

AN AGRICULTURE MECHANICS COURSE OF STUDY FOR HIGH
SCHOOL STUDENTS IN THE WHEAT-BEEF PRODUCING
AREA OF NORTHWESTERN OKLAHOMA

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CHAPTER I

INTRODUCTION

Are our Vocational Agriculture Departments doing the job for which they were designed? How many boys that graduate from our Vocational Agriculture Departments will return to the farm? These are questions that have confronted educators for years. With the size of farms increasing, it is becoming increasingly harder for a young man to become established in farming on his own. Education is very essential to everyone and for the high school graduate who is interested in Agriculture, but does not have the opportunity to farm, many farm related jobs await him.

Northwestern Oklahoma is one of these areas that farms are increasing in size. With the wheat farmer constantly finding new ways or methods to till the soil, plant and cultivate the crops, numbers of farms are decreasing and size is increasing. The same is true in the case of the beef producer.

Northwestern Oklahoma has for years been known as the wheat-beef producing area of Oklahoma. In a seven county area; Beaver, Harper, Woodward, Dewey, Ellis, Woods, and Alfalfa counties, size of farms are large as compared to other areas of Oklahoma. The average size of farms in Beaver County is 991.0 acres, it being the largest of the

seven county area, and Alfalfa County the smallest with 388.6 acres per farm.¹

In this seven county area there are thirty Vocational Agriculture Departments. These thirty schools furnished the writer with information that made possible this study on Agriculture Mechanics.

With the size of farms becoming larger the rate of mechanization in the farm operation has become more important.² For the person in the rural communities that does not go on and complete his education, the high school Vocational Agriculture Departments are going to have the responsibility of preparing these students as citizens of this vast country.

Purposes and Objectives of Study

During the Annual Vocational Agriculture Teacher's Summer Conference of 1963, a plan was released by the State Board of Education that Vocational Agriculture teachers in the smaller school (enrollment of 25 students or less in all-day classes) may be assigned extra duties. In the past years it has been the ruling of the State Board of Education that the Vocational Agriculture in our Oklahoma High Schools. No other subject could be taught or extra assignments could be made on these teachers.

¹Oklahoma Agriculture Annual Report, 1961, State Board of Agriculture and the Statistical Reporting Service, United States Department of Agriculture.

²Dwight Latta, "A Four-Year Time Allocation for Teaching Farm Mechanics to All-Day Students in the Fargo, Oklahoma High School". (Unpub. M.S. Report Oklahoma State University, 1958).

Under the new ruling additional work or duties that may be assigned to the teacher of Vocational Agriculture in the smaller schools are as follows:

1. Study Hall
2. Eighth Grade Vocational Consultant
3. Grade School Farm Shop
4. Agriculture Mechanics class for High School students.

These extra duties can be made only when the teacher's classes are completed by the end of the fourth period or by two o'clock.

Purpose of the Study. The primary purpose of this study is to develop an Agriculture Mechanics Program for a High School in the predominate wheat and beef cattle area of Oklahoma. This will be accomplished by developing a course of study for students in an Agriculture Mechanics class. This study may be used as a guide for setting up programs in Agriculture Mechanics in other areas of the State of Oklahoma.

Objectives of the Study. The objectives of the study are as follows:

1. To determine if our farm shops have adequate equipment.
2. To determine if additional instruction will be needed by the teachers and in what areas of Agriculture Mechanics.
3. To determine what areas of Farm Mechanics are the most important in the wheat and beef cattle area of Oklahoma.
4. To determine the skills the teachers of Vocational Agriculture think need to be taught in an Agriculture Mechanics course.

5. To develop a course of study for an Agriculture Mechanics course and from the results of the questionnaire.

Definition of Terms Used

1. Farm Mechanics: includes all the unspecialized mechanical activities that a progressive farmer should perform on the 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 agriculture teachers training of the American Society of Agriculture Engineers in collaboration with an advisory group of agriculture education specialists. This committee recommended five areas of instruction, namely:
 1. Farm Shop work
 2. Farm Power and Machinery
 3. Farm buildings and conveniences
 4. Soil and Water Conservation
 5. Rural electrification³
2. All day students: refers to all male students enrolled in Vocational Agriculture in the high schools surveyed.
3. Farmers: refers to the group of men that actually own, rent, and farm their land.
4. Young and Adult Farmer: refers to an adult group that is organized as such and has regular meetings for the

³Phipps and Cook, Handbook on Teaching Vocational Agriculture, p. 659 Sixth Edition, 1952.

purpose of continuing their education in the field of Agriculture.

5. Agriculture Mechanics: is a term that includes all areas of farm mechanics and all agriculture engineering technology.

In a course of Agriculture Mechanics the instructor would have the students five days a week, thirty-six weeks per year to teach all areas of farm mechanics and agriculture engineering technology. There would be very little time lost due to other subjects that are taught in Vocational Agriculture.

Procedure

To develop an agriculture mechanics program for the wheat-beef producing area of Northwestern Oklahoma, 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. Specialists in the field of Agriculture Education were asked for advice and helpful criticism in preparing the questionnaire.
 - c. The final questionnaire (which is shown in Appendix A) was prepared.
2. The population selected to provide information for this study of developing an Agriculture Mechanics Program for Northwestern Oklahoma were the thirty teachers of Vocational Agriculture in the seven county areas mentioned previously in this report.

3. A conference was held to review the questionnaire with the Vocational Agriculture teachers. Individual conferences were held with various individual teachers to explain the questionnaire more fully.
4. The results of the survey were completed and analyzed.
5. An Agriculture Mechanics program for the wheat-beef producing area of Northwestern Oklahoma to be taught to high school students was developed.

CHAPTER II

REVIEW OF SELECTED LITERATURE

A review of selected literature was made to obtain information useful in preparation of a questionnaire and Master's report. The review was also made to determine what work had been done previously in teaching agricultural mechanics to high school students on a five periods a week--thirty-six weeks a year basis. In all the literature that was reviewed work had been done on teaching farm mechanics to students enrolled in Vocational Agriculture. The writer could not find any information concerning an agriculture mechanics course taught as a separate unit.

