MECHANICAL COMPETENCIES NEEDED BY THE FARMERS OF THE NINNEKAH COMMUNITY

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CHAPTER I

INTRODUCTION

Without tools or machinery, a farmer is limited to what he can do with his hands. But give a farmer tools and he becomes a giant. Modern machinery, by increasing his output, has given the American farmer the highest standard of living in the world. With intensive use of machinery on the farm today the need of competencies must be possesed in order to reach a satisfactory standard of efficiency and financial return. The continuing increase in mechanization and trend toward more power tools and equipment bear testimony to the important place of farm mechanics in most agricultural operations.

The ability to operate a mechanized farm is essential to success in modern farming. The size of the farms are becoming larger. It was the writers opinion that a well rounded program of farm mechanics should be planned. The four year course of study should be based on the opinions of farmers pertaining to the mechanical competencies needed in farm power and machinery, farm buildings and conveniences, farm electrification, soil and water management, and farm shop which should be taught to the all-day students, young, and adult farmers in the Ninnekah Community.

The information gathered from the farmers of the community formed the basis for developing a farm mechanics program in vocational agriculture to meet the needs of present day farming.

Statement of the Problem

Farming operations are becoming so mechanized that it is an absolute necessity for a farmer to be able to perform the various mechanical competencies required of persons farming in this community.

Since farming operations are rapidly becoming mechanized, the competencies required of farm operators include mechanical skills, abilities, and understandings related to proficiency in farming. Educational programs in vocational agriculture, therefore, must include the teaching of such competencies.[1]

Purpose of the Study

The primary purpose of this study are two-fold. The first being - to determine the competencies needed in farm mechanics by farmers in the Ninnekah Community; second - to determine the degree of importance which should be placed on the teaching of mechanical competencies in planning the farm mechanics program. This study is to be used in setting up

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[1]Roy Wesley Dugger, "Mechanical Competencies Needed by Vocational Agriculture Teachers in Oklahoma" (unpub. Ph. D. Dissertation, Oklahoma Agricultural and Mechanical College, 1956), p. 3.

the farm mechanics course of study for the all-day students, young, and adult farmer groups.

Objectives

1. To determine the need for an improved farm mechanics program for the Vocational Agriculture Department of the Ninnekah High School.
2. To determine the mechanical competencies which farmers of this community think that a farmer should be able to perform on his home farm.
3. To determine the mechanical competencies which farmers of this area think a student should learn in his vocational agriculture farm mechanics program.

Scope of the Study

The scope of this study was limited to the experiences and opinions of thirty young and adult farmers from the Ninnekah Community. The farming experience of the various farmers range from two or more years of farming in the community.

The study is concerned with those mechanical competencies which the farmer encounters in farming. This includes the mechanical competencies arising from working with farm power and machinery, farm buildings and conveniences, farm electrification, soil and water management, and farm shop.

It is not intended that the study should in any way

attempt to develop complete lesson plans for teaching the farm mechanics, but to determine what mechanical competencies the farmers think are important in relation to the farming needs of today.

Definition of Terms

A farm mechanics program includes all the unspecialized mechanical activities that a progressive farmer should perform on his home farm with the kinds of tools and equipment he will have accessible. Recommendations on what should be included in the farm mechanics program have been made by a committee on agricultural teacher training of the American Society of Agricultural Engineers in collaboration with an advisory group of agricultural education specialists. This committee recommended five areas of instruction, namely:[2]

1. Farm shop work
2. Farm power and machinery
3. Farm buildings and conveniences
4. Soil and water management
5. Rural electrification

Procedure

To develop a solution to this research problem and to achieve the purposes previously stated, the procedure followed in making this study included:

1. Development of questionnaire
   a. The writer reviewed selected available literature to develop a questionnaire for gathering material to make this study.
   b. The questionnaire was designed to ascertain which mechanical competencies were needed by

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L. J. Phipps, G. C. Cook, Handbook on Teaching Vocational Agriculture (Danville, Illinois 1956), p. 659.

the farmers of the community. This questionnaire was prepared on basis of certain findings by Roy W. Dugger.[3]

c. Four progressive farmers in the community were selected for the purpose of evaluating the tentative questionnaire.

d. The final questionnaire, which is shown in Appendix A, was then prepared.

2. The group selected to provide information concerning the needs of mechanical competencies for an improved farm mechanics program were farmers in the Ninnekah Community.

3. Each of the selected farmers were visited in person by the writer and asked to furnish certain information in accordance with the prepared questionnaire.

4. The results of the survey were then compiled and analyzed.

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[3]Roy Wesley Dugger, "Mechanical Competencies Needed by Vocational Agriculture Teachers in Oklahoma" (unpub. Ph. D. Dissertation, Oklahoma Agricultural and Mechanical College, 1956), p. 97-103.

CHAPTER II

REVIEW OF SELECTED LITERATURE

A review of selected literature was made to obtain information useful in the preparation of a questionnaire. This review of selected literature was also made to determine what research had previously been reported concerning the development of a farm mechanics program for teaching the mechanical competencies to all-day students, young, and adult farmers. In reviewing previously reported research, several studies were found concerning the teaching of farm mechanics to all-day students, young, and adult farmers. However, some research has been reported concerning the teaching of mechanical competencies in farm mechanics to all-day students, young, and adult farmers.

In 1938, Chris White[1] compiled a thesis entitled, "Farm Mechanics as a Part of the Instruction in Vocational Agriculture in Oklahoma High Schools."

The objective of this study was to assemble information that would be helpful in planning the farm mechanics phase of vocational agriculture.

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[1]Chris White, "Farm Mechanics as a Part of the Instruction in Vocational Agriculture in Oklahoma High Schools" (unpub. M. S. thesis, Oklahoma Agricultural and Mechanical College, 1938).

White concluded that the type of farm mechanics program differed because of several factors:

1. The farm families are more stable in some areas than other areas.
2. The type of farm carried on in an area dictated the type of farm mechanics program.
3. Distances of farms from town increased the necessity for more training in farm mechanics.
4. More farm machinery and home conveniences were found in those areas associated with higher standard of living.

