-40	2	6.67	1	3.33
31-35	0	0.00	1	3.33
26-30	1	3.33	2	6.67
21-25	2	6.67	1	3.33
16-20	1	3.33	3	10.00
11-15	1	3.33	2	6.67
6-10	5	16.67	6	20.00
1-5	15	50.00	11	36.67
0	1	3.33	1	3.33
Totals	30	100.00	30	100.00
Mean percentage of farms having welders		13.77		13.77
Difference between the means			0.00	
t-value of difference between means			0.00	

Percentage of farms having electric and/or acetylene welders. The data presented in Table L show that the mean percentage of farms having electric and/or acetylene welders is 13.77 for both Group One and Group Two. Since the data in this table do not show any difference in the mean percentage of farms having welders, the null hypothesis cannot be rejected.

TABLE LI

VOCATIONAL AGRICULTURE DEPARTMENTS IN WHOSE SERVICE AREAS WHEAT IS A MAJOR CROP ENTERPRISE

	Above-Average Departments		Below-Average Departments	
	Number	Per cent	Number	Per cent
Yes	14	46.67	17	56.67
No	16	53.33	13	43.33
Totals	30	100.00	30	100.00
Chi-square value of the degree of association between groups		0.60		

Vocational agriculture departments in whose service areas wheat is a major crop enterprise. The data presented in Table LI show that 46.67 per cent of the vocational agricultural service areas in Group One have wheat as a major crop enterprise; whereas 56.67 per cent of those in Group Two have wheat as a major crop enterprise. The difference of 10.00 per cent in those having wheat as a major crop enterprise has a chi-square value of 0.60, in favor of Group Two, which is greatly below the 3.84 value required for significance at the five per cent level. Therefore, the null hypothesis cannot be rejected.

TABLE LII

VOCATIONAL AGRICULTURE DEPARTMENTS IN WHOSE SERVICE AREAS COTTON IS A MAJOR CROP ENTERPRISE

	Above-Average Departments		Below-Average Departments	
	Number	Per cent	Number	Per cent
Yes	5	16.67	8	26.67
No	25	83.33	22	73.33
Totals	30	100.00	30	100.00
Chi-square value of the degree of association between groups		0.35		

Vocational agriculture departments in whose service areas cotton is a major crop enterprise. The data presented in Table LII show that only 16.67 per cent of the service areas in Group One have cotton as a major crop enterprise, and only 26.67 per cent of those in Group Two have cotton as a major crop enterprise. The difference of 10.00 per cent, in favor of Group Two, has a chi-square value of 0.35, which is somewhat below that required for significance at the five per cent level. Therefore, the null hypothesis may be considered as tenable.

TABLE LIII

VOCATIONAL AGRICULTURE DEPARTMENTS IN WHOSE SERVICE AREAS FORAGE CROP PRODUCTION IS A MAJOR CROP ENTERPRISE

	Above-Average Departments		Below-Average Departments	
	Number	Per cent	Number	Per cent
Yes	15	50.00	20	66.67
No	15	50.00	10	33.33
Totals	30	100.00	30	100.00
Chi-square value of the degree of association between groups		1.71		

Vocational agriculture departments in whose service areas forage crop production is a major crop enterprise. As indicated by the data in Table LIII, 50 per cent of the service areas in Group One have forage crop production as a major crop enterprise, and 66.67 per cent of those in Group Two have forage crop production as a major crop enterprise. The difference of 16.67 per cent, in favor of Group Two, has a chi-square value of 1.71, which is considerably below that required for significance at the five per cent level. Therefore, the null hypothesis cannot be rejected.

