August 6, 1956

To the Graduate Council:

I am submitting herewith a thesis written by Dwight Cox Ellis entitled "An Analysis of One Hundred and Eight Courses of Study in Farm Mechanics." I recommend that it be accepted for nine quarter hours of credit in partial fulfillment of the requirements for the degree of Master of Science, with a major in Agricultural Education.

J. E. Wiegers, Jr.
Major Professor

We have read this thesis
and recommend its acceptance:

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Accepted for the Council:

E. G. Williamson
Dean of the Graduate School

AN ANALYSIS OF ONE HUNDRED AND EIGHT COURSES OF STUDY IN FARM MECHANICS

A THESIS

Submitted to
The Graduate Council
of
The University of Tennessee
in
Partial Fulfillment of the Requirements
for the degree of
Master of Science

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by

Dwight Cox Ellis

August 1956

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This study was made possible by the cooperation of many people and the author wishes to express his appreciation to all the teachers who planned a course of study that was used in writing this study.

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CHAPTER I

THE PROBLEM AND ITS DEFINITION

Purpose

The purpose of this study is to find solutions to the problems of planning a farm mechanics course of study. The purpose embodies four elements which may be stated as follows:

1. What areas of instruction are included in a farm mechanics course of study?

2. What are the activities in each area?

3. What is the range in hours planned for teaching each activity?

4. What is the average number of hours allotted to teach each activity?

The first element of the purpose is concerned with revealing the number of areas planned and their importance. By importance of area is meant which area was planned by the most number of teachers.

The second element of the purpose is to show the different activities that were planned to be taught in each area.

The third element of the purpose is to show the range of hours for teaching each activity.

The final element of the purpose is to show the average time planned for teaching each activity.

Limitations of the Study

This study is limited in that the investigation concerns itself with 108 farm mechanics courses of study. It is further limited in that it investigated only Tennessee teachers' programs.

Very little time has been spent in research on jobs that are taught and how long it takes to teach each job. It is not the purpose of this study to make recommendations as to jobs to teach and length of time to teach each job. The study brings together 108 vocational agriculture teachers' planned farm mechanics courses of study and the time devoted to different areas and jobs.

No scientific study, such as time checks have been made. Only what the teachers have planned has been recorded.

Need for the Study

When setting up a farm mechanics course of study it is helpful to know about how much time should be devoted to each activity to be taught. In this study each activity will have the range and also the average number of hours planned for teaching each job. It is also important to know what jobs other teachers deem important. A listing of jobs and projects will be helpful especially to new teachers and will possibly give older teachers new ideas about new projects and jobs. The grouping of the areas and jobs will suggest what year each area and jobs are normally taught by the teachers.

Definition of Terms

The term "farm mechanics course of study" as employed in this study is used to designate the vocational agriculture teachers' farm mechanics instructional program. The farm mechanics program is an integral part of the agriculture teacher's job in that each student should know some of the fundamentals of the different areas.

The term "area" refers to the different instructional areas such as: woodworking, welding and electricity.

The term "job" is a teaching unit resulting from a division or analysis of an instructional area.

The term "skill" is a refinement of an activity that comes from a desire to reach an objective through thought and action.

The term "project" refers to the making of some useful article.

The term "activities" as used in this study includes jobs, skills and projects.

The term "service area" is the area an agriculture teacher is serving.

Method of Procedure

One hundred and eight planned courses of study were obtained from Dr. George W. Wiegers, Jr., who taught a course including instruction in developing a farm mechanics course of study. Each teacher who took the course planned a farm mechanics course of study

for his own school. One hundred and eight programs were selected to represent all sections of the State of Tennessee.

A master chart was set up and information from each area planned by the teachers was recorded. Charts were made for each area of instruction and information from the master chart was transferred to these charts. Information found on the charts is as follows: number of teachers planning instruction in that area for each class and activity, the range in hours planned for teaching each job and the average number of hours planned for teaching each area and activity.

Related Studies

The writer located and reviewed a number of studies that related to a farm mechanics course of study.

Walker[1] conducted a study to determine the content of farm mechanics courses of study in vocational atriculture in 1931. Through a survey he asked farmers what they thought ought to be taught and what mechanical jobs they were actually doing on their farms. He indicated that because of increased power on the farm the farmer should acquire a knowledge of power equipment to help him operate the equipment satisfactorily and to make minor repairs and adjustments.