White also concluded that the ten most important farm mechanics units, considering the state as whole, are:

1. Making rough wood appliances
2. Sharpening edge tools
3. Fitting handles
4. Filing saws
5. Figuring bill of material
6. Building fences
7. Painting
8. Making rough concrete work
9. Riveting harness
10. Soldering

In 1956, Roy W. Dugger[2] compiled a dissertation en-

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[2]Roy W. Dugger, "Mechanical Competencies Needed by Vocational Agriculture Teachers in Oklahoma" (unpub. Ph. D. Dissertation, Oklahoma Agricultural and Mechanical College, 1956).

titled, "Mechanical Competencies Needed by Vocational Agriculture Teachers in Oklahoma."

Dugger found that vocational agriculture teachers must possess sufficient understanding to be able to provide training, in educational programs implemented by them, that will enable farmers and prospective farmers to acquire the degree of understanding needed in one-hundred-twelve of the one-hundred-fifteen mechanical competencies considered in this dissertation.

Dugger concluded that farm mechanics instruction is a vital part of the total vocational education program in agriculture. To develop instructional programs in farms mechanics which will help prepare students to become successful farmers is needed:

1. The degree of understanding needed by farmers in farm mechanics competencies.
2. The facilities that are necessary for developing and carrying out effective educational programs in farm mechanics.
3. The methods that should be used in teaching farm mechanics skills, abilities, and understandings.
4. The age groups to which certain farm mechanics competencies should be taught.
5. The farm mechanics practices being used by successful farmers.
6. The farm mechanics competencies being taught by successful vocational agriculture teachers.
7. The amount of time that should be devoted to the

teaching of farm mechanics to high school students, to young farmers, and to adult farmers.

In 1959, Dwight D. Latta[3] conducted a non-thesis study entitled, "A Four Year Time Allocation for Teaching Farm Mechanics to All-Day Students in the Fargo, Oklahoma High School."

Latta found that there are certain phases of farm mechanics that need to be given attention and should be considered in planning a farm mechanics program. The conclusions determined as a result of this study are as follows:

1. With the large acreage contained in the farms represented in this study, and with the larger and more expensive types of equipment available in this community, machinery maintenance and repair should be an important phase of the farm program.
2. All phases of the farm shop skills listed in this study should be thoroughly outlined and taught to the all-day students.
3. All phases of farm power and machinery listed in this study should be taught to the all-day students, with the exceptions of fitting and adjusting pins, piston rings and bearings.
4. Farm buildings and structures is another phase of

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[3]Dwight D. Latta, "A Four Year Time Allocation for Teaching Farm Mechanics to All-Day Students in the Fargo, Oklahoma High School" (unpub. M. S. non-thesis, Oklahoma State University, 1959).

farm mechanics which should be thoroughly taught to high school students.

5. Rural electrification and conveniences should also be taught to the all-day students.

6. Measuring and calculating acreage and running terrace lines are two skills which should definitely be taught.

In 1957, Hoyt S. Morgan[4] conducted a non-thesis study entitled, "A Four Year Plan for Teaching Farm Mechanics to Young Farmers in the Fort Laramie, Wyoming Vocational Agriculture Department."

The purposes of this study were to formulate a tentative four year plan for teaching farm mechanics to young farmers based on their needs and desires, and to develop guides for teaching farm mechanics to young farmers for 1957-1958. In order to effectively achieve these purposes, a class survey was made of the ten young farmers enrolled in the Fort Laramie Young Farmer Class.

Morgan concluded that more of the selected young farmers desired further instruction in farm electrification than any of the other four areas considered in this study.

Morgan also noted that farmers who lacked adequate skill in the various farm mechanic jobs desired further instruction. All of the selected young farmers desired

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[4]Hoyt S. Morgan, "A Four Year Plan for Teaching Farm Mechanics to Young Farmers in the Fort Laramie, Wyoming Vocational Agriculture Department" (unpub. M. S. report, Oklahoma State University of Agriculture and Applied Science, 1957).

some instruction in farm mechanics.

In 1948, James Elliott[5] compiled a thesis study entitled, "Planning a Course in Farm Mechanics in Oklahoma." This study was made for the purpose of providing the teachers of vocational agriculture and school administrators in Oklahoma with material that would assist them in planning the course in farm mechanics.

Elliott concluded that the subject areas of farm mechanics taught and the amount of time spent teaching each subject area should vary from one community to another. The course of farm mechanics should be developed from information gathered through a comprehensive community survey. After the important areas and the time spent teaching these areas are determined, the instructor should then develop a seris of teaching guides that may be used in teaching the course.

Elliott concluded that the personal interests of the instructor and special abilities possessed by the instructor often affected the type of farm mechanics course that was offered, rather than the community needs.

While other studies have been conducted in the field of teaching mechanical competencies to high school students and young and adult farmers, those studies which have been cited in this chapter were considered to be representative of this research problem.

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[5]James D. Elliott, "Planning a Course in Farm Mechanics in Oklahoma" (unpub. M. S. thesis, Oklahoma Agricultural and Mechanical College, 1948).

value; (4) it is not important.

Comparison of the total acres on the thirty farms included in this study. According to Table I 63.3 percent of the farms are composed of 480 acres or less while 10.0 percent of the farms contains over 800 acres. The other twenty-

TABLE I

COMPARISON OF THE TOTAL ACRES OPERATED ON THE THIRTY FARMS INCLUDED IN THIS STUDY

Size of Farms in Acres	Farms	
	Number	Percent
0 to 160	5	16.7
161 to 320	7	23.3
321 to 480	10	33.3
481 to 640	1	3.3
641 to 800	4	13.3
801 to 960	2	6.7
over 961	1	3.3
Totals	30	100.0

seven and seven tenths percent of the farms in this study contain over 480 acres. The five smallest farms represented are less than 160 acres while the largest is 1700 acres, with the average farm containing 434.1 acres.