TABLE LIV

VOCATIONAL AGRICULTURE DEPARTMENTS IN WHOSE SERVICE AREAS GRAIN SORGHUM PRODUCTION IS A MAJOR CROP ENTERPRISE

	Above-Average Departments		Below-Average Departments	
	Number	Per cent	Number	Per cent
Yes	10	33.33	11	36.67
No	20	66.67	19	63.33
Totals	30	100.00	30	100.00
Chi-square value of the degree of association between groups		0.07		

Vocational agriculture departments in whose service areas grain sorghum production is a major crop enterprise. The data presented in Table LIV show that 33.33 per cent of the service areas of Group One and 36.67 per cent of those in Group Two have grain sorghum production as a major crop enterprise. The difference of 3.33 per cent has a chi-square value of 0.07, in favor of Group Two, which is greatly below that required for significance at the five per cent level. Therefore, the null hypothesis cannot be rejected.

TABLE LV

VOCATIONAL AGRICULTURE DEPARTMENTS IN WHOSE SERVICE AREAS PEANUT PRODUCTION IS A MAJOR CROP ENTERPRISE

	Above-Average Departments		Below-Average Departments	
	Number	Per cent	Number	Per cent
Yes	8	26.67	4	13.33
No	22	73.33	26	86.67
Totals	30	100.00	30	100.00
Chi-square value of the degree of association between groups		0.94		

Vocational agriculture departments in whose service areas peanut production is a major crop enterprise. The data in Table LV indicates that 26.67 per cent of the services areas of Group One have peanut production as a major crop enterprise, whereas only 13.33 per cent of those in Group Two have peanut production as a major crop enterprise. The difference of 13.33 per cent in the two groups has a chi-square value of 0.94, in favor of Group One, which is not significant at the five per cent level. Therefore, the null hypothesis may be considered as tenable.

TABLE LVI

VOCATIONAL AGRICULTURE DEPARTMENTS IN WHOSE SERVICE AREAS CORN PRODUCTION IS A MAJOR CROP ENTERPRISE

	Above-Average Departments		Below-Average Departments	
	Number	Per cent	Number	Per cent
Yes	6	20.00	6	20.00
No	24	80.00	24	80.00
Totals	30	100.00	30	100.00
Chi-square value of the degree of association between groups		0.00		

Vocational agriculture departments in whose service areas corn production is a major crop enterprise. The data presented in Table LVI show that 20 per cent of both Group One and Group Two have corn production as a major crop enterprise in the service areas. Since the data show no difference between the two groups, the null hypo- must be considered as tenable.

Vocational agriculture departments in whose service areas beef production is a major animal enterprise. The data in Table LVII show that all of the service areas in both Group One and Group Two have beef production as a major animal enterprise. Therefore, the null hypothesis cannot be reject.

TABLE LVII

VOCATIONAL AGRICULTURE DEPARTMENTS IN WHOSE SERVICE AREAS BEEF PRODUCTION IS A MAJOR ANIMAL ENTERPRISE

	Above-Average Departments		Below-Average Departments	
	Number	Per cent	Number	Per cent
Yes	30	100.00	30	100.00
No	0	0.00	0	0.00
Totals	30	100.00	30	100.00
Chi-square value of the degree of association between groups		0.00		

TABLE LVIII

VOCATIONAL AGRICULTURE DEPARTMENTS IN WHOSE SERVICE AREAS DAIRY PRODUCTION IS A MAJOR ANIMAL ENTERPRISE

	Above-Average Departments		Below-Average Departments	
	Number	Per cent	Number	Per cent
Yes	13	43.33	12	40.00
No	17	56.67	18	60.00
Totals	30	100.00	30	100.00
Chi-square value of the degree of association between groups		0.07		

Vocational agriculture departments in whose service areas dairy production is a major animal enterprise. The data presented in Table

LVIII show that 43.33 per cent of the service areas in Group One and 40 per cent of those in Group Two have dairy production as a major animal enterprise. The chi-square value of 0.07, in favor of Group One, is not significant at the five per cent level. Therefore, the null hypothesis cannot be rejected.