Cook, Scranton, and McColley stresses the importance of farm mechanics in Vocational Agriculture teaching:

The farm boy of the present is the farmer of the future and should be trained in the knowledge, skills, ideals, and appreciations that he needs to meet the mechanical problems with which a farmer has to deal.¹

¹G. C. Cook, L. L. Scranton, and H. F. McColley, Farm Mechanics Text and Handbook. (Danville, Illinois: The Interstate Printing Company, 1956.)

Donald Dean Brown states in a non-published thesis; "In the advancing mechanization of farming that we are engaged in today, the farm mechanics skills that an operator is able to do himself in his own farm shop may often save a great deal of time and money".² Brown goes on the quote Cook, Scranton, and McColley in listing the advantages of farm mechanics training:

1. It provides one of the strongest agencies in convincing the students, superintendents, school boards, and faculty of the community of the need for giving continued and enthusiastic support of the program of vocational education in agriculture.
2. It provides training in skills that are necessary to do the needed farm mechanics jobs on the farm.
3. It gives the students an opportunity to do purposeful thinking, as well as to use their hands in mastering real problems of everyday life.
4. It helps the student, after the job is done, to realize that it is practical, and that he has really accomplished something.
5. It is one of the best ways of motivating and stimulating the student's interest, as students especially like this phase of work.
6. It provides training based on individual needs.

²Donald Dean Brown, "The Preparation and Competency of Teachers of Vocational Agriculture in the Northwest Supervisory District for Teaching and Performing Farm Mechanics Skills in Oklahoma High Schools." (Unpublished M. S. Report, Oklahoma State University, 1959.)

7. It adds variety to the vocational program.
8. It provides the type of training needed by all-day students, young farmers and adult farmers.
9. It produces immediate results.³

In 1956, Curnutt⁴ developed a four year course of study for the Table Rock High School, with major attention given to determining the major enterprises. His study showed that the equipment needed for the major livestock enterprises of beef and swine were overlapping in some areas and that considerable time should be devoted to the construction; maintenance and repair of this equipment in the farm mechanics course offered.

In a study of farm mechanics skills which farmers of the Fargo community think a student should have in his vocational agriculture program, Dwight D. Latta,⁵ concluded that machinery maintenance and repair should be an important phase of the agricultural mechanics program.

Since more than ninety per cent of the farmers surveyed indicated that beef cattle was their major livestock enter-

³Ibid.

⁴James F. Curnutt, "Developing a Four-Year Course of Study in Farm Mechanics for Table Rock High School, Table Rock, Nebraska." (Unpublished M. S. Report, Oklahoma A. and M. College, 1956.)

⁵Dwight D. Latta, "A Four-Year Time Allocationa for Teaching Farm Mechanics to All-Day Students in the Fargo High School." (Unpublished M. S. Report Oklahoma State University, 1958.)

prise, Latta allotted considerable time in his farm mechanics program for teaching the construction and maintenance of beef cattle equipment.

The farmers surveyed recommended a complete and thorough list of farm shop skills which should be included in the agricultural mechanics program.

Latta concluded that all phases of farm power and machinery except fitting and adjusting wrist pins, piston rings, and bearings, could be taught to the all-day students in the Fargo High School.

Farm buildings and structures along with rural electrification and conveniences were also included in Latta's four-year teaching program.

Latta used an extensive list of skills for each of the five areas of agricultural mechanics work (farm shopwork, farm power and machinery, farm buildings and conveniences, soil and water management, and rural electrification) in his questionnaire that was distributed to the farmers. Only those skills that more than forty per cent of the farmers ranked as being important were included in his recommended agricultural mechanics program for the Fargo High School.

In 1957 Hoyt S. Morgan⁶ conducted a non-thesis study entitled, "A Four Year Plan for Teaching Farm Mechanics to Young Farmers in the Fort Laramie, Wyoming Vocational Agri-

⁶Hoyt S. Morgan, "A Four Year Plan for Teaching Farm Mechanics to Young Farmers in the Fort Laramie, Wyoming Vocational Agriculture Department." (Unpub. H. S. Report Oklahoma Agricultural and Mechanical College, 1957.)

culture Department."

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

It was noted that farmers who lacked adequate skills in the various agricultural mechanics jobs desired further instruction. All of the selected young farmers desired some instruction in farm mechanics.

George E. Cook⁷ made a study of farm shops in land grant colleges in 1952. Cook recommended at least one period of safety be taught. Also safety should be stressed in all lessons.

William A. Bourne's⁸ study of twenty-nine schools in Southeastern Oklahoma found that areas of arc welding, oxy-acetylene welding, and cutting, farm electrification, farm carpentry, farm surveying, plumbing, and farm machinery and repairs. All of these areas were reported to be taught by fifty per cent or more of the schools.

While other studies have been conducted in the field of teaching farm mechanics to high school students and young and adult farmers, these studies which have been cited in this chapter were considered to be representative of this study.

⁷George E. Cook, "A Study of Farm Shops in Land Grant Colleges" (Unpublished M. S. Thesis Oklahoma A. and M. College, 1955.)

⁸William A. Bourne, "The Nature and Extent of the Program of Farm Mechanics as taught in Twenty-nine Southeastern Oklahoma High Schools. (Unpublished M. S. Report 1961.)

CHAPTER III

PRESENTATION AND ANALYSIS OF DATA

Data presented in this chapter were obtained from questionnaires filled out by the seventeen teachers of vocational agriculture in Woods, Alfalfa, Dewey, Ellis, Harper, Woodward, and Beaver counties. The questionnaire was sent or given personally to the teachers in this area. A conference was held during the Vocational Agriculture Teachers Summer Conference of 1964 with these teachers to explain this questionnaire fully. Also some private sessions were held with some of the teachers.

The writer felt that this seven county area mentioned was a good representative of the wheat-beef producing area of Oklahoma. These teachers were asked, in the questionnaire, for information on their school, community, vocational agriculture program, adult education program, and farm mechanics program. The information obtained was analyzed and tabulated and reported in this chapter.

The five major areas of agricultural mechanics used in this study were: (1) rural electrification, (2) farm power and machinery, (3) farm buildings and conveniences, (4) farm shop work and, (5) soil and water conservation.