Comparison of the total acres in pasture on the thirty farms included in this study. Table II shows that the

majority of the farms, 76.7 percent, contain less than 240

TABLE II

COMPARISON OF THE TOTAL ACRES IN PASTURE ON THE THIRTY FARMS INCLUDED IN THIS STUDY

Number of Acres in Pasture	Farms	
	Number	Percent
0 to 80	8	26.7
81 to 160	8	26.7
161 to 240	7	23.3
241 to 320	6	20.0
over 321	1	3.3
Totals	30	100.0

acres of pasture. One farm in this study reported no acres of pasture while the average of the eight smallest farms in terms of acres in pasture, was less than 100 acres, with the largest over 1200 acres. The average number of acres of pasture of the farms in this study is two hundred and sixty-three. This size of acreage in pasture accounts for the high percent of farms with beef cattle in this community.

Comparison of the total acres in cropland on the thirty farms included in this study. An examination of Table III shows that the majority, 60 percent, of the farms represented in this study contain 240 acres or less of cropland while 40

percent of the farms contain 321 acres or more. One farm in

TABLE III

COMPARISON OF THE TOTAL ACRES IN CROPLAND ON THE THIRTY FARMS INCLUDED IN THIS STUDY

No. of Acres in Cropland	Farms	
	Number	Percent
0 to 80	8	26.7
81 to 160	3	10.0
161 to 240	7	23.3
241 to 320	4	13.3
over 321	8	26.7
Totals	30	100.0

this study contained no acres of cropland while three farms contained less than 50 acres. The average number of acres in cropland of the farms represented is 163.1 acres, with alfalfa being the most important plant enterprise. Wheat, oats, barley and grain sorghums make up the minor plant enterprises, which accounts for approximately 50 percent of the cropland acreage.

A farm mechanics program for this community should definitely emphasize the farm mechanical competencies related to these enterprises. With the exception of alfalfa, these enterprises require largely the use of the same equipment, which is composed of the larger, more expensive type of farm

machinery.

The major animal enterprises reported by thirty farmers included in this study. Beef cattle is definitely the most important livestock enterprise in the Ninnekah community. Table IV shows that 90 percent of the farmers represented in

TABLE IV

THE MAJOR ANIMAL ENTERPRISES REPORTED BY THE THIRTY FARMS INCLUDED IN THIS STUDY

Kind of Livestock	Farms	
	Number	Percent
Beef Cattle	27	90.0
Dairy Cattle	3	10.0
Swine	0	0.0
Sheep	0	0.0
Totals	30	100.0

this study raise beef cattle. Ten percent of the farmers reported dairy as the major livestock enterprise. It is noted that no farmer reported sheep or swine as the major productive enterprise.

Comparison of the total number of animals reported on each farm included in this study. Beef cattle is the most important productive livestock enterprise reported by the thirty farmers included in this study. The data contained

in Table V shows that 63 percent of the farms have 50 or

TABLE V

COMPARISON OF THE TOTAL OF ANIMALS REPORTED ON EACH FARM INCLUDED IN THIS STUDY

No. of Animals	Beef		Dairy		Swine	
	Farms Reporting		Farms Reporting		Farms Reporting	
	Number	Percent	Number	Percent	Number	Percent
0 to 25	10	37.0	1	20.0	3	50.0
26 to 50	7	26.0	1	20.0	3	50.0
51 to 75	4	14.8	1	20.0	0	0.0
76 to 100	1	3.7	1	20.0	0	0.0
over 101	5	18.5	1	20.0	0	0.0
Totals	27	100.0	5	100.0	6	100.0

less animals while 18.5 percent of the farms contain over 100 head of beef cattle, with the other 28.5 percent reported having 50 or more animals. The smallest number of animals represented is two, while the largest is 125 animals, with the average farm beef herd containing 50.5 head of cattle.

The productive enterprises of dairy and swine represents the smallest percentage of livestock in the community. The number of dairy farms reported in this study are the majority of the farms with dairy cattle in the community. Of the thirty farmers selected in this research problem,

73.3 percent have only one productive livestock enterprise while 26.7 percent reported two productive livestock enterprises, with two farmers reporting a dairy and beef cattle combination on a large scale. The conclusions drawn from Table V imply that considerable time should be allocated, in the farm shop program, to teaching the construction and maintenance of equipment for the beef cattle enterprise.

Opinions of thirty farmers regarding the mechanical competencies in farm power and machinery. The findings in Table VI clearly indicates the opinions of the thirty farmers regarding the importance of teaching mechanical competencies of farm power and machinery in the farm mechanics program. Seventy-six and seven tenths percent of

TABLE VI

OPINIONS OF THIRTY FARMERS REGARDING THE TEACHING OF MECHANICAL COMPETENCIES IN FARM POWER AND MACHINERY

Competencies	Farmers Indicating							
	Must Teach		Should Teach		Limited Value		Not Important	
	No.	%	No.	%	No.	%	No.	%
Servicing & repairing farm machinery	23	76.7	6	20.0	0	0.0	1	3.3
Lubricating engines & farm machinery	22	73.3	5	16.7	2	6.7	1	3.3
Selecting farm machinery	18	60.0	8	26.7	2	6.7	2	6.6
Adjusting engine valves	17	56.7	4	13.3	4	13.3	5	16.7

TABLE VI Continued

Competencies	Farmers Indicating							
	Must Teach		Should Teach		Limited Value		Not Important	
	No.	%	No.	%	No.	%	No.	%
Servicing engine cooling systems	16	53.3	6	20.0	7	23.4	1	3.3
Servicing engine fuel systems	16	53.3	6	20.0	4	13.3	4	13.3
Selecting farm tractors	14	46.7	8	26.6	5	16.7	3	10.0
Servicing engine ignition systems	13	43.3	5	16.7	8	26.7	4	13.3
Repairing & adjusting brakes	11	36.7	11	36.7	6	20.0	2	6.7
Replacing & adjusting clutches	9	30.0	8	26.7	9	30.0	4	13.3
Servicing transmissions	6	20.0	10	33.3	9	30.0	5	16.7
Servicing final drives	6	20.0	5	16.7	15	50.0	4	13.3
Selecting farm trucks	4	13.3	8	26.7	13	43.3	5	16.7
Selecting stationary engines	4	13.3	5	16.7	12	40.0	9	30.0

the farmers thought that all farmers should have the ability to service and repair farm machinery while 73.3 percent thought that a farmer should be able to lubricate engines and farm machinery. Only 60 percent of the farmers thought that a farmer should have the ability to select farm ma-

chinery. Only 56.7 percent of the thirty farmers expressed opinions that a farmer should be able to adjust engine valves, while 53.3 percent thought that servicing engines cooling and fuel systems should be taught to high school students. Forty-six and seven tenths of the farmers indicated that selecting farm tractors should be included in the farm mechanics course of study. The degree of importance needed by farmers in certain other farm power and machinery competencies, according to opinions expressed by the selected interviewees, is indicated in the above data.