TABLE LIX

VOCATIONAL AGRICULTURE DEPARTMENTS IN WHOSE SERVICE AREAS SWINE PRODUCTION IS A MAJOR ANIMAL ENTERPRISE

	Above-Average Departments		Below-Average Departments	
	Number	Per cent	Number	Per cent
Yes	5	16.67	12	40.00
No	25	83.33	18	60.00
Totals	30	100.00	30	100.00
Chi-square value of the degree of association between groups		2.95		

Vocational agriculture departments in whose service areas swine production is a major animal enterprise. The data in Table LIX show that 40 per cent of the service areas in Group Two have swine production as a major animal enterprise, whereas only 16.67 per cent of those in Group One have swine production as a major animal enterprise. The chi-square value of 2.95, in favor of Group Two, is somewhat below the 3.84 value required for significance at the five per cent level. Therefore, the null hypothesis cannot be rejected.

CHAPTER V

SUMMARY, CONCLUSIONS, AND IMPLICATIONS

Problem of the Study

It is a rather common assumption among teachers of vocational agriculture that there are certain factors which are associated with the probability of developing successful programs of instruction in farm mechanics. However, there is much diversity of opinion as to just what factors are significant, and the relative significance of of each factor. It was to contribute to at least a partial clarification of this assumption that this study was undertaken.

The central problem of this study was to determine what factors are associated to a greater degree with the occurrence of above-average instructional programs in farm mechanics, than with the occurrence of below-average programs of instruction in farm mechanics.

Methods and Procedures of the Study

This study was designed to test a number of null hypotheses concerned with the possible existence of significant differences between departments of vocational agriculture having above-average programs of instruction in farm mechanics, and departments of vocational agriculture having below-average programs of instruction in farm mechanics.

Null hypotheses were tested to provide evidence which might support the acceptance of the major null hypothesis that with regard to

certain selected personal background characteristics of teachers of vocational agriculture, certain selected characteristics of the high schools and the vocational agriculture departments, and certain selected economic characteristic of the school service areas, significant differences do not exist between those departments of vocational agriculture adjudged to have above-average programs of instruction in farm mechanics, and those departments of vocational agriculture adjudged to have below-average programs of instruction in farm mechanics.

The personal interview technique was selected as the most appropriate method of obtaining data for this study. In order to assure uniformity in interview procedure, the investigator personally conducted all interviews.

Interviews were conducted with 30 teachers selected from each of two groups of departments adjudged, by their district supervisors, as having either above-average or below-average programs of instruction in farm mechanics. To assure a geographical distribution in the samples, the two populations were stratified according to the five supervisory districts of vocational agriculture in Oklahoma. The 30 departments in each of the two groups were randomly selected, using a table of random numbers, from the five supervisory districts on a proportional basis. Thus the sampling technique was one of stratified random sampling.

The departments randomly selected from the group adjudged to be above-average, according to the effectiveness of their program of instruction in farm mechanics, are referred to as Group One. Those departments randomly selected from the group adjudged to be below

average, according to the effectiveness of their program of instruction in farm mechanics, are referred to as Group Two.

The interview schedule used in obtaining the data from the 60 teachers of vocational agriculture, was designed to obtain the necessary data for testing the stated hypotheses of this study. The interview schedule used was constructed with the assistance of the teacher training staff in agricultural education at the Oklahoma State University, and the district supervisors of vocational agriculture of the State of Oklahoma. The items included in the schedule were ones which numerous teachers of vocational agriculture have considered as having possible association with successful programs of instruction in farm mechanics.

The tentative interview schedule was used to interview three teachers, who were not included in this study, in order to check it for clarity. After the schedule was formulated into its final form it was used in interviewing the teachers of vocational agriculture in this study.

Summary of Findings Regarding the Hypotheses Tested

The tabulated data obtained in this study were subjected to appropriate statistical analysis in order to test the stated null hypotheses. The level of significance required for rejection of the null hypotheses in this study was set at the five per cent level. The statistical analysis of the data obtained concerning each factor resulted in most of the null hypotheses being sustained, however, a few were rejected.