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[1]Clyde Walker, "Determining the Content of Farm-Mechanics Courses of Study for Smith-Hughes Agricultural Departments in High Schools." (Unpublished M. S. thesis, University of Nebraska, Lincoln, 1931), 80 pp.

Aton[2] made a study to determine the types of shop work that should be taught in small schools. Through a survey he asked farmers and students what they thought should be taught. Pupils suggested nineteen types of shop work and 1,665 projects largely of construction type. Parents suggested fifteen types of shop work and 1,277 jobs and their choice tends toward repair jobs. A plan of organization with desirable types of work and lists of jobs were formulated.

Hayden[3] conducted a study in 1933 to determine what enterprises should be taught in farm mechanics and the amount of time to teach such enterprise. Through state supervisors he surveyed some of the outstanding teachers of farm mechanics in several states. He found that instruction should be correlated with farming type, teaching in general should begin with simple skills and that many teachers have not been adequately trained to teach skills.

Clendenen[4] conducted a study to determine the needs for farm mechanics instruction in vocational agriculture in Tennessee in 1949. Through a survey of all-day students, veterans and adult farmers he

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[2]Rex Aton, "The Function of the Shop in the Smaller High Schools of Nebraska." (Unpublished M. S. thesis, University of Nebraska, Lincoln, 1934), 60 pp.

[3]Lyle Johnson Hayden, "Enterprises and Objectives in Vocational Farm Mechanics." (Unpublished M. S. thesis, Pennsylvania State College, State College, 1931), 53 pp.

[4]Max Murry Clendenen, "Determining the Farm Mechanics Needs for the Vocational Agriculture Department at Maynardville, Tennessee." (Non-thesis study, Department of Agricultural Education, University of Tennessee, Knoxville, 1949), 130 pp.

found that many jobs should be taught to the entire class. Some jobs should be taught to small groups and others on an individual basis. Group jobs were listed for each class and jobs to be taught to small groups or individuals were listed.

Bartlett[5] conducted a study in West Virginia in 1948 to determine the farm shop jobs and skills needed by farmers and to make a course of instruction to meet the needs for students of vocational agriculture. Through a survey to farmers he obtained a list of what they thought should be taught in a farm mechanics course of instruction.

Croom[6] made a study to determine what areas and jobs are being taught and the number of hours given to each area and job in the farm mechanics program. Through a survey of teachers he found the areas and jobs were fairly evenly divided over a four-year period. In general more instruction in farm power and machinery, farm buildings and conveniences, soil and water conservation and rural electrification is given in the third and fourth year.

Kindschy[7] conducted a study to determine the course content in welding, farm machinery and tractors in 1948. Through surveys to

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[5]Lawrence Farrell Bartlett, "A Farm Shop Study." (Unpublished M. S. thesis, West Virginia University, Morgantown, 1948), 102 pp.

[6]Walter McDonough, "A Study of the Areas of Farm Mechanics Emphasized in the All-Day Program of Vocational Agriculture in North Carolina with Suggestions for Improvement." (Unpublished M. S. thesis, North Carolina State College, Raleigh, 1948), 104 pp.

[7]Dwight Lewis Kindschy, "Course Content in Welding, Farm Machinery and Tractors for the Curriculum in Vocational Agriculture." (Unpublished M. S. thesis, Iowa State College, Ames, 1948), 37 pp.

former students of vocational agriculture who were enrolled in young farmer classes he obtained a list of skills they thought important.

Greene[8] conducted a study to determine the approximate time required to do various jobs in farm mechanics in 1927. Through the records of students in the Mississippi State Agricultural and Mechanics College he obtained the data necessary to determine how long it should take to do certain jobs.

Nellist[9] conducted a study to determine units to include in a course of study in vocational agriculture in 1932. Through a survey he asked farmers what areas they thought should be taught in a farm mechanics instructional program. A total of twenty-two areas was listed.

Pollom[10] conducted a study to determine the relative importance of the various phases of the farm shop. Through a survey to farmers he asked them to what extent the farm mechanics instruction in the school met the needs of the vocation in the community. From the findings he indicates that farm carpentry ranks above all the others.