The rapid increase in machinery investments has resulted in research that deals with the changing pattern in farm capital distribution. Nearly all of our farmers have spent more on machinery in the past 10 to 15 years than their fathers did in their entire lives. Farmers will continue to mechanize their businesses since machinery is less expensive than labor and farm work can be done at the time needed. In a period of falling or stable prices they will not replace present equipment as quickly as they did during the late forties and early fifties.[1]

Some of the farmers estimated their farm machinery to be worth $2,000.00 or less, while a few farmers estimated their machinery to be worth over $5,000.00. One farmer stated he had approximately $12,000.00 in farm machinery.

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[1] J. L. McGurk, "Farm Equipment Dealers" Farm Economics, Department of Agricultural Economics New York State College of Agriculture Cornell University, CXCIV (1954) p. 5115-5118.

There are several farmers in the community with an estimated average value of $10,000.00 to $15,000.00 in farm machinery. The low estimated value of farm machinery in this community indicates that a majority of the machinery in this range is old and in need of repair. This should provide an excellent opportunity for farm mechanics instruction in the area of maintenance and repair of farm machinery. The high estimated value of farm machinery implies that implement dealers are selling new machinery to farmers, usually with loans from the bank or dealer. Therefore, the importance of selection in farm machinery should be very important in teaching all-day students.

Three mechanical competencies in this table were rated of most importance; namely the servicing and repairing farm machinery, lubricating engines and farm machinery, and selecting farm machinery. By combining the first and second column ratings in one group as favorable percentages of the above three are 96.7%, 90.0%, and 86.7% respectively.

An analysis of the material above shows plainly that farm power and machinery competencies are highly important and should be included in the farm mechanics course of study.

Opinions of thirty farmers regarding the mechanical competencies in farm buildings and conveniences. It is interesting to discover in Table VII the opinions of the thirty farmers regarding the teaching of mechanical competencies in the farm mechanics program. Sixty-six and seven tenths percent of the farmers indicated that farmers need an

TABLE VII

OPINIONS OF THIRTY FARMERS REGARDING THE TEACHING OF MECHANICAL COMPETENCIES IN FARM BUILDINGS AND CONVENIENCES

Competencies	Farmers Indicating							
	Must Teach		Should Teach		Limited Value		Not Important	
	No.	%	No.	%	No.	%	No.	%
Planning farm water systems	20	66.7	6	20.0	4	13.3	0	0.0
Planning farm buildings	19	63.3	8	26.7	3	10.0	0	0.0
Planning livestock & poultry equipment	17	56.7	12	40.0	1	3.3	0	0.0
Building livestock & poultry equipment	15	50.0	12	40.0	3	10.0	0	0.0
Planning fence arrangements	15	50.0	9	30.0	5	16.7	1	3.3
Estimating building costs	14	46.7	13	43.3	2	6.7	1	3.3
Building with metals	14	46.7	8	26.7	6	20.0	2	6.6
Building fences	13	43.3	11	36.7	3	10.0	3	10.0
Installing farm water systems plumbing	13	43.3	10	33.4	7	23.3	0	0.0
Repairing farm buildings	12	40.0	15	50.0	2	6.7	1	3.3
Selecting water pump, motor, & pressure tank	12	40.0	8	26.7	8	26.7	2	6.6
Building with lumber	12	40.0	7	23.3	10	33.3	1	3.4
Repairing livestock & poultry equipment	11	36.7	12	40.0	5	16.7	2	6.6

TABLE VII Continued

Competencies	Farmers Indicating							
	Must Teach		Should Teach		Limited Value		Not Important	
	No.	%	No.	%	No.	%	No.	%
Building with concrete	10	33.3	9	30.0	9	30.0	2	6.7
Servicing water pump, motor, & pressure tank	10	33.3	6	20.0	10	33.3	4	13.4
Servicing & repairing farm water systems	9	30.0	14	46.7	6	20.0	1	3.3
Planning sewage disposal systems	9	30.0	11	36.7	7	23.3	3	10.0
Installing sewage disposal systems	9	30.0	8	26.7	9	30.0	4	13.3
Installing water pump, motor, & pressure tank	9	30.0	5	16.7	13	43.3	3	10.0
Repairing fences	8	26.7	12	40.0	7	23.3	3	10.0
Servicing sewage disposal systems	5	16.7	11	36.6	9	30.0	4	13.3
Filtering & treating water	5	16.7	9	30.0	13	43.3	3	10.0
Servicing & repairing heating equipment	4	13.3	10	33.3	12	40.0	4	13.3
Building with prefabricated materials	2	6.7	5	16.7	13	43.3	10	33.3

understanding of how to plan farm water systems. Only 63.3 percent of the farmers thought that planning farm buildings

should be included in the course of study in farm mechanics.

It is interesting to note that five of the mechanical competencies in the above table were rated of most importance; namely planning the equipment for livestock and poultry, planning farm buildings, building livestock and poultry equipment, repairing farm buildings, and estimating building costs. By combining the first and second column ratings in one group as favorable percentages of the above are 96.7%, and four 90.0% respectively. Only four mechanical competencies in farm buildings and conveniences were rated below 50 percent by the same combination of columns. This table shows that farm buildings and conveniences is another area of farm mechanics which should be taught to high school students.