Hypotheses regarding personal background characteristics of the vocational agriculture teacher. Of the 20 hypotheses tested regard personal background characteristics of the vocational agriculture teachers, only two were rejected. It was found that between departments of vocational agriculture adjudged to have above-average programs of instruction in farm mechanics and those adjudged to have below-average programs of instruction in farm mechanics, significant differences do not exist in regard to:

(1) age of teacher,

(2) years of teaching experience in vocational agriculture,

(3) years of teaching experience in present department,

(4) number of college hours credit in farm mechanics,

(5) teachers having college training in arc and acetylene welding,

(6) teachers having college training in cold metal work,

(7) teachers having college training in farm carpentry,

(8) teachers having college training in electrical wiring,

(9) teachers having college training in hot metal work,

(10) teachers having taken college courses in farm machinery,

(11) number of college hours credit in other courses of a mechanical nature,

(12) teachers having taken college courses in farm structures,

(13) teachers having college training in soil and water conservation structures,

(14) teachers having college training in irrigation practices,

(15) teachers having received organized civilian mechanical instruction below the college level,

(16) teachers having received instruction of a mechanical nature while in the armed forces,

(17) teachers having well equipped farm shops on their home farms while they were enrolled in high school, and

(18) teachers receiving farm mechanics instruction while enrolled in high school.

It was found that between departments of vocational agriculture adjudged to have above-average programs of instruction in farm mechanics and those departments adjudged to have below-average programs of instruction in farm mechanics, significant difference do exist in regard to:

(1) teachers receiving other types of shop training while enrolled in high school, and

(2) teachers having college training in farm surveying. This finding should not be taken to infer that training in farm surveying is detrimental in itself, but that teachers taking it may have done so at the expense of more useful courses. (See explanation in discussion of Table XIII.)

Hypotheses regarding characteristics of the schools and vocational agriculture departments. Of the 14 hypotheses tested regarding the characteristics of the individual schools and vocational agriculture departments, only ten were sustained. It was found that significant differences do not exist between those departments of vocational agriculture adjudged to have above-average programs of instruction in farm mechanics, and those departments adjudged to have below-average programs of instruction in farm mechanics, with regard to the following characteristics of the individual schools and departments of vocational agriculture:

(1) average enrollment in high school (four year) during the last two school years,

(2) average enrollment in all-day classes in vocational agriculture during the last two school years,

(3) average hours of instruction per week for each all-day class in vocational agriculture,

(4) vocational agriculture departments having young farmer classes,

(5) average enrollment in young farmer classes for the last two school years,

(6) vocational agriculture departments having adult farmer classes,

(7) average enrollment in adult farmer classes during the last two school years,

(8) departments of vocational agriculture sharing shop facilities with other high school departments,

(9) departments of vocational agriculture for which the local school administration provides a budget for the financing of farm mechanics instruction, and

(10) available shop floor space per student enrolled in the largest class of vocational agriculture.

It was found that between departments of vocational agriculture adjudged to have above-average programs of instruction in farm mechanics, and those departments adjudged to have below-average programs of instruction in farm mechanics, significant differences do exist in regard to:

(1) departments having a shop available for use,

(2) departments in which shop space was already available at the time of the present teacher's initial employment in the department,

(3) number of hours in the four-year time allotment for farm mechanics instruction, and

(4) departments in which the station method, or a modified version, is used in teaching farm mechanics.

Hypotheses regarding economic characteristics of the service areas of the schools. Eighteen hypotheses were tested regarding the economic characteristics of the service areas of the schools. The data obtained sustained all except one of the 18 hypotheses. It was found that between those departments of vocational agriculture adjudged to have above-average programs of instruction in farm mechanics, and those departments adjudged to have below-average programs of instruction in farm mechanics, significant differences do not exist with regard to the following economic characteristics of the service areas of the schools:

(1) average acres per farm,

(2) average value of cultivated land per acre,

(3) average value of pasture land per acre,

(4) average number of beef cattle per farm,

(5) average number of dairy cattle per farm,

(6) average number of swine per farm,

(7) average number of poultry per farm,

(8) percentage of farms having pressure water systems,

(9) percentage of farm homes having modern plumbing systems,

(10) percentage of farms having tractors,

(11) average number of tractors per farm,

(12) percentage of farms having trucks, not including pickups,

(13) percentage of farms having combines and/or other large items of harvest equipment,

(14) percentage of farms having irrigation systems,

(15) percentage of farms having electric and/or acetylene welders,

(16) major crops in the service area of the school, and

(17) major animal enterprises in the service area of the school.