Percent of male students in seventeen high schools enrolled in vocational agriculture.

In these seventeen high schools reporting information it was noted that a total of 863 male students enrolled. Of the 863 male students 487 or 56.4 per cent enrolled in vocational agriculture. Of these seventeen high schools reporting none reported that vocational agriculture was required for all male students.

TABLE I
PERCENT OF MALE STUDENTS OF SEVENTEEN HIGH SCHOOLS
ENROLLED IN VOCATIONAL AGRICULTURE

	<u>NUMBER</u>	<u>PER CENT</u>
MALE STUDENTS ENROLLED IN VOCATIONAL AGRICULTURE	487	56.4
MALE STUDENTS NOT ENROLLED IN VOCATIONAL AGRICULTURE	<u>376</u>	<u>43.6</u>
TOTAL NUMBER MALE STUDENTS ENROLLED	863	100.0

Number of schools offering additional mechanical courses and number of male students enrolled.

Table II shows three of the high schools offered additional mechanical courses such as: auto mechanics, industrial arts, woodworking and mechanical drawing. Of the 376 male students in Table I that were not enrolled in vocational agriculture only 115 or 30.6 per cent were enrolled in these additional mechanics courses.

TABLE II

NUMBER OF SCHOOLS OFFERING ADDITIONAL MECHANICAL COURSES
AND NUMBER OF MALE STUDENTS ENROLLED

	<u>NUMBER</u>	<u>PER CENT</u>
SCHOOLS OFFERING MECHANICS COURSES	3	17.6
SCHOOLS NOT OFFERING MECHANICS COURSES	14*	82.4
NUMBER OF STUDENTS ENROLLED	115	30.6
NUMBER OF STUDENTS NOT TAKING ANY TYPE OF MECHANICS	261	69.4

*One school offered an agriculture mechanics course but the students had to be enrolled in vocational agriculture before they could enroll in the agriculture mechanics course.

TABLE III

NUMBER OF STUDENTS IN SEVENTEEN HIGH SCHOOLS
THAT WOULD ENROLL IN AN AGRICULTURAL MECHANICS COURSE
INSTEAD OF VOCATIONAL AGRICULTURE
AND NUMBER THAT WOULD ENROLL IN BOTH

	<u>NUMBER</u>	<u>PER CENT</u>
STUDENTS THAT WOULD ENROLL IN AN AGRICULTURE MECHANICS COURSE INSTEAD OF VOCATIONAL AGRICULTURE	81	14.4
STUDENTS THAT WOULD ENROLL IN BOTH	479	85.6
TOTAL	560	100.0

Table III indicates that these schools might lose a few students from vocational agriculture if a separate agriculture mechanics course was offered. However, the majority of the students enrolled in vocational agriculture would enroll in both.

Table III also indicates that these teachers of vocational agriculture would be in contact with a larger number of students, 560, as compared to 487 (Table I).

TABLE IV

NUMBER OF STUDENTS IN VOCATIONAL AGRICULTURE
THAT LIVE ON THE FARM, IN TOWN BUT FARM,
IN TOWN AND DO NOT FARM AND ON THE
FARM AND DO NOT FARM

	<u>NUMBER</u>	<u>PER CENT</u>
LIVES ON THE FARM AND FARMS	346	72.0
LIVES ON THE FARM BUT DOES NOT FARM	14	2.5
LIVES IN TOWN BUT FARMS	66	13.3
LIVES IN TOWN AND DOES NOT FARM	<u>61</u>	<u>12.2</u>
TOTAL	487	100.0

Number of students in vocational agriculture that live on the farm, in town but farm, in town that do not farm, and on the farm but do not farm.

Table IV shows that most of the students live on the farm and farm. Eighty-five and three tenths per cent of all the students does some kind of farming even though 13.3 per cent live in town. A very small 2.5 per cent live on the farm and do not farm. Almost all chapters have some boy that lives in town and does not have the opportunity to farm. Twelve and two tenths per cent of the students fall in this category.

TABLE V
SIZE OF SERVICE AREA OF THE REPORTING SCHOOLS

	<u>NUMBER</u>	<u>PER CENT</u>
LESS THAN 100 SQUARE MILES	5	29.4
101 - 200 SQUARE MILES	4	23.4
201 - 300 SQUARE MILES	2	11.8
301 - 400 SQUARE MILES	2	11.8
OVER 401 SQUARE MILES	4	23.5

Size of service area of reporting schools.

In this area surveyed a majority of the school service areas are less than 200 square miles. Fifty-two and nine tenths per cent of the schools fall in this category. Next in order would be the largest in size. Twenty-three and five tenths per cent reported a service area of 400 square miles or more.

TABLE VI
RECOGNITION OF TEACHERS AS TO THEIR QUALIFICATION
IN DIFFERENT AREAS OF FARM MECHANICS

<u>AREA</u>	<u>NUMBER INDICATING QUALIFICATIONS</u>			
	<u>YES</u>	<u>PER CENT</u>	<u>NO</u>	<u>PER CENT</u>
RURAL ELECTRIFICATION	2	11.8	15	88.2
FARM POWER AND MACH.	11	64.8	6	35.2
FARM BUILDING AND CONV.	7	41.1	10	58.9
FARM SHOP WORK	15	88.3	2	11.7
SOIL AND WATER CONSV.	12	70.6	5	29.4

Qualifications of teachers in different areas of farm mechanics.

The teachers rated themselves as to whether they were qualified to teach these areas. Farm shopwork ranked first as the one being qualified with 88.3 per cent stating that they were qualified. Soil and water conservation ranked second with 70.6 per cent. Rural electrification ranked last with a mere 11.7 per cent that felt they were qualified to teach this to the high school students. The qualifications of the teachers ties in very close with facilities available (Table VIII and amount of previous study (Table IX) each has had.