Opinions of thirty farmers regarding the mechanical competencies in farm electrification competencies. Electricity was available on all the farms operated by the thirty farmers interviewed. It is noteworthy to observe the data in Table VIII shows that 73.3 percent of the farmers felt that a farmer should know how to plan and install electric wiring systems. Seventy percent of the farmers expressed the opinion that a farmer should have the ability to repair electric wiring. With the exception of servicing and repairing electric heating equipment, over 50 percent of the thirty farmers thought that all the farm electrification competencies should be included and taught to all-day students. They marked planning, installing, and repairing

TABLE VIII

OPINIONS OF THIRTY FARMERS REGARDING THE TEACHING OF MECHANICAL COMPETENCIES IN FARM ELECTRICATION COMPETENCIES

Competencies	Farmers Indicating							
	Must Teach		Should Teach		Limited Value		Not Important	
	No.	%	No.	%	No.	%	No.	%
Planning electric wiring systems	22	73.3	6	20.0	2	6.7	0	0.0
Installing electric wiring	22	73.3	5	16.7	3	10.0	0	0.0
Repairing electric wiring	21	70.0	3	10.0	6	20.0	0	0.0
Estimating costs of electric wiring	12	40.0	9	30.0	9	30.0	0	0.0
Servicing & repairing electric appliances	11	36.7	6	20.0	9	30.0	4	13.3
Selecting electric lighting equipment	10	33.3	11	36.7	7	23.3	2	6.7
Selecting electric appliances	10	33.3	11	36.7	4	13.3	5	16.7
Estimating electric power demand	10	33.3	10	33.3	9	30.0	1	3.4
Servicing electric motors	9	30.0	7	23.3	11	36.7	3	10.0
Estimating electric cost	8	26.7	11	36.7	10	33.3	1	3.3
Servicing & repairing lighting equipment	7	23.3	11	36.7	10	33.3	2	6.7
Servicing electric overload protectors	7	23.3	11	36.7	9	30.0	3	10.0

TABLE VIII Continued

OPINIONS OF THIRTY FARMERS REGARDING THE TEACHING OF MECHANICAL COMPETENCIES IN FARM ELECTRIFICATION COMPETENCIES

Competencies	Farmers Indicating							
	Must Teach		Should Teach		Limited Value		Not Important	
	No.	%	No.	%	No.	%	No.	%
Servicing & repairing electric heating equipment	6	20.0	5	16.7	11	36.7	8	26.6

electrical wiring systems as the most important competencies to be taught.

The potential for the use of electricity on our farms is very great. On the average only about 30 percent of the electricity delivered to the farm is actually used for the farming operation. The 70 percent is used in the home.[2]

The use of electricity on the farm means less hard labor and better standard of living. The efficient use of electricity depends on a wiring system that will take care of all present and future needs. A review of the opinions of the thirty farmers definitely reveals that farm electrification is an important phase of the farm mechanics program.

Opinions of thirty farmers regarding the mechanical

[2]E. F. Oliver, "The Farm Wiring Menace." Agricultural Education Magazine, XXVII (1955), p. 159-166.

competencies in soil and water management competencies. The most important competency, as disclosed by the following information, was building and maintaining terraces. Seventy-six and seven tenths percent of the farmers thought that all

TABLE IX

OPINIONS OF THIRTY FARMERS REGARDING THE TEACHING OF MECHANICAL COMPETENCIES IN SOIL AND WATER MANAGEMENT COMPETENCIES

Competencies	Farmers Indicating							
	Must Teach		Should Teach		Limited Value		Not Important	
	No.	%	No.	%	No.	%	No.	%
Building & maintaining terraces	23	76.7	7	23.3	0	0.0	0	0.0
Measuring land & calculating acreage	19	63.3	6	20.0	5	16.7	0	0.0
Building & maintaining drainage systems	18	60.0	12	40.0	0.	0.0	0	0.0
Maintaining pond dams & spillways	15	50.0	14	46.7	1	3.3	0	0.0

farmers should be able to perform this competency and that it should be taught to high school students. It is of interest to note that 63.3 percent of the farmers thought that measuring and calculating acreage should be taught to all-day students, while 60 percent of the group indicated that all-day students should also be taught how to build and maintain drainage systems. The data above is of considerable

interest because it shows that 83.3 percent of the farmers expressed that all of the soil and water management competencies should be included in the farm mechanics program.

Opinions of thirty farmers regarding the mechanical competencies in farm shop. The data in Table X is of special interest because 83.3 percent of the farmers agreed

TABLE X

OPINIONS OF THIRTY FARMERS REGARDING THE TEACHING OF MECHANICAL COMPETENCIES IN FARM SHOP COMPETENCIES

Competencies	Farmers Indicating							
	Must Teach		Should Teach		Limited Value		Not Important	
	No.	%	No.	%	No.	%	No.	%
Planning farm shop facilities	25	83.3	5	16.7	0	0.0	0	0.0
Using electric arc equipment	23	76.7	5	16.7	2	6.6	0	0.0
Using oxygen-acetylene equipment	21	70.0	7	23.3	1	3.4	1	3.3
Using a framing square	20	66.7	6	20.0	4	13.3	0	0.0
Using power tools	18	60.0	10	33.3	1	3.4	1	3.3
Selecting power tools	14	46.7	13	43.3	1	3.3	2	6.7
Soldering	13	43.3	10	33.3	6	20.0	1	3.4
Using hand tools	12	40.0	11	36.7	4	13.3	3	10.0
Selecting hand tools	12	40.0	10	33.3	5	16.7	3	10.0
Painting	12	40.0	7	23.3	9	30.0	2	6.7

TABLE X Continued

Competencies	Farmers Indicating							
	Must Teach		Should Teach		Limited Value		Not Important	
	No.	%	No.	%	No.	%	No.	%
Conditioning tools	11	36.7	11	36.6	6	20.0	2	6.7
Cutting & threading pipe	10	33.3	10	33.3	7	23.3	3	10.0
Cutting & threading bolts	8	26.7	9	30.0	10	33.3	3	10.0
Using nails & screws	7	23.3	6	20.0	12	40.0	5	16.7
Using bolts, keys, & pins	7	23.3	4	13.3	15	50.0	4	13.4
Annealing & tempering metals	4	13.3	13	43.3	8	26.7	5	16.7
Selecting power transmission belts	4	13.3	8	26.7	14	46.7	4	13.3
Repairing power transmission belts	4	13.3	6	20.0	16	53.3	4	13.4
Splicing rope	2	6.7	7	23.3	12	40.0	9	30.0

that planning farm shop facilities is the most important competency in farm shop. The above data shows clearly that 60 percent of the farmers thought that the mechanical competencies of using electric arc equipment, oxygen-acetylene equipment, a framing square, and power tools should be taught to high school students. A review of the above material reveals that fifteen of the farm shop competencies should be included in the farm mechanics course of study. When a

summary is made of the above data , it shows that farm shop work still is an important area in farm mechanics. Its usefulness to farms and farmers has been enhanced be the addition of electric arc and acetylene welding, and power tools.