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[8]Stanley Smith Greene, "A Study of Time and Cost Standards in Performing Farm Shop Jobs." (Unpublished M. S. thesis, Cornell University, Ithaca, N. Y., 1927), 139 pp.

[9]Russess Ray Nellist, "The Development of a Suggestive Course of Study in Rural School Shopwork for the Richland Consolidated Teacher-Training School at Richland, Michigan." (Unpublished M. S. thesis, Cornell University, Ithaca, N. Y., 1932), 137 pp.

[10]Lester Boyd Pollom, "A Study of the Scope and Content of Farm Mechanics Courses and Organization for Teaching them in the Vocational Agriculture Schools of Kansas." (Unpublished M. S. thesis, Kansas State College, Kansas State Board of Vocational Education, Topeka), 45 pp.

CHAPTER II

AREAS AND ACTIVITY ANALYSIS

It is the purpose of this chapter to present the data gathered from the courses of study of the 108 teachers who planned instruction in farm mechanics. No attempt was made to arrange the areas as to importance, but they are arranged in sequence, the one being planned by the most number of teachers being first.

Woodworking

The area of woodworking covered in this study is presented in Table I. Referring to the purpose of this study it is important to note that all teachers considered this area important enough to provide instruction in one or more classes. It is significant to note that more teachers planned to teach in this area in Agriculture I and Agriculture II than they did in Agriculture III and Agriculture IV. This indicates the teachers feel the activities in woodworking are suitable for the lower grades in the secondary schools.

One hundred and eight teachers planned to teach woodworking and of this number 105 planned for instruction in Agriculture I. The range for the whole area was two to forty-one hours with an average of nine hours.

One hundred and four teachers planned instructional activities in this area in Agriculture II. The range in number of hours allocated

TABLE I

WOODWORKING

	Activities	Instruction Planned in Agriculture[a] I: Number of Teachers	I: Hours Range	I: Hours Average	II: Number of Teachers	II: Hours Range	II: Hours Average	III: Number of Teachers	III: Hours Range	III: Hours Average	IV: Number of Teachers	IV: Hours Range	IV: Hours Average
1.	Identify and select lumber	33	1/3-3	2	16	¼-4	1	5	1	1	6	1-3	1½
2.	Use of common wood tools	45	½-7	2½	17	2	2	6	1-2	1½	4	1-2	1½
3.	Measure and mark lumber	24	½-2	1	11	½-2	1	6	1	1	5	1	1
4.	Using glue	6	1	1	10	½-5	1½	3	½-2	1			
5.	Setting and driving nails and screws	22	¼-2	1	8	1	1	6	1	1			
6.	Square and saw board	38	½-2	1	8	1-3	1½	2	1	1	2	1	1
7.	Making joints	7	1-7	2	11	½-7	2	5	½-3	1½	2	1	1
8.	Identify nails and screws	33	½-2	1	7	½-2	1	3	1	1	1	1	1
9.	Cut rafters	11	1-3	2	34	½-4	2½	39	1-6	3½	36	1-6	3½
10.	Make steps and stringers	1	1	1	10	1-7	2	17	1-5	2	10	1-3	2
11.	Figure bill of material	38	½-4	2	23	1-4	1½	8	1-2	1½	7	1-5	2
12.	Drawing plans	21	1-5	2½	8	1-3	2	6	2	2	5	1-3	2
13.	Hand boring	17	½-1½	1	4	1	1	1	1	1			
14.	Hand plane	23	¼-2	1	8	1	1	1	1	1			
15.	Hand sanding	4	1	1	1	1	1	1	2	2			
16.	Machine plane	1	2	2	1	1	1						
17.	Machine sanding				1	1	1						
18.	Chiseling				18	½-2	1	4	1	1			
19.	Counter sinking				3	½	½						
20.	Use of hand saw	28	½-2	1	4	1	1						
21.	Use of hand square	20	¼-3	1	12	½-4	1½	4	1-2	1½	5	1	1
22.	Use of level	3	1	1	2	1-2	1½						
23.	Reading blue prints				3	1-2	1½	3	1-2	1½	3	1-2	1½
24.	Roofing							1	1	1			
25.	Building forms	1	4	4	4	1-6	3	3	3-7	4	5	1-4	2
26.	Terms, parts of building				2	2	2	1	2	2	1	2	2
27.	Fitting doors and windows	1	1	1	2	1-2	1½	1	1	1	2	1-2	1½
28.	Finishing wood	1	1	1	2	2	2	4	3	3	2	1-2	1½
29.	Using power tools	6	½-3	2	11	1-2	1½	3	2-5	3	3	2-4	2½
30.	Care of tools	3	1	1	1	1	1	1	1	1	1	1	1