TABLE VII

TOTAL NUMBER AND AVERAGE NUMBER OF HOURS TAUGHT
BY SEVENTEEN TEACHERS IN EACH AREA OF FARM
MECHANICS FOR VO. AG. I, VO. AG. II,
VO. AG. III AND VO. AG. IV

AREA	VO. AG. I		VO. AG. II	
	HOURS TAUGHT	HOURS AVERAGE	HOURS TAUGHT	HOURS AVERAGE
RURAL ELECTRIFICATION	14	.82	45	2.64
FARM POWER AND MACH.	95	5.58	148	8.70
FARM BUILDING AND CONV.	43	2.52	97	5.70
FARM SHOPWORK	442	26.00	528	31.00
SOIL AND WATER CONS.	127	7.47	181	10.60

AREA	VO. AG. III		VO. AG. IV	
	HOURS TAUGHT	HOURS AVERAGE	HOURS TAUGHT	HOURS AVERAGE
RURAL ELECTRIFICATION	47	2.76	43	2.52
FARM POWER AND MACH.	198	11.64	219	12.88
FARM BUILDING AND CONV.	106	6.23	132	7.76
FARM SHOPWORK	608	35.76	668	38.70
SOIL AND WATER CONS.	180	10.58	162	9.52

Total number and average number of hours taught in each area of farm mechanics to Vo. Ag. I, Vo. Ag. II, Vo. Ag. III, and Vo. Ag. IV.

Table VII shows the total number of hours taught in each area of farm mechanics by seventeen teachers. In each year of vocational agriculture farm shopwork ranks first with an average number of hours for Vo. Ag. I, twenty-six hours. For Vo. Ag. IV an average number of 38.7 hours was being taught. In all areas except soil and water conservation the total number and average number of hours increased each year. Soil and water conservation increased from 127 total hours for Vo. Ag. I to 181 for Vo. Ag. II. However, for Vo. Ag. III it drops to 180 and Vo. Ag. IV down to 162.

Rural electrification is an area that most teachers have indicated that they are not qualified to teach. The writer believes this to be the reason for the low number of hours taught each year.

TABLE VIII
SCHOOLS HAVING FACILITIES FOR TEACHING
EACH AREA OF FARM MECHANICS

AREA	NUMBER INDICATING FACILITIES			
	YES	PER CENT	NO	PER CENT
RURAL ELECTRIFICATION	6	35.3	11	64.7
FARM POWER AND MACH.	11	64.7	6	35.3
FARM BUILDINGS AND CONV.	8	47.0	9	53.0
FARM SHOPWORK	17	100.0	0	00.0
SOIL AND WATER CONS.	14	82.4	3	17.6

Number of schools having facilities for teaching each area of farm mechanics.

In Table VIII 100.0 per cent of the teachers reporting indicated they had facilities for teaching farm shopwork. One school reported that they had some facilities for teaching but they were very poor. Only one school indicated that they had facilities for teaching all areas. Soil and water conservation ranked second with 82.4 per cent of the departments having facilities for teaching. It was indicated in Table VII that a very small number of hours were being taught. Here in Table VIII only 35.3 per cent had facilities available for teaching rural electrification.

TABLE IX
TEACHERS INDICATING NEED FOR ADDITIONAL TRAINING
IN EACH AREA OF AGRICULTURAL MECHANICS

AREA	TEACHERS INDICATING			
	NEED TRAINING	PER CENT	DO NOT NEED TRAINING	PER CENT
RURAL ELECTRIFICATION	17	100.0	0	00.0
FARM POWER AND MACH.	15	88.3	2	11.7
FARM BUILDINGS AND CONV.	15	88.3	2	11.7
FARM SHOP WORK	9	52.9	8	47.1
SOIL AND WATER CONS.	12	70.6	5	29.4

Teachers reporting they need additional training in each area of farm mechanics.

Here in Table IX, 100.0 per cent of the teachers reported they need additional training in rural electrification. Fewer teachers reported they need additional training in farm shopwork.

TABLE X

NUMBER OF AREAS OF FARM MECHANICS BEING TAUGHT THAT ARE CONSIDERED BY REPORTING TEACHERS TO BE ADVANCED IN NATURE

AREA	NUMBER TEACHERS REPORTING	PER CENT
RURAL ELECTRIFICATION	2	11.7
FARM POWER AND MACHINERY	3	17.6
FARM BUILDINGS AND CONVENIENCES	0	00.0
FARM SHOPWORK	9	52.9
SOIL AND WATER CONSERVATION	0	00.0
NO ADVANCED TEACHING	1	5.8
DID NOT REPORT	5	29.4

Number of areas of farm mechanics being taught that are considered by reporting teachers to be advanced in nature.

Farm shopwork leads in number of teachers giving advanced training. One teacher reported that no advanced training was taught in any area. Five teachers did not report.

TABLE XI
NUMBER OF TEACHERS REPORTING YOUNG AND ADULT
FARMER PROGRAMS IN AGRICULTURAL MECHANICS

YOUNG FARMER	8*
ADULT FARMER	8*
COMBINED (YOUNG*ADULT FARMER)	6*
AVERAGE NUMBER OF HOURS TAUGHT EACH YEAR IN FARM MECHANICS	20.9 hours

*Some schools reported having both young farmer and adult farmer programs in farm mechanics. Some schools combined both in one group.

Number of teachers reporting young and adult farmer programs in farm mechanics.

In Table XI eight schools reported having a young farmer program in farm mechanics. Eight schools, also, reported adult farmer programs. Six schools reported combining the two groups into one. The average number of hours taught in each farm mechanics program was 20.9 hours.

TABLE XII
TEACHERS JUDGEMENTS AS TO NUMBER OF
YOUNG AND ADULT FARMERS WITH ADEQUATE
TO FAIR HOME FARM SHOPS IN EACH COMMUNITY

	NUMBER REPORTED IN RANGE				
	0-5	6-10	11-15	16-20	OVER 20
ADEQUATE	5	5	1	3	3
FAIR	3	7	22	1	5

Number of young and adult farmers with adequate and fair home farm shop in each community.

Each teacher was asked to report the number of home farm shop considered adequate and number considered fair in his community. These shops were reported as belonging to a young or adult farmer in the community. Five teachers reported to have five or fewer adequate farm shops. Three teachers reported having over twenty adequate farm shops. One teacher reported having as many as 150 farm shops in his community which he considered adequate. Seven teachers reported to have 6-10 fair farm shops and five teachers reported having over twenty fair farm shops.