Pertaining to the hypothesis rejected, it was found that between those departments having above-average and those departments having below-average programs of instruction in farm mechanics, a significant difference does exist in regard to the percentage of farms having farm mechanics facilities in use.

Conclusions Based Upon Hypotheses Tested

Of the 20 hypotheses tested concerning the personal background characteristics of the vocational agriculture teacher, 18 were sustained. Therefore it may be concluded that between departments of vocational agriculture adjudged to have above-average programs of instruction in farm mechanics, and those departments adjudged to have below-average programs of instruction in farm mechanics, significant differences do not exist in regard to the teacher characteristics of age; years of teaching experience in vocational agriculture; tenure in present department; college hours credit in farm mechanics courses; having college training in arc and acetylene welding, hot and cold metal work, farm carpentry, farm machinery, and electrical wiring; college hours credit in other

courses of a mechanical nature; having college training in farm structures, soil and water conservation structures, and irrigation practices; having instruction of a mechanical nature in the armed forces; having organized civilian mechanical training below the college level; having a well equipped farm shop on home farm while enrolled in high school; and having farm mechanics training in high school.

The foregoing conclusion is further strengthened by the fact that data were taken from randomly selected teachers with a range in age from 23 to 58 years, with relatively equal scatter of ages about the mean in both groups. Since all of the teachers in both groups, with the exception of one, had received their undergraduate training at the Oklahoma State University, and the scatter of ages about the mean was approximately the same, we may infer that the two groups were probably exposed to the same quality of college instruction in farm mechanics courses, and other courses of a mechanical nature.

In regard to teachers receiving other types of shop training in high school, a significant difference does exist, in favor of Group Two; therefore, we may assume that an association does seem to exist between this factor and the occurrence of below-average programs of instruction in farm mechanics.

Fourteen hypotheses regarding characteristics of the schools and vocational agriculture departments were tested, of which ten were sustained. It may be concluded that average enrollment in high school, average enrollment in vocational agriculture all-day classes, average hours of instruction per week per all-day class, having young farmer classes, average enrollment in young farmer classes, having adult farmer classes, average enrollment in adult farmer classes, sharing shop

facilities with other high school departments, having a budget for school financing of farm mechanics instruction, and shop floor space per student enrolled in the largest vocational agriculture class are not factors which are significantly associated with either above-average or below-average programs of instruction in farm mechanics.

In regard to departments in which a shop was already available at the time of the present teacher's initial employment in the department, it was found that this factor is significantly associated with below-average programs of instruction in farm mechanics. Therefore, we may conclude that not having shop facilities at the time of initial employment is not, ordinarily, a justifiable reason for not developing an effective instructional program in farm mechanics within a relatively few years.

In regard to departments having shop facilities available, the number of hours in the four-year time allotment for farm mechanics instruction, and departments in which the station method, or a modified version, is used in teaching farm mechanics, it was found that these factors are significantly associated with above-average programs of instruction in farm mechanics.

Eighteen hypotheses concerning the economic characteristics of the service areas of the schools were tested, 17 of which were sustained by the data. It was concluded that the average acres per farm, value of cultivated land per acres, value of pasture land per acre, number of beef cattle, dairy cattle, swine, and poultry per farm, farms having pressure water systems, farm homes having modern plumbing, farms having tractors, average number of tractors per farm, farms having trucks, farms having large items of harvest machinery, farms with

irrigation systems, farms having electric and/or acetylene welders, major crops of the service area, and major livestock enterprises of the service area are not factors which significantly distinguish between departments of vocational agriculture having above-average and those departments having below-average programs of instruction in farm mechanics.

It was concluded that the percentage of farms having shop facilities is a factor showing significant association with the above-average programs of instruction in farm mechanics.