TABLE I

WOODWORKING (continued)

Activities	Instruction Planned in Agriculture[a] I: Number of Teachers	I: Hours Range	I: Hours Average	II: Number of Teachers	II: Hours Range	II: Hours Average	III: Number of Teachers	III: Hours Range	III: Hours Average	IV: Number of Teachers	IV: Hours Range	IV: Hours Average
31. Fitting handles	3	1	1	4	1	1	1	½	½	1	2	2
32. Simple skills	3	1-5	2	1	1	1	1	1	1			
33. Demonstration and study	16	1-3	2	9	1-2	1½	6	1	1	5	1	1
Projects - Make:												
34. Chicken feeder	11	½-3	2	13	½-4	2½	3	1-2	1½	3	1-2	1½
35. Tool rack	2	1-2	1¼	4	½-4	2½	2	3-5	4	1	3	3
36. Hog trough	17	½-2	1½	15	½-4	2				2	1-6	3
37. Self feeder	11	2-5	3½	19	2-8	5	17	2-5	4	11	2-10	4
38. Saw horse	14	½-3	2	18	1-6	3	7	1-4	3	6	1-4	2½
39. Chicken feeder	3	2	2	13	1-5	3	3	2-5	3	8	2-5	4
40. Work bench	8	2-4	3	9	2-6	4	6	2-6	4	4	5	5
41. Gate	13	½-3	2	23	1-5	3	20	2-6	3	9	1-6	3
42. Lawn furniture	2	3	3	7	1-4	3	14	½-5	4	6	1-10	4
43. Feed rack	1	2	2									
44. Tool carrier	22	1-5	3½	12	1-5	3	6	1-3	2	3	1-3	2
45. Step ladder	5	1-5	3	9	1-4	3	9	1-5	3	9	2-4	3
46. Milk stool	18	1-5	2½	7	1-3	2	1	1	1	1	1	1
47. Single tree	2	1	1	3	½-2	1	2	1-2	1½	1	2	2
48. Projects	23	1-13	5	33	1-12	6	29	1-26	6	26	2-26	8
49. Nail box	42	1-7	3	11	1-3½	2	2	1-2	1½	4	1-3	2
50. Window screen	6	1-3	2	12	1-3	2	9	2-6	3	6	1-2	1½
51. Flower box				1	2	2						
52. Hay rack	1	4	4	5	2-4	2½	2	2-5	3½	2	2-3	2½
53. Truck rack							1	6	6			
54. Bench hook	6	½-2	1				2	1	1			
55. Hog house	4	2-5	4	10	2-6	3½	12	2-10	5	7	2-5	4
56. Hog brooder house	2	2	2	3	2-4	3	3	2-4	3	6	1-4	3
57. Loading shute	2	2-5	3½				1	5	5	4	2-4	3
58. Mail box	4	2	2				1	5	5			
59. Trailer bed							4	3-10	5	10	2-10	5½
Total for area	105	2-41	9	104	2-33	10	83	2-38	10	71	2-37	10

[a]Number of teachers reporting - 108.

by teachers was two to thirty-three with an average of ten.

In Agriculture III eighty-three teachers planned for instruction in woodwork with a range of two to thirty-eight hours with an average of ten hours.

Seventy-one teachers planned instruction in Agriculture IV. The range in hours for the area was two to thirty-seven with an average of ten.

Some of the most common activities include the following: using common wood tools, squaring and sawing a board, identifying and selecting lumber and using hand saw.

Some of the most common projects were: making a tool carrier, making a nail box and making a milk stool.

Rope Work

The instruction planned in the area of rope work is shown in Table II. The data shows that instruction was planned primarily for the lower grades. All but three teachers planned to offer instruction in Agriculture I while less than 25 per cent planned to offer instruction in Agriculture II and less than 10 per cent in Agriculture III and in Agriculture IV.