TABLE XIII
NUMBER OF TEACHERS REPORTING DIFFICULTY
IN TEACHING FARM MECHANICS TO ADULT GROUPS

	TEACHERS REPORTING	
	NUMBER	PER CENT
TEACHERS REPORTING DIFFICULTY	8	47.0
TEACHERS HAVING NO DIFFICULTY	9	53.0
TOTAL	17	100.0

Number of teachers reporting difficulty in teaching farm mechanics to adult groups.

Table XIII shows the number of reporting teachers having difficulty in teaching adult groups. Forty-seven per cent of the teachers reported difficulty due to age, limited knowledge and farmers are harder to get motivated.

TABLE XIV
TEACHERS REPORTING THE NATURE AND EXTENT
OF SAFETY PRACTICES TAUGHT

TAUGHT AS	NUMBER	PER CENT
A SEPERATE UNIT	0	00.0
INCORPORATED IN ALL LESSONS	13	76.5
BOTH	4	23.5

Teachers reporting the nature and extent of safety practices taught.

Table XIV deals with the number of teachers that teach safety in farm mechanics and the method used. Seventy-six and five tenths per cent of the reporting teachers state safety was stressed in all lessons. Twenty-three and five tenths per cent of the teachers reported that safety was taught as a seperate unit but was also stressed in all lessons.

TABLE XV
PROBLEM AREAS REPORTED AS TAUGHT BY TEACHERS IN
RURAL ELECTRIFICATION AND CONVENIENCES

PROBLEM AREA	TEACHERS REPORTING	
	NUMBER	PER CENT
WIRING THE FARMSTEAD	8	47.0
INSTALLING SWITCHES AND LIGHTS	9	52.9
PLANING WIRING SYSTEMS	10	58.8
UNDERSTANDING ELECTRICAL SOURCES & TERMS	8	47.0
INSTALLING ELECTRICAL WIRING	8	47.0
SAFETY	9	52.9
ELECTRIC MOTORS	4	23.5
WATER SYSTEMS	3	17.6

Problem areas reported as taught by teachers in rural electrification.

In Table XV 58.8 per cent of the teachers reported as teaching planning wiring systems. Ranked second was installing switches and lights and safety with 52.9 per cent. Other areas reported taught are wiring the farmstead, understanding electrical sources and terms, and installing electrical wiring. Forty-seven per cent of the teachers reported teaching these areas.

TABLE XVI

PROBLEM AREAS REPORTED AS TAUGHT BY TEACHERS
IN FARM POWER AND MACHINERY

PROBLEM AREA	TEACHERS REPORTING	
	NUMBER	PER CENT
CARE AND MAINTENANCE	11	64.7
REPAIR	14	82.3
PRINCIPLES OF GAS ENGINES	5	29.4
CONSTRUCTION OF MACHINERY	5	29.4
DRAWING	1	5.8
SAFETY	6	35.3
PROPER TOOL USE	4	23.5
STORAGE OF MACHINERY	4	23.5
ADJUSTMENT OF EQUIPMENT	3	17.6
SERVICING OF EQUIPMENT	7	41.1

Problem areas reported as taught by teachers in farm power and machinery.

In this area of farm mechanics more emphasis has been placed on the repair of farm machinery than other areas. Eighty-two and three tenths per cent of the teachers reported they were teaching this area. Ranked second was care and maintainence with 64.7 per cent. Each teacher reported that this problem area is being stressed more each year because farmers are becoming so highly mechanized in their business.

TABLE XVII
PROBLEM AREAS REPORTED AS TAUGHT BY TEACHERS
IN FARM BUILDINGS AND CONVENIENCES

PROBLEM AREA	TEACHERS REPORTING	
	NUMBER	PER CENT
CONSTRUCTION OF LIVESTOCK BUILDINGS	4	23.5
GENERAL STRUCTURES	10	58.8
MATERIALS AND FRAMING	8	47.0
LAYOUT AND DESIGN	5	29.4
ADAPTABILITY OF BUILDINGS	2	11.7
TYPES OF BUILDINGS	6	35.3
TOOL AND CARE	6	35.3
RAFTER CUTTING	5	29.4
CONCRETE WORK	7	41.1
DRAFTING AND READING BLUEPRINTS	5	29.4

Problem areas reported as taught by teachers in farm buildings and conveniences.

Farm building and conveniences is an area of farm mechanics that is apparently difficult to teach to high school students. The writer made this statement from interviews with several of the reporting teachers; however, some teaching is now being done. Fifty-eight and eight tenths per cent of the teachers reported as teaching general structures.

TABLE XVIII
PROBLEM AREAS REPORTED AS TAUGHT BY TEACHERS
IN FARM SHOPWORK

PROBLEM AREA	TEACHERS REPORTING	
	NUMBER	PER CENT
ARC WELDING	16	94.1
OXY-ACETYLENE WELDING AND CUTTING	16	94.1
PIPE CUTTING AND THREADING	11	64.7
WOODWORKING	6	35.3
COLD METAL WORK	7	41.1
USE AND CARE OF HAND TOOLS	8	47.0
SAFETY IN THE SHOP	17	100.0
TOOL FITTING	5	29.4
PAINTING AND GLAZING	2	11.8
USE OF ROPE	3	17.6
SOLDERING	3	17.6
METALLURGY	1	5.8
MECHANICAL DRAWING	3	17.6
PROJECT CONSTRUCTION	6	35.3

Ranked second was materials and framing with 47 per cent. Concrete work ranked third with 41.1 per cent. All other areas ranked below 29.9 per cent of the teachers reporting. Problem areas reported as taught by teachers in farm shopwork.

In the area of farm shopwork 100 per cent of the teachers reported safety now being taught. Ranked second and very close behind was arc welding and oxy-acetylene welding and cutting with 94.1 per cent. More problem areas were stressed in farm shopwork than any other area of farm mechanics.