CHAPTER IV

SUMMARY AND CONCLUSIONS

Summary

The primary purpose of this study was to determine the competencies needed in farm mechanics by farmers in the Ninnekah Community. A second purpose was to determine the degree of importance which should be placed on teaching the various phases of mechanical competencies in planning the farm mechanics program.

To achieve the purposes previously stated, the writer followed a procedure which included developing a questionnaire and interviewing farmers in the community. The thirty farmers were visited in person by the writer and asked to furnish certain information in accordance with the questionnaire.

Data from these questionnaires were compiled, and an analysis was attempted with the following results being obtained.

In order to obtain a better understanding of the size of farms in this community, one question on the questionnaire was devoted to this phase of the study. It was found that the five smallest farms contained less than one hundred and sixty acres, while the largest contained 1,700 acres. The

average number of acres in the farms represented was 434.1 acres.

It was found that 76.7 percent of the farms contained less than 240 acres of pasture. The average number of acres in pasture on the farms represented was two hundred and sixty-three. Beef cattle is definitely the most important animal enterprise in the community. Ninety percent of the farmers considered beef cattle as the most important. Alfalfa is the most important plant enterprise in the community. The small grains and grain sorghum crops make up the minor plant enterprises, which accounts for approximately 50 percent of the cropland acreage.

The questionnaire was designed to determine which mechanical competencies the farmers needed in the following areas: (1) farm power and machinery, (2) farm buildings and conveniences, (3) farm electrification, (4) soil and water management, (5) and farm shop. This was prepared on the basis of certain findings by Roy W. Dugger.[1]

In interviews, conducted in accordance with the prepared questionnaire shown in Appendix A, with the thirty selected young and adult farmers an attempt was made to secure opinions regarding the degree of importance needed by farmers. These opinions would then be used as a basis for planning the farm mechanics course of study for all-day

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[1]Roy W. Dugger, "Mechanical Competencies Needed by Vocational Agriculture Teachers in Oklahoma" (unpub. Ph. D. Dissertation, Oklahoma Agricultural and Mechanical College, 1956).

students, young, and adult farmers. A summary of the opinions expressed by the farmers follows.

Farm power and machinery competencies. The farmers were asked to express opinions regarding the degree of importance needed by farmers in fourteen mechanical competencies relating to farm power and machinery. Fifty-three and three tenths percent or more expressed the opinion that the following mechanical competencies should be taught to high school students:

1. Servicing and repairing farm machinery.
2. Lubricating engines and farm machinery.
3. Selecting farm machinery.
4. Adjusting engine valves.
5. Adjusting engine cooling systems.
6. Servicing engine fueling systems.

Thirty to forty-six and seven tenths percent of the farmers expressed the opinion that the following mechanical competencies should be taught to high school students:

1. Selecting farm tractors.
2. Servicing engine ignition systems.
3. Repairing and adjusting brakes.
4. Replacing and adjusting clutches.

Thirty percent or less of the farmers expressed the opinion that the following mechanical competencies should be taught to high school students:

1. Servicing transmissions.
2. Servicing final drives.
3. Selecting farm trucks.
4. Selecting stationary engines.

Farm buildings and conveniences competencies. The farmers were asked to express their opinions regarding the degree of importance needed by farmers in twenty-four mechanical competencies relating to farm buildings and con-

veniences. Fifty percent or more expressed the opinion that the following mechanical competencies should be taught to high school students:

1. Planning farm water systems.
2. Planning farm buildings.
3. Planning livestock and poultry equipment.
4. Building livestock and poultry equipment.
5. Planning fence arrangements.

Thirty to forty-six and seven tenths percent of the farmers expressed the opinion that the following mechanical competencies should be taught to high school students:

1. Estimating building costs.
2. Building with metals.
3. Building fences.
4. Installing farm water systems plumbing.
5. Repairing farm buildings.
6. Selecting water pump, motor, and pressure tank.
7. Building with lumber.
8. Repairing livestock and poultry equipment.
9. Building with concrete.
10. Servicing water pump, motor, and pressure tank.
11. Servicing and repairing farm water systems.
12. Planning sewage disposal systems.
13. Installing sewage disposal systems.
14. Installing water pump, motor, and pressure tank.

Thirty percent or less of the farmers expressed the opinion that the following mechanical competencies should be taught to high school students:

1. Repairing fences.
2. Servicing sewage disposal systems.
3. Filtering and treating water.
4. Servicing and repairing heating equipment.
5. Building with pre-fabricated materials.

Farm electrification competencies. The farmers were asked to express their opinions regarding the degree of importance needed by farmers in thirteen mechanical competencies relating to farm electrification. Seventy percent or more expressed the opinion that the following mechanical

competencies should be taught to high school students:

1. Planning electric wiring systems.
2. Installing electric wiring.
3. Repairing electric wiring.

Thirty to forty percent of the farmers expressed the opinion that the following mechanical competencies should be taught to high school students:

1. Estimating costs of electric wiring.
2. Servicing and repairing electric appliances.
3. Selecting electric lighting equipment.
4. Estimating electric power demand.
5. Selecting electric appliances.
6. Servicing electric motors.

Twenty-six and seven tenths percent or less of the farmers expressed the opinion that the following mechanical competencies should be taught to high school students:

1. Estimating electric cost.
2. Servicing and repairing lighting equipment.
3. Servicing electric overload protectors.
4. Servicing and repairing electric heating equipment.