Of the 107 teachers who planned to offer instruction in rope work 104 reported jobs in Agriculture I. The range for the area was two to sixteen hours with an average of seven hours. Tying knots, making splices and making halters were the jobs planned to be taught

TABLE II

ROPE

Activities	Instruction Planned in Agriculture[a] I: Number of Teachers	I: Hours Range	I: Hours Average	II: Number of Teachers	II: Hours Range	II: Hours Average	III: Number of Teachers	III: Hours Range	III: Hours Average	IV: Number of Teachers	IV: Hours Range	IV: Hours Average
1. Selecting rope	20	½-2	1	1	1	1	1	1	1			
2. Whipping ends of rope	37	½-1½	1	3	½	½	2	½	½			
3. Tying knots	101	½-5	3½	9	½-5	2	6	1	1	2	1	1
4. Make splices	97	1-7	3	18	1-5	3	4	2-4	3½	2	1-2	1½
5. Make hitches	16	½-3	1	1	½	½	1	½				
6. Care of rope	15	½-2	1	5	1	1	1	1	1	2	1	1
7. Reeving block and tackle	4	½-2	1				1	1	1			
8. Make halter	74	½-3	2	16	1-5	3	7	1-3	2	5	1-2	1½
9. Relaying	3	½-1	½	1	½	½						
10. Repair rope	9	½-2	1	2	1-2	1½	1	1	1	1	1	1
11. Make rope from twine	11	1-4	2									
12. Mechanical and chemical injury	1	½	½	1	1	1						
13. Break string	1	½	½	1	½	½	1	½	½			
14. Attach a buckle				1	½	½						
15. Lashings	1	½	½				1	1	1	1	1	1
16. Study and demonstrations	8	1	1	1	1							
Total for area	104	2-16	7	23	2-12	5	9	2-10	5	7	2-4	2½

[a]Number of teachers reporting - 107.

the most number of times. The range for jobs was not less than one-half hour and not more than three and one-half hours.

Twenty-three teachers planned to offer instruction in Agriculture II. The range was two to twelve hours and the average was five hours.

In Agriculture III, nine teachers planned to offer instruction in rope work. The range was two to ten hours with an average of five. Less time was allocated for tying knots but more time was allocated for making splices.

Seven teachers planned to offer instruction in Agriculture IV. The range was two to four hours with an average of two and one-half hours. The average time for each job was one-half hour to one and one-half hour.

Some of the most common activities include the following: whipping ends of rope, tying knots, making splices and making halters.

Soldering and Sheet Metal

Planning for instruction in soldering and sheet metal area as shown in Table III was participated in by 96 per cent of the total number planning a farm mechanics program.

Of the 104 planning to include soldering and sheet metal in their program 65 per cent planned some instruction in Agriculture I and Agriculture II, 28 per cent in Agriculture III and 19 per cent in Agriculture IV.