TABLE XIX
PROBLEM AREAS REPORTED AS TAUGHT BY TEACHERS
IN SOIL AND WATER CONSERVATION

PROBLEM AREA	TEACHERS REPORTING	
	NUMBER	PER CENT
USE OF THE FARM LEVEL	10	58.8
TERRACING	9	52.9
FARM PONDS	9	52.9
CONTOUR FARMING	8	47.0
STRIP CROPPING	4	23.5
CONTROL OF EROSION	7	41.1
LAND CLASSIFICATION	7	41.1
RESEEDING OF PASTURES	3	17.6
COVER CROPS	5	29.4
STUBBLE MULCHING	6	35.3
ROTATIONS	4	23.5
IRRIGATION	1	5.8

Problem areas reported as taught by teachers in soil and water conservation.

Only three problem areas rated above the fifty per cent mark. Use of the farm level was reported as being taught by 58.8 per cent of the teachers. Terracing and farm ponds each had 52.9 per cent of the teachers reporting teaching these areas. In various farming areas specific problems were reported as important while in another area it was of minor concern.

Number of graduates during the past six years, their occupation and their indication as to the helpfulness of farm mechanics in their work.

During the past six years seventeen vocational agriculture departments have graduated 488 students. Of these 488 students, one hundred and sixty-three are presently engaged in farming. Another one hundred and thirty-five are in some occupation related to agriculture. The remaining one hundred and ninety students are in some type of work that is not related to agriculture.

On the 163 students presently engaged in farming, one hundred and eight reported farm mechanics as being essential to their work. Only two reported farm mechanics as not needed.

On hundred ninety students were reported as having jobs not related to agriculture. Only 19 reported farm mechanics as essential. Eighty-six reported as helpful and eighty-five stated farm mechanic training as not needed.

To look at the total picture, ninety-one of the four hundred and eighty-eight students or 22.2 per cent reported

farm mechanics as not needed. However, the remaining 87.8 per cent reported it as helpful or essential in their work.

Jobs in both the agricultural related and non-agricultural related jobs varied. The majority of the non-agricultural related graduates (one hundred and twenty-two were in college studying for a profession other than farming, and another thirty were in the military service.)

TABLE XX

NUMBER OF GRADUATES DURING THE PAST SIX YEARS, THEIR
OCCUPATION AND THEIR INDICATION AS TO THE
HELPLESSNESS OF FARM MECHANICS IN THEIR WORK

OCCUPATION	NUMBER INDICATING FARM MECHANIC TRAINING AS		
	ESSENTIAL	HELPFUL	NOT NEEDED
FARMING	108	53	2
<u>AGRICULTURAL RELATED JOBS:</u>			
FARM LABOR	6	13	
COUNTY AGENT	1	1	
MEAT PROCESSING			1
TRANSPORTATION		9	
COLLEGE (AGRICULTURE)	32	27	2
FORESTRY		1	
FEED STORE		2	
AGRICULTURE ENGINEER	1		
USDA		3	
REPAIRMEN		4	
MECHANIC	9		
VOC. AGRI. TEACHER	3		
R. E. A.	1		
LUMBER YARD	5	1	
SALE BARN			1
TOTAL	167	114	6

TABLE XX (CON'T)

OCCUPATION	NUMBER INDICATING FARM MECHANICS TRAINING AS		
	ESSENTIAL	HELPFUL	NOT NEEDED
<u>NONAGRICULTURAL RELATED JOBS:</u>			
AIRCRAFT WORKER	1		
ELECTRONICS REPAIRMAN	1		
MILITARY SERVICE		17	13
COLLEGE (NON-AGRICULTURE)	5	51	56
DRAFTSMAN		1	
BUSINESS OF THEIR OWN	3		5
INSURANCE			1
SERVICE STATION	3	9	1
PIPELINE EMPLOYEE	2	4	
RETAIL STORE CLERK	3		5
RAILROAD		2	
FURNITURE MOVER		1	
PHARMACY			1
BANK EMPLOYEE			1
MECHANIC (LARGE CITY)	1		
REFRIGRATION ENGINEER		1	
TOTAL	19	86	85
GRAND TOTAL*	186	200	91

*Includes all graduates, both in the agricultural related work and non-agricultural related work. Total graduates was 488.

CHAPTER IV

SUMMARY AND CONCLUSIONS

The primary purpose of this study was to develop an agricultural mechanics program most suited for the wheat-beef producing area of Northwestern Oklahoma. The second purpose was to determine if our farm shops had adequate equipment for teaching all areas of farm mechanics. Third, to determine if additional skills and competencies in farm mechanics will be needed by the teachers in the area of the state surveyed. The fourth purpose was to determine what areas of farm mechanics are considered most important in the wheat-beef producing area. The final purpose was to determine what skills are now being taught to students of vocational agriculture in the area surveyed.

To achieve the purposes stated, the writer formulated a questionnaire and distributed it to the teachers of vocational agriculture in Woods, Alfalfa, Harper, Beaver, Woodward, Ellis and Dewey counties. Of the thirty questionnaires distributed seventeen were completed and returned.

Data from these questionnaires were tabulated and analyzed with the following results being obtained.

In tabulating information about the different schools, it was found that a total of 863 male students were currently enrolled in the high schools. Of this number, 487

students were taking vocational agriculture. Another 115 was enrolled in some type of mechanics instruction other than that provided in vocational agriculture. Only three of the seventeen schools offered additional mechanics courses.

It was also found that 85.3 per cent of the male students enrolled in vocational agriculture had some type of farming program with 72 per cent actually living on the farm.

When tabulating data regarding the qualifications of the teachers to teach various areas of farm mechanics, it was found that 88.3 per cent were qualified to teach farm shop as contrasted with a mere 11.7 per cent who felt qualified to teach rural electrification and conveniences.

The tabulation showed that the teachers were teaching more of the areas of farm mechanics that they felt fully qualified for and/or had adequate facilities for teaching. To the writers surprise 100 per cent of the teachers reported they could profit from additional training in rural electrification, 88.3 per cent indicated needing additional training in farm power and machinery, 88.3 per cent indicated needing additional training in farm building and conveniences, while 70.6 per cent felt additional training in soil and water conservation would be of value. The most surprising finding was that 52.9 per cent reported needing additional training in farm shop skills and competencies.

From the tabulation of problem areas now being taught in each area of farm mechanics, one must conclude that teach-

ers are largely devoting teaching time to the areas they feel more qualified for. More farm shop skill and competencies were being taught than in any other area of farm mechanics.