Implications of the Study

It was not the purpose of this study to try to establish cause and effect relationships, but to establish association or non-association of certain selected factors with programs of instruction in farm mechanics. The information gained through this study should be useful to vocational agriculture teachers in becoming more aware of what are the associative factors in developing more effective programs of instruction in farm mechanics, to district supervisors in counseling and directing more effective programs of instruction in farm mechanics, and to teacher trainers in planning and directing more effective courses of study in agricultural education and farm mechanics.

It should prove most useful to the aforementioned groups to know that the information from this study implies that successful programs of instruction in farm mechanics are probably as likely to evolve regardless of the geographical region of the state, the economic status of the community, type of farming area, or size and scope of the farming operations.

The data further imply that teacher age, years of teaching experience, and tenure in the present school can hardly be regarded as restrictive factors. While it is logical that the number of hours credit and the scope of college training in farm mechanics and other courses of a mechanical nature are important factors in developing successful farm mechanics programs, it is also apparent from the data obtained in this study that all vocational agriculture teachers in Oklahome are likely to have quite similar training in farm mechanics.

This study revealed that approximately twice as many of the departments in the below-average group had a farm shop available at the time of the present teacher's initial employment in the department as did those departments in the above-average group. Therefore, it would seem to be a quite logical implication that the absence of a shop, or shop space, at the time of the teacher's initial employment in a department is not a valid reason for failure to develop an effective program of farm mechanics. The data show that 70 per cent of the teachers in the above-average group obtained shop facilities after their initial employment in their present department. Here it seems quite evident that the initiative of the teacher is a powerful determinant of success.

The data presented in this study indicate that most of the teachers of vocational agriculture have little or no college training in farm structures, soil and water conservation structures, and irrigation practices. This situation implies a need for in-service training in these areas. The writer also observed little evidence of instruction be carried on in the area of farm electrification. This

suggests that teacher training in farm electrification has been far too meager and too elementary in nature to develop the necessary skill and confidence needed by teachers in this area of tremendously increasing importance.

Since the use of the station method, or a modified version, in teaching farm mechanics is a factor significantly associated with successful programs of instruction in farm mechanics, the implication can be made that more emphasis should be placed upon the use of this technique in the undergraduate and especially in the graduate courses in farm mechanics.

In summary it may be said that the hypotheses tested in this study imply that the successful programs of instruction in farm mechanics are not characterized by significant differences in teacher age, experience, tenure, college courses in farm mechanics or other mechanical training, except that significantly fewer of the more successful teachers had received college training in farm surveying (see explanation in discussion of Table XIII), and fewer had shop training other than farm mechanics while in high school. Significant differences are not evident in school and departmental characteristics, other than the present availability of shop facilities, four-year time allotment for farm mechanics instruction, and use of the station method or a modified version in the teaching of farm mechanics, all of which show significant association with above-average programs of instruction in farm mechanics; and in having a shop available at the time of the present teacher's initial employment in the department, which shows significant association with below-average programs of farm mechanics.

The findings of this study do emphasize clearly the implication that the teacher -- with his initiative, drive, interest, enthusiasm, perseverance, and personality -- is probably the critical factor in the establishment of a successful program of instruction in farm mechanics.

A SELECTED BIBLIOGRAPHY

Curtis, Charlie M. "Some Factors Affecting The Teaching Of Farm Mechanics." Unpublished Doctoral Dissertation, Louisiana State University. 1958.

Garret, Henry E. Statistics in Psychology and Education. New York: Longmans, Green and Company. 1953.

Gray, R. B. "Some New Farm Machines." Yearbook of Agriculture. 1943-1947. Washington: U. S. Government Printing Office. 1947.

Hagood, Margaret J., and Daniel O. Price. Statistics for Sociologists. New York: Henry Holt and Company. 1952.

Harris, Roland. "Farm Mechanics Today." Agricultural Education Magazine, XXVIII, No. 12 (June, 1955).

Knebel, Earl E. "An Analysis of Factors Contributing to Effective Programs of Vocational Agriculture." Unpublished D. Ed. Dissertation, Oklahoma State University, 1955.