Soil and water management competencies. The farmers were asked to express their opinions regarding the degree of importance needed by farmers in four mechanical competencies relating to soil and water management. Fifty percent or more expressed the opinion that the following mechanical competencies should be taught to high school students:

1. Building and maintaining terraces.
2. Measuring land and calculating acreage.
3. Building and maintaining drainage systems.
4. Maintaining pond dams and spillways.

Farm shop competencies. The farmers were asked to express their opinions regarding the degree of importance needed by farmers in nineteen mechanical competencies relating to farm shop. Sixty percent or more expressed the

opinion that the following mechanical competencies should be taught to high school students:

1. Planning farm shop facilities.
2. Using electric arc equipment.
3. Using oxygen-acetylene equipment.
4. Using a framing square.
5. Using power tools.

Forty-six and seven tenths to thirty-three and three tenths percent of the farmers expressed the opinion that the following mechanical competencies should be taught to high school students:

1. Selecting power tools.
2. Soldering.
3. Using hand tools.
4. Painting.
5. Selecting hand tools.
6. Conditioning tools.
7. Cutting and threading pipe.

Twenty-six and seven tenths percent or less of the farmers expressed the opinion that the following mechanical competencies should be taught to high school students:

1. Cutting and threading bolts.
2. Using nails and screws.
3. Using bolts, keys, and pins.
4. Annealing and tempering metals.
5. Selecting power transmission belts.
6. Repairing power transmission belts.
7. Splicing rope.

Conclusions

On the basis of this study, there are certain mechanical competencies in farm mechanics that need to be given attention and should be considered in planning a farm mechanics course of study for all-day students, young, and adult farmers. The conclusions determined as a result of this study are as follows:

1. Four hundred thirty four and one tenths acres represents the average size of the farms in this study, and with the more expensive types of equipment for alfalfa, small grains, and grain sorghum enterprises in this community, machinery maintenance and repair should be an important phase of the farm mechanics course of study.

2. Sufficient time should be allocated, in the farm shop program, to teaching the construction and maintenance of equipment for the beef cattle enterprise.

3. All mechanical competencies in farm power and machinery listed in Table VI should be taught in the farm mechanics course of study, except servicing transmissions, servicing final drives, selecting farm trucks, and selecting stationary engines.

4. With the exceptions of repairing fences, servicing sewage disposal systems, filtering and treating water, servicing and repairing heating equipment, and building with pre-fabricated materials, all the competencies of farm buildings and conveniences listed in this study should be taught in the farm mechanics program.

5. Farm electrification competencies is another phase of farm mechanics which should be taught in the program of farm mechanics for high school students, with the exceptions of estimating electric cost, servicing and repairing lighting equipment, servicing electric overload protectors, and servicing and repairing electric heating equipment.

6. Soil and water management competencies should definitely be taught in the farm mechanics course of study for

high school students.

7. According to Table X all mechanical competencies listed in farm shop should be taught to high school students, except the competencies of cutting and threading bolts, using, nails and screws, using bolts, keys, and pins, annealing and tempering metals, selecting power transmission belts, repairing power transmission belts, and splicing rope.

8. It is felt that any mechanical competencies which was rated by less than 30 percent of the farmers as being important enough to teach to all-day students should not be included in a farm mechanics course of study.

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APPENDIX

A. Questionnaire
B. Farm Mechanics Course of Study

Mechanical Competencies Survey

Name _____

Total acres in farm (owned and rented) _____

Acres of Cropland _____ Acres of pasture _____

Kind of Livestock _____ Number of Head _____

Check Column A if you think it should be given top priority, a must in teaching.
Check Column B if you think it is very desirable, and should be included.
Check Column C if you think it is of limited value.
Check Column D if you think it is not important.

Jobs or Skills	Column A	B	C	D
Farm Power and Machinery Competencies				
Selecting farm trucks				
Selecting farm tractors				
Selecting stationary engines				
Lubricating engines and farm machinery				
Servicing engine fuel systems				
Adjusting engine valves				
Servicing engine ignitions systems				
Servicing engine cooling systems				
Replacing and adjusting clutches				
Repairing and adjusting brakes				
Servicing transmissions				
Servicing final drives				
Selecting farm machinery				
Servicing and repairing farm machinery				
_____				
Farm Buildings and Conveniences Competencies				
Planning farm buildings				
Estimating building costs				
Building with concrete				
Building with lumber				
Building with pre-fabricated materials				
Building with metals				
Repairing farm buildings				
Planning livestock and poultry equipment				
Building livestock and poultry equipment				
Repairing livestock and poultry equipment				

Jobs or Skills	Column A	B	C	D
Planning fence arrangements				
Building fences				
Repairing fences				
Planning sewage disposal systems				
Installing sewage diposal systems				
Servicing sewage diposal systems				
Planning farm water systems				
Installing farm water system plumbing				
Servicing and repairing farm water systems				
Selecting water pump, motor, and pressure tank				
Installing water pump, motor, and pressure tank				
Servicing water pump, motor, and pressure tank				
Filtering and treating water				
Servicing and repairing heating equipment				
Farm Electrification Competencies				
Planning electric wiring systems				
Estimating cost of electric wiring				
Installing electric wiring				
Repairing electric wiring				
Estimating electric power demand				
Estimating electric cost				
Servicing electric motors				
Servicing electric overload protectors				
Selecting electric appliances				
Servicing and repairing electric appliances				
Selecting electric lighting equipment				
Servicing and repairing lighting equipment				
Servicing and repairing electric heating equipment				
Soil and Water Management Competencies				
Building and maintaining terraces				
Building and maintaining drainage systems				
Maintaining pond dams and spillways				

Jobs or Skills	Column A	B	C	D
Measuring land and calculating acreage				
Farm Shop Competencies				
Planning farm shop facilities				
Selecting power tools				
Using power tools				
Selecting hand tools				
Using hand tools				
Conditioning tools				
Annealing and tempering metal				
Using electric arc equipment				
Cutting and threading pipe				
Using oxygen-acetylene equipment				
Cutting and threading bolts				
Using nails and screws				
Using bolts, keys, and pins				
Selecting power transmissions				
Repairing power transmission belts				
Splicing rope				
Painting				
Using a framing square				