An answer to the question posed in the opening statement of the report as to whether farm mechanics has been beneficial in the occupational work of the high school graduates during the past six years is proved in data presented in Table XX. The findings substantiate the premise that it has been of major importance. Seventy-seven and eight-tenths per cent of the high school graduates reported that farm mechanics was either essential or helpful in their line of work. Only 91 of the 488 graduates or 22.2 per cent reported that farm mechanics was not needed. Of this 91 graduates, 85 had jobs that were not agriculturally related.

The writer realizes there has been a large amount of research time spent on farm mechanics while all too little has been expended on actually developing an agricultural mechanics course for high school students.

Conclusions drawn from the Survey

The writer felt that several valid conclusions could be drawn from the study. First of all; vocational agriculture has been reaching only 50 per cent of the total male students attending high school in the Northwestern Oklahoma schools included in this study. Second; a large group of students could be reached by the teachers of vocational agriculture,

if an agricultural mechanics course separate from vocational agriculture was offered. Third; a majority of the teachers will need additional equipment and facilities to teach either the additional course effectively or to make their present course in vocational agriculture of maximum benefit. Also a majority of the teachers will need some additional training in each of the five areas of farm mechanics. Among other factors this is due to the fast changes being made in the agricultural industry. Fourth; the teachers of vocational agriculture are now spending more time teaching problems that they feel more qualified to teach as well as those in which they have ample facilities for teaching. Fifth; the size of service area apparently does not have any direct bearing of the kind or number of teaching skills being taught in the vocational agriculture shops. Sixth; each teacher is largely teaching those competencies and skills in agricultural mechanics that are most widely used in their communities. Very little new skills are being taught to prepare the students for jobs in agricultural industry or other related areas of work. Seventh; the University programs of teacher preparation must assume responsibilities for preparing future teachers to teach both advanced competencies and skills in areas now being taught as well as those additional areas which are recognized as of increasing importance. It is imperative that all students preparing to teach obtain a well-rounded education in all areas of agricultural mechanics. The teachers that are now

on the job are going to need to avail themselves of additional training particularly in areas in which they recognize they are deficient. Eighth; most of the time allotted for farm mechanics is now being devoted to only one or two areas, farm shop work and soil and water conservation. Other areas are becoming of increasing importance. Ninth; of the graduated students that the vocational agriculture teachers have taught, a very large percentage have indicated the farm mechanics training they received has been very helpful in their work.

CHAPTER V

A SUGGESTED COURSE OF STUDY IN AGRICULTURAL MECHANICS DESIGNED FOR THE WHEAT-BEEF PRODUCING AREA OF NORTHWESTERN OKLAHOMA

In setting up a course of study in agricultural mechanics, the writer believes we should use most of the problem areas being taught in the regular farm mechanics programs in vocational agriculture. Also a more advanced course should be included for the students in these agricultural mechanics courses.

At the Southern Regional Conference for Agricultural Education and Agricultural Engineering personnel in 1964, a new naming of two of the five areas of farm mechanics was released. These areas were changed from rural electrification and conveniences to electrical power and processing and farm shopwork was changed to agricultural construction and maintenance. The other three area names were left as they were originally. These areas are farm power and machinery, farm buildings and conveniences, and soil and water conservation. In setting up this suggested course in agricultural mechanics these new named areas were used.

Listed below are problem areas that are recommended to be included in an agricultural mechanics course of study for Northwestern Oklahoma. Each teacher and each com-

community will find different areas of importance and should select the problems that best meets their needs. Also time allocation will vary with communities and teachers.

Problem Areas for A Suggested Course of Study for Agricultural Mechanics

Electrical Power and Processing

- A. Electrical safety precautions
- B. Electrical sources and terms
- C. Planning wiring system
- D. Estimating cost of electrical wiring
- E. Estimating power demand
- F. Estimating power cost
- G. Wiring the farmstead
- H. Selecting electrical appliances
- I. Selecting lighting equipment
- J. Servicing electrical appliances
- K. Servicing lighting equipment
- L. Selecting power tools
- M. Heating the home
- N. Identification of various wires
- O. Selection and use of plumbing equipment
- P. Establishing farm water supply systems
- Q. Establishing sewage disposal systems

Farm Power and Machinery

- A. Selecting farm machinery
- B. Adjusting and repairing farm machinery
- C. Fundamental principles of engines
- D. Operating and lubricating farm motors and engines
- E. Servicing the cooling, fuel, and ignition systems
- F. Replacing and adjusting clutches
- G. Repairing and adjusting brakes
- H. Servicing transmissions
- I. Building labor saving farm equipment

Farm Buildings and Conveniences

- A. Construction and maintenance of fences
- B. Painting farm buildings
- C. Planning a home farm shop
- D. Construction and repairing farm buildings
- E. Proper use of concrete mixtures
- F. Determining quantities and proportions for concrete mixtures
- G. Mixing and curing concrete
- H. Reinforcing concrete
- I. Reading blueprints.

Soil and Water Conservation

- A. Measuring land and calculating acreage
- B. Planning and maintaining irrigation systems
- C. Use of the farm level
- D. Running terrace lines
- E. Building farm ponds
- F. Mechanical practices for control of erosion

Agricultural Construction and Maintenance

- A. Shop orientation
- B. Tool use and nomenclature
- C. Arc welding
 - 1. Safety precautions
 - 2. Striking an arc and running a bead
 - 3. Principles of arc welding
 - 4. Cutting with the arc
 - 5. Use of the carbon arc torch
 - 6. TIG welding
 - 7. MIG welding
 - 8. Repairing broken parts of farm machinery
 - 9. Selection of electrodes and filler rods
 - 10. Types of welding joints
 - 11. Welding positions
 - 12. Hardsurfacing
- D. Oxy-acetylene welding
 - 1. Safety precautions
 - 2. Lighting and adjusting the torch
 - 3. Principles of oxy-acetylene welding
 - 4. Braze welding
 - 5. Using the cutting torch
 - 6. Hardsurfacing
 - 7. Welding cast iron
- E. Woodworking
 - 1. Selection of lumber
 - 2. Proper use of tools
 - 3. Planning and smoothing wood
 - 4. Use of nails and screws
 - 5. Hand saws and their use
 - 6. Use of brace and auger bit
 - 7. Using the tri, T-bevel, and combination square
 - 8. Figuring bill of material
 - 9. Drawing and sketching
 - 10. Cutting rafters
 - 11. Use of the framing square
 - 12. Use of power tools
- F. Hot and Cold Metal Work
 - 1. Metal working equipment and its use (Farm black-smithing)
 - 2. Working hot and cold metal
 - 3. Annealing and tempering metal
 - 4. Pipe cutting and threading
 - 5. Bolt cutting and threading
 - 6. Conditioning tools and equipment