Price, Robert R. "Factors Associated With The Occurrence of Local Young Adult Farmer Instructional Programs in Vocational Agriculture in The States of Oklahoma and Pennsylvania." Unpublished D. Ed. Dissertation, Pennsylvania State University, 1955.

Province, Elmer A. "Characteristics of Farms and Farming in The Service Area of Fifty Above-Average and Fifty Below-Average Departments of Vocational Agriculture." Unpublished Masters Thesis, Oklahoma State University, 1955.

Snedecor, George W. Statistical Methods. Ames, Iowa: Iowa State College Press. 1950.

State Board of Control for Vocational Education, Michigan State Department of Education. Farm Shop Work in Michigan Vocational Agriculture Departments. (Bulletin No. 261, Lansing, Michigan, 1940).

Wert, James E., Charles O. Neidt, and J. Stanley Ahmann. Statistical Methods in Educational and Psychological Research. New York: Appleton-Century-Crofts, Inc. 1954.

Weston, Curtis. "Farm Mechanics Jobs." County Agent and Vo-Ag Teacher Magazine. (May, 1960).

Tate, Merle W. Statistics in Education. New York: The Macmillan Company. 1955.

APPENDIXES

Appendix A - Interview Schedule

Appendix B - Statistical Computation

APPENDIX A

FACTORS ASSOCIATED WITH THE OCCURRENCE OF EFFECTIVE LOCAL FARM MECHANICS PROGRAMS IN VOCATIONAL AGRICULTURE IN OKLAHOMA

Interview Schedule

BACKGROUND CHARACTERISTICS OF TEACHER:

1. Age. _____
2. Years taught vocational agriculture. _____
3. Years taught in present school. _____
4. College hours credit in farm mechanics courses. _____
5. Specific areas that farm mechanics courses covered:

   Arc and Acetylene Welding _____ Electric Wiring _____

   Cold Metal Work _____ Hot Metal Work _____

   Farm Carpentry _____ Farm Machinery _____
6. College hours credit in other courses of a mechanical nature. _____
7. Specific areas covered in other courses of a mechanical nature:

   Farm Structures _____ Soil & Water Conservation Structures____

   Farm Surveying _____ Irrigation Practices _____
8. Received other organized civilian mechanical training. _____
9. Received mechanical training in armed forces. _____
10. Had well equipped shop on home farm while in high school. _____
11. Received farm mechanics training in high school. _____
12. Received other shop training in high school. _____

CHARACTERISTICS OF THE SCHOOL AND VOCATIONAL AGRICULTURE DEPARTMENT:

1. Average enrollment in four year high school during last two years.___
2. Average enrollment in vo-ag during last two years. _____
3. Hours instruction per week in Vo-Ag I ____, II ____, III ____, IV ___.
4. Have a young farmer class. _____. Enrollment _____
   (Av. of last two years)

5. Have an adult farmer class. _____. Enrollment _____ (Av. of last two years)

6. Shop facilities available for vo-ag use. _____

7. Shop shared with other high school departments. _____

8. Shop space available at time of your initial employment. _____

9. Administration provides budget for farm mechanics. _____

10. Available shop floor space per student in largest class. _____

11. Four-year time allotment for farm mechanics instruction. _____

12. Station method, or modified version, used in teaching. _____

ECONOMIC CHARACTERISTICS OF SERVICE AREA OF SCHOOL:

1. Average acres per farm. _____

2. Estimated weighted average value of land per acre: (Agricultural)

   Cultivated Land $_____

   Pasture Land $_____ (Not timber or waste land)