A FOUR YEAR COURSE OF STUDY FOR FARM MECHANICS
NUMBER PERIODS ALLOCATED BY MONTHS

			Number Periods	Month Taught
Year I	Problem Area			
	Farm Shop		6	September
			8	October
			8	November
			15	December
			10	March
			8	April
			5	May
		Total for Year	60	
Year II	Problem Area			
	Farm Shop		2	October
			7	November
			7	February
		Sub-totals 14		
	Farm Buildings & Conveniences		2	December
			4	January
			10	February
			4	March
			4	April
		Sub-totals 24		
	Farm Electrification		2	January
			8	February
		Sub-totals 10		
	Soil & Water Management		4	March
			4	April
			4	May
		Sub-totals 12		
		Totals for Year	60	

			Number Periods	Month Taught
Year III	Problem Area			
	Farm Shop		4	September
			19	October
		Sub-totals 23		
	Farm Electrification		1	November
			2	December
			19	January
		Sub-totals 22		
	Farm Power & Machinery		13	April
			2	May
		Sub-totals 15		
		Total for Year 60		
Year IV	Problem Area			
	Farm Shop		3	March
			7	April
		Sub-totals 10		
	Farm Power & Machinery		18	October
			8	November
		Sub-totals 26		
	Farm Buildings & Conveniences		15	January
			8	February
			1	March
		Sub-totals 24		
		Total for Year 60		

MONTHLY PROBLEM LAYOUT FOR
VOCATIONAL AGRICULTURE I

Problem Area	Number Periods	Month Taught
Teaching Unit: Farm Shop		
Farm shop orientation	2	September
Tool use and nomenclature	2	September
Farm shop safety	2	September
Arc Welding		
Safety precautions	1	October
Striking an arc & running a bead	1	October
Principles of arc welding	3	October
Selecting & identification of electrodes	1	October
Oxyacetylene Welding		
Safety precautions	1	October
Lighting & adjusting oxyacetylene torch	1	October
Principles of oxyacetylene torch	2	November
Selecting hand tools	5	November
Using hand tools	5	December
Individual and chapter projects	10	December
	10	March
Cutting & threading pipe	1	April
Painting		
Principals of painting	1	April
Painting individual projects	1	April
Soldering		
Principals of soldering	2	April
Individual projects	3	April
Conditioning tools	3	May
Tool identification	2	May
GRAND TOTAL PERIODS FOR YEAR	60	

MONTHLY PROBLEM LAYOUT FOR
VOCATIONAL AGRICULTURE II

Problem Area	Number Periods	Month Taught
Teaching Unit: Farm Shop		
Arc Welding		
Cutting with the arc	1	October
Using the carbon arc torch	1	October
Individual projects & farm machinery maintenance	7	November
Oxyacetylene Welding		
Individual projects & farm machinery maintenance	7	February
Teaching Unit: Farm Buildings & Conveniences		
Building with lumber	2	December
Building with concrete	2	January
Building with metals	2	January
Planning livestock and poultry equipment	2	February
Building livestock and poultry equipment	2	March
Repairing livestock and poultry equipment	2	March
Planning fence arrangement	2	April
Building fences	2	April
Individual projects	8	February
Teaching Unit: Farm Electrification		
Planning electric wiring systems	2	January
Estimating cost of electric wiring	2	February
Installing electric wiring	2	February
Repairing electric wiring	2	February
Individual projects	2	February
Teaching Unit: Soil & Water Management		
Building and maintaining terraces	4	March
Measuring land and calculating acreage	4	April
Building and maintaining drainage systems	2	May
Maintaining pond dams and spillways	2	May
GRAND TOTAL PERIODS FOR YEAR	60	

MONTHLY PROBLEM LAYOUT FOR
VOCATIONAL AGRICULTURE III

Problem Area	Number Periods	Month Taught
Teaching Unit: Farm Shop		
Woodwork		
Using a framing square	2	September
Cutting rafters	2	September
Arc Welding		
Individual projects	11	October
Oxyacetylene Welding		
Individual projects	8	October
Teaching Unit: Farm Electrification		
Electrical safety precautions, sources & terms	1	November
Servicing and repairing electric appliances	2	December
Selecting electric lighting equipment	2	January
Estimating electric power demand	3	January
Selecting electric appliances	1	January
Servicing electric motors	2	January
Individual projects	11	January
Teaching Unit: Farm Power & Machinery		
Servicing and repairing farm machinery	2	April
Lubricating engines and farm machinery	2	April
Selecting farm machinery	2	April
Adjusting engine valves	2	April
Servicing engine cooling systems	2	May
Individual projects	5	April
GRAND TOTAL PERIODS FOR YEAR	60	

MONTHLY PROBLEM LAYOUT FOR VOCATIONAL AGRICULTURE IV

Problem Area	Number Periods	Month Taught
Teaching Unit: Farm Power & Machinery		
Servicing engine fuel systems	2	October
Selecting farm tractors	2	November
Servicing engine ignitions systems	2	November
Repairing and adjusting brakes	2	November
Replacing and adjusting clutches	2	November
Individual projects	18	October
Teaching Unit: Farm Buildings & Conveniences		
Installing farm water system plumbing	2	January
Planning farm water systems	2	January
Planning farm buildings	2	January
Estimating building costs	2	January
Repairing farm buildings	2	February
Selecting water pump, motor, and pressure tank	1	February
Planning sewage disposal systems	1	February
Servicing water pump, motor, and pressure tank	1	February
Installing water pump, motor, and pressure tank	1	February
Servicing and repairing farm water systems	2	February
Installing sewage disposal systems	1	March
Individual projects	7	January
Teaching Unit; Farm Shop		
Planning farm shop facilities	2	March
Selecting power tools	2	March
Using power tools	2	April
Individual projects	4	April
GRAND TOTAL PERIODS FOR YEAR	60	

VITA

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Master of Science

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