7. Soldering
8. Use of files
9. Using and maintaining grinders
10. Building labor saving equipment

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A P P E N D I X

- A. Copy of Letter Sent With Questionnaire**
- B. Questionnaire**

Box 6
Capron, Oklahoma
June 5, 1964

Name of Teacher
Teacher of Vocational Agriculture
Town, Oklahoma

Dear Sir:

I would like to ask for your cooperation in filling out the enclosed questionnaire. I am making a study of the Farm Mechanics Programs that are taught in Northwestern Oklahoma's Vocational Agriculture Department. I am attempting to set up an Agriculture Mechanics Program for the wheat-beef producing area of Northwest Oklahoma. To make a complete and accurate study, I need the questionnaire completed and returned to me as soon as possible. All information obtained will be considered confidential material.

I am enclosing a stamped, self-addressed envelope for your convenience. Your cooperation and prompt response will be deeply appreciated.

Sincerely yours,

Clifton R. Draker

CRD/aw
Enclosure

QUESTIONNAIRE

I. Information about school:

- A. Name of school. _____
- B. Number of male students in high school. _____
- C. Number of students in Vocational Agriculture I. _____
II _____ III _____ IV _____.
- D. Does your school provide additional mechanical courses?

- E. If so, what additional courses are provided? _____

- F. Number enrolled in each course. _____

- G. Number of students that would enroll in an Agriculture
Mechanics course. A. Instead of Vocational Agriculture
B. And Vocational Agriculture

II. Information about the community:

- A. Size of service area. _____
- B. Number of all-day students that live on the farm. _____
- C. Number of all-day students that live in town, but farm.

- D. Number of all-day students that live in town, but do not
farm. _____
- E. Number of all-day students that live on the farm, but do
not farm. _____
- F. Number of farms with adequate farm shops. _____

1. Do the farmers use these shops?_____
2. Are they performing all unspecialized skills of Farm Mechanics?_____

III. Information about the Vocational Agriculture Program:

- A. Do you feel that you are qualified to teach all areas of Farm Mechanics? (1) Rural Electrification_____ (2) Farm Power and Machinery_____ (3) Farm Bldg. Conv._____ (4) Farm Shop_____ (5) Soil and Water Conservation_____

- B. Number of hours taught in each area of Farm Mechanics?

	Ag I	Ag II	Ag III	Ag IV
1. Rural Electrification				
2. Farm Power & Mach.				
3. Farm Building & Conv.				
4. Farm Shop				
5. Soil and Water Cons.				

- C. What areas of Farm Mechanics do you stress the most. Why?
- _____
- _____
- _____

- D. Does your school have facilities for teaching all areas of Farm Mechanics? Rural Electrification_____ Farm Power and Machinery_____ Farm Building & Conv._____ Farm Shop_____ Soil and Water Conservation_____.

- E. Would you need additional training in any of these areas of Farm Mechanics? Rural Electrification_____ Farm Power and Machinery_____ Farm Building & Conv._____ Farm Shop_____ Soil and Water Conservation_____

F. Is your department limited in size by funds not being available? _____

1. Size of classroom _____

2. Size of Farm Mechanics Laboratory and Storage Rooms _____

3. Size of laboratory _____

4. Size of office and other rooms _____

G. List some areas in Farm Mechanics that are advanced in nature that you are teaching your students. _____

IV. Information about your Adult Education Program:

A. Number of Young Farmers enrolled _____

B. Number of Adult Farmers enrolled _____

C. Number of Combined (Young and Adult Farmers) enrolled _____

D. Number of hours taught each year in Farm Mechanics to Young and Adult Farmers _____

E. Number of periods taught in each area: Rural Electrification _____ Farm Machinery and Power _____ Farm Building Conveniences _____ Farm Shop _____ Soil and Water Conservation _____.

F. (1) Number of Young and Adult Farmers in community with adequate farm shop _____

(2) Number of Young and Adult Farmers in community with fair farm shops _____

- G. Do you find it more difficult to teach a Farm Mechanics course to an Adult group than to an All-Day class? _____
If answered yes, explain why? _____

V. Information about your Farm Mechanics Program:

- A. Do you teach safety as a separate unit or incorporate it in with all lessons? _____

- B. List the units or jobs under each area of Farm Mechanics stressed most:

1. Rural Electrification

2. Farm Power and Machinery

3. Farm Building and Conveniences

4. Farm Shop

5. Soil and Water Conservation

C. List the number of boys that have graduated in the past six years. _____

	Total	Number Farm Mech. Essential	Number Farm Mech. Helpful	Mechanics Not Needed
Farming				
Farm Related Jobs (List)				
Non-Farm Related Jobs (List)				

D. Of what importance do you think Farm Mechanics is to your local community? Explain in detail. (This question is for my own personal information and use.)

VITA

Clifton Ray Braker

Candidate for the Degree of
Master of Science

Report: AN AGRICULTURE MECHANICS COURSE OF STUDY FOR HIGH SCHOOL STUDENTS IN THE WHEAT-BEEF PRODUCING AREA OF NORTHWESTERN OKLAHOMA

Major Field: Agricultural Education

Biographical:

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Experiences: Entered the United States Army, March 1957; received a honorable discharge in March, 1959; was Graduate assistant, Agriculture Engineering Department, Oklahoma State University for 9 months from September, 1960, to May, 1961; taught Vocational Agriculture for three years at Sapron, Oklahoma.

Member of Collegiate FFA, Block and Bridle Club, Phi Delta Kappa, Oklahoma Vocational Association, American Vocational Association, Oklahoma Education Association, and the National Education Association.