3. Estimated average number of livestock per farm: (Calculated on basis of all farms, not just those having.)

   Beef Cattle _____ Swine _____ Poultry _____

   Dairy Cattle _____ Sheep _____

4. Per cent of farms having pressure water systems. _____

5. Per cent of farms having modern plumbing systems. _____

6. Per cent of farms having tractors. _____

7. Average number of tractors per farm. _____

8. Per cent of farms having trucks, not including pickups. _____

9. Per cent of farms having combines and/or other large items of harvesting equipment. _____

10. Per cent of farms having irrigation systems. _____

11. Per cent of farms having farm mechanics facilities in use. _____

12. Per cent of farms having electric and/or acetylene welders. _____

13. Major crops of the service area. _____, _____, _____

14. Major animal enterprises of service area. _____, _____, _____

EXAMPLES OF STATISTICAL COMPUTATIONS IN THIS STUDY

TABLE I

FREQUENCY DISTRIBUTION OF THE AGES OF VOCATIONAL AGRICULTURE TEACHERS HAVING ABOVE-AVERAGE AND THOSE HAVING BELOW-AVERAGE PROGRAMS OF INSTRUCTION IN FARM MECHANICS

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{\Sigma x_1^2}{k_1(k_1 - 1)} + \frac{\Sigma x_2^2}{k_2(k_2 - 1)}}}$$

x^2 = sum of squared deviations of scores in a sample group away from the mean in that group.

$\bar{X}_1 = 36.43$

$\bar{X}_2 = 38.40$

$\Sigma x_1^2 = 971.37$

$\Sigma x_2^2 = 1921.20$

$k_1 = 30$

$k_2 = 30$

$(k_1 - 1) = 29$

$(k_2 - 1) = 29$

k_1 = cases in group one.

k_2 = cases in group two.

$(k_1 - 1)$ = degrees of freedom.

$(k_2 - 1)$ = degrees of freedom.

$$t = \frac{36.43 - 38.40}{\sqrt{\frac{971.37}{30(30 - 1)} + \frac{1921.20}{30(30 - 1)}}}$$

$t = -1.08$

Not significant at the five per cent level.

TABLE VIII

TEACHERS WHO HAVE COLLEGE TRAINING IN ELECTRICAL WIRING

Group	Yes	No	Total
One	a 23	b 7	a+b 30
Two	c 24	d 6	c+d 30
Total	a+c 47	b+d 13	N 60

$$\chi^2 = \frac{N(ad - bc)^2}{(a+b)(c+d)(a+c)(b+d)}$$

$$\chi^2 = \frac{60\left[(23 \times 6) - (7 \times 24)\right]^2}{(30)(30)(47)(13)}$$

$$\chi^2 = \frac{54{,}000}{549{,}900}$$

$$\chi^2 = 0.09$$

$$d.f. = 1$$

Not significant at the five per cent level.

The Yates' formula for corrected chi-square was used in instances were one or more of the cell values was five or less.

VITA

Walter Wesley Hobbs

Candidate for the Degree of

Doctor of Education

Thesis: FACTORS ASSOCIATED WITH THE OCCURRENCE OF EFFECTIVE LOCAL FARM MECHANICS PROGRAMS IN VOCATIONAL AGRICULTURE IN OKLAHOMA

Major Field: Higher Education

Biographical:

Personal Data: Born at Washita, Oklahoma, January 6, 1923, the son of William Shirley and Emma Mable Hobbs

Education: Attended grade and high school at Washita, Oklahoma, graduating as valedictorian of the senior class of 1940. Graduated with honors from Cameron College in May, 1948. Graduated with honors (Phi Kappa Phi) from the Oklahoma State University in August, 1949, with a Bachelor of Science Degree in Agricultural Education. Received the Master of Science Degree, with a major in Agricultural Education, from the Oklahoma State University in August, 1958. Additional graduated work was completed at the Pennsylvania State University in 1959. Requirements for the Doctor of Education Degree were completed at the Oklahoma State University in August, 1960.

Professional Experience: Farmed near Anadarko, Oklahoma from May, 1940, until January, 1945. Entered military service on January 16, 1945, by enlisting in the United States Navy. Served overseas in Europe and Asia for fourteen months, and was honorably discharged July 31, 1947. Taught vocational agriculture at Dale, Oklahoma, from September, 1949, until June, 1953; and at Ninnekah, Oklahoma, from July, 1953, until June, 1958. Graduate assistant in the Agricultural Education Department of the Oklahoma State University during the 1958-59 and 1959-60 school terms, doing research and teaching.