TABLE III

SOLDERING AND SHEET METAL

	Activities	Instruction Planned in Agriculture[a] I: Number of Teachers	I: Hours Range	I: Hours Average	II: Number of Teachers	II: Hours Range	II: Hours Average	III: Number of Teachers	III: Hours Range	III: Hours Average	IV: Number of Teachers	IV: Hours Range	IV: Hours Average
1.	Operate torch and heat iron	52	½-3	1	30	½-2	1	9	1-2	1½	2	1	1
2.	Identify metals	23	½-2	1	13	½-2	1	3	1-2	1½	2	1-2	1½
3.	Cleaning and tinning copper	56	¼-2	1	31	½-2	1	13	½-2	1	4	1	1
4.	Solder holes in metal	34	¼-2½	1	24	¼-2	1	8	½-2	1	6	1	1
5.	Measure and cut sheet metal	4	½	½	8	½-1½	1	1	½	½	4	½-3	1
6.	Solder seams and joints	40	½-2	1	36	½-4	1	8	½-3	1	7	1-3	1½
7.	Sweating on patches	48	½-2	1	28	½-2	1	11	½-2	1	5	½-2	1
8.	Rivet and punch sheet metal	6	½-2	1	9	½-2	1	1	½	½	3	1	1
9.	Cleaning surface	11	1	1	7	1	1	2	1-2	1½			
10.	Repair milk can	7	1-2	1	4	1-2	1						
11.	Solder different metals	9	1-5	2	13	1-3	2	3	1-2	1½	3	1-2	1½
12.	Solder wire splice	20	½-2	1	20	½-2	1	6	½-2	1	4	½-2	1
13.	Select equipment	2	1	1	2	1	1						
14.	Solder tubing				2	1	1						
15.	Using electric iron				5	1	1						
16.	Using arc welder to solder				2	1	1						
17.	Bending sheet metal				1	1	1				2	½-2	1½
18.	Rolling sheet metal				1	½	½				1	½	½
19.	Making seams and joints				5	1	1				1	1	1
20.	Selecting solder	1	1	1	1	½	½	1	1	1			
21.	Solder aluminum	1	1-2	1½									
	Projects - Make:												
22.	Metal feed scoop	25	1-3	1½	18	1-5	2	9	1-3	2	5	1-3	2
23.	Poultry light reflector	4	1	1	4	2	2	1	2	2	1	3	3
24.	Chick feeder	6	2	2	9	1-3	2	6	1-3	2	5	2-4	2½
25.	Funnel	15	1-2	1½	20	1-3	1½	9	1-5	2	5	2-5	2½
26.	Gutter and downspout	2	1-2	1½	3	½-2	1½	2	2-4	3	1	2	2
27.	Home project	13	1-5	2½	13	1-6	3	6	1-10	3	7	2-5	3
28.	Dust pan	3	1	1	7	1-3	1½	4	2-5	3	1	1	1
29.	Layout and repair metal roof	1	1	1	1	1	1				1	2	2
30.	Study and demonstration	9	1-5	2	6	¼-2	1½	3	1	1	1	1	1
Total for area		68	2-15	6	68	2-14	7	29	2-14	6	21	2-18	6

[a]Total number of teachers reporting - 104.

The average number of hours planned for in this area was six hours for Agriculture I, seven hours for Agriculture II and six hours for Agriculture III and Agriculture IV.

Some of the activities planned the most number of times were: operating torch and heat iron, identifying metal, cleaning and tinning copper and sweating on patches.

Tool Fitting

The area of tool fitting is probably one of the most important areas of farm mechanics. To do an exceptionally good job on a project or other work, tools must be in good condition. Many times poor work can be credited to inferior, wrong kind or dull tools. Many man hours of labor are lost each year due to improperly cared for tools.

Teachers planning their farm mechanics program realizing that students should learn to sharpen and care for tools early in their program as indicated by the number planning to teach tool fitting in Agriculture I.

Table IV shows that out of 103 teachers planning to teach tool fitting, 100 teachers planned to offer instruction in one or more of the twenty-three activities listed in Agriculture I. The average for each activity was not less than one-half hour and not more than two hours.

Eighty-six teachers planned to give instruction in one or more of the twenty-three jobs listed in tool fitting for Agriculture II.

TABLE IV

TOOLFITTING

Activities	Instruction Planned in Agriculture[a] I: Number of Teachers	I: Hours Range	I: Hours Average	II: Number of Teachers	II: Hours Range	II: Hours Average	III: Number of Teachers	III: Hours Range	III: Hours Average	IV: Number of Teachers	IV: Hours Range	IV: Hours Average
1. True emery wheel	55	½-2	1	23	½-2	1	6	½-2	1	1	½	½
2. Fit and sharpen hand tools	53	¼-3	1	51	½-6	1½	17	½-5	1½	11	½-5	1½
3. Fit handles	57	½-4	2	45	½-4	1½	8	1-3	1½	3	1	1
Sharpen:												
4. Wood chisel	31	½-2½	1	21	1-1½	1	4	1	1	4	1	1
5. Plane bit	48	½-5	1	32	½-2	1	10	¼-2	1	8	1	1
6. Axe or hatchet	57	½-4	1	24	½-2	1	2	1	1	1	1	1
7. Auger bit	29	¼-1	½	36	½-3	1	5	1	1	4	1	1
8. Cold chisel	46	¼-2	1	24	½-2	1	5	½-2	1	3	½-2	1
9. Knife	56	½-3	1	16	½-2	1	3	½	½	1	1	1
10. Hand saw	10	1-4	2	33	1-5	2½	7	½-5	2	6	1-5	3
11. Twist drill	33	½-2	1	41	½-3	1	10	½-2	1	7	½-2	1
12. Hoe	35	½-3	1	8	1	1	1	½	½			
13. Mower blade	5	1	1	17	1-2	1½	3	1	1	1	1	1
14. Circle saw	1	1	1	3	2	2						
15. Cross cut	2	1	1	15	2-5	2½	5	1-4	2	5	1-3	2
16. Reface hammer				2	2	2						
17. Clean and polish saw	4	1	1	1	2	2						
18. Care and use of tools	27	½-3	1½	8	1	1						
19. Identify and select tools	33	½-3	1½	10	1	1	1	1	1			
20. Clean oil stone	8	½-2	1	2	½	½						
21. Clean files and rasps	5	1	1				1	1	1	1	1	1
22. Sharpen lawn mower	2	1-2	1½				1	1	1	1	1	1
23. Replace mower knife section	2	1	1	4	2	2	6	1-5	2	1	1	1
24. Grinding, filing and whetting	11	½-1½	1	2	1	1						
25. Home projects	6	1-4	2	9	2-6	3	1	2	2	2	2	2
26. Study and demonstration	7	1-3	2	3	1	1	3	1	1	1	1	1
Total for area	100	2-16	7½	86	2-15	5	32	1-10	4	22	1-9	4

[a]Number of teachers reporting - 103.

Emphasis in Agriculture II was still on some of the smaller activities with a trend toward the more difficult activities such as sharpen cross cut saw and sharpen mower blades.

In Agriculture III thirty-two teachers planned for instruction in tool fitting. Only twenty-two planned to offer instruction in Agriculture IV.

Some of the most common activities were: sharpening knife, truing emery wheel, fitting handles and fitting and sharpening hand tools.

Forge and Cold Metal

Ninety-seven teachers or 90 per cent of the 108 teachers planning a farm mechanics program planned to offer instruction in the area of forge and cold metal.

It is shown in Table V that of the ninety-seven teachers planning instruction in this area, seventy-nine planned to teach one or more activities in Agriculture I. The range of hours planned to be allocated was two to sixteen with an average of seven.

Ninety-two teachers planned to offer instruction in Agriculture II. The range was two to twenty hours with an average of eight hours.

In Agriculture III fifty teachers planned instruction in this area. The range was two to seventeen hours with an average of six hours.

TABLE V

FORGE AND COLD METAL

Activities	Instruction Planned in Agriculture[a] I: Number of Teachers	I: Hours Range	I: Hours Average	II: Number of Teachers	II: Hours Range	II: Hours Average	III: Number of Teachers	III: Hours Range	III: Hours Average	IV: Number of Teachers	IV: Hours Range	IV: Hours Average
1. Build and maintain forge fire	60	½-3	1	28	½-2	1	10	1	1	5	1	1
2. Shape, Bend and measure iron	44	½-4	1½	28	½-3	1	11	½-3	1	5	1	1
3. Punch hole in hot iron	10	½-2	1	9	1	1	1	1	1			
4. Use of drill press	26	¼-2	½	24	½-2	1						
5. Sharpen and temper pick				2	1-2	1½	5	1	1	3	1	1
6. Thread bolt and nut	31	½-4	1½	42	½-4	1½	12	½-2	1½	5	1	1
7. Repair chain link	6	1	1	16	½-2	1½	3	1	1			
8. Draw and temper cultivator shovel	5	1-2	1½	15	½-4	1½	11	1-7	3	7	1-7	3
9. Cut metal with chisel	40	½-2	1	20	½-2	1	5	1	1	2	1	1
10. Upsetting metal	7	½-2	1	10	½-2	1	3	½-2	1			
11. Sharpen and temper harrow teeth	5	1	1	5	1-2	1½	4	½-2	1	3	2	2
12. Forge welding				3	1	1	3	½-3	1½	4	1-3	2
13. Rivet mower section	8	1	1	21	½-5	1						
14. Cut metal with hack saw	39	1-2	1	22	½-2	1	5	1	1	3	1	1
15. Identify iron and steel	16	½-2	1	13	½-2	1	3	½-2	1	1	1	1
16. Filing, grinding, reaming and tempering	25	½-2	1	31	½-3	1	5	½-2	1	3	½-3	1½
17. Heating metal	9	½	½	6	½	½	1	½	½	1	1	1
18. Annealing metals				1	1	1	1	1	1			
19. Counter sinking	1	1	1									
20. Using easy out							1	1	1			
21. Selecting equipment				2	1	1						
22. Safety	1	1	1									
Projects - Make:												
23. Gate hinge or hook	10	1-2	1½	18	½-9	2	9	1-5	2	3	1-2	1½
24. Clevis and pin	9	½-2	1	23	½-4	2	13	½-3	2	7	1-5	2
25. Cold chisel	19	½-6	2	38	1-3	1½	23	½-3	1½			
26. Sack holder	2	1-2	1½	1	2	2	1	2	2	1	2	2
27. Hay hook	40	½-3	1½	25	1-4	2	14	½-3	1½	6	½-2	1½

TABLE V

FORGE AND COLD METAL (continued)

Activities	Instruction Planned in Agriculture[a] I Number of Teachers	I Hours Range	I Hours Average	II Number of Teachers	II Hours Range	II Hours Average	III Number of Teachers	III Hours Range	III Hours Average	IV Number of Teachers	IV Hours Range	IV Hours Average
28. Punch	14	1-2	1½	24	½-5	2	12	½-2	1½	6	1-5	2
29. Harrow tooth	7	½-2	1	10	½-2	1½	5	1-4	2	5	1-2	1½
30. Meat hook	4	1-2	1½	7	2-4	2½	1	2	2	1	2	2
31. I-bolt	3	1-3	2	8	½-4	1½	2	2-3	2½	1	3	3
32. Hog hook	4	2	2	2	1-2	1½						
33. Lap ring	1	1	1	2	1-2	1½						
34. Tobacco peg	1	1	1	2	2-4	3						
35. Knife				1	2	2	1	2	2			
36. Rivet set	2	2	2				3	1-3	2			
37. Shoe scraper	4	1-5	2	3	1-3	1½	3	1-2	1½			
38. Milk stool				4	1-5	2						
39. Wagon box rod and plates	2	2-4	3	1	2	2	1	3	3			
40. Staple	5	1-3	1½	5	1	1				1	1	1
41. Corner brace	3	1	1	4	1-3	2	1	1	1			
42. Home project	9	1-3	1½	14	1-6	3	10	2-5	2½	8	2-5	3
43. Steeple puller	3	½-2	1	4	½-2	1	5	1-3	1½	1	2	2
44. Nail puller				2	1	1	1	1	1	1	1	1
45. Trailer hitch				2	1	1	1	3	3	1	2	2
46. U-bolt	1	1	1	2	1-4	2½	1	1	1	1	1	1
47. Poker	3	½-2	1	3	½-2	1						
Total for area	79	2-16	7	92	2-20	8	50	2-17	6	31	2-15	6

[a]Number of teachers reporting - 97.

In Agriculture IV thirty-one teachers planned instruction in this area.

The most common activities included in the course of study were the following: building and maintaining a forge fire, shaping, bending and measuring iron, cutting metal with chisel, and cutting metal with a hack saw.

The most common projects included the following: making hay hook, making cold chisel, and making clevis and pin.

Painting and Glazing

This is one of the areas that had very good participation by the teachers who planned a course of study in farm mechanics. Of the 108 teachers planning for instruction in farm mechanics, Table VI shows that ninety-two planned some instruction in the area of painting and glazing.

Of the ninety-two teachers who planned to give instruction in painting and glazing, 62 per cent planned to provide instruction in Agriculture I, 54 per cent in Agriculture II, 37 per cent in Agriculture III and 25 per cent in Agriculture IV.

The average time allocated for each school year was six hours.

Some of the most common activities included the following: preparing wood for painting, cleaning paint brushes, applying paint and stain and selecting and mixing paint.

TABLE VI

PAINTING AND GLAZING

	Activities	Instruction Planned in Agriculture[a] I: Number of Teachers	I: Hours Range	I: Hours Average	II: Number of Teachers	II: Hours Range	II: Hours Average	III: Number of Teachers	III: Hours Range	III: Hours Average	IV: Number of Teachers	IV: Hours Range	IV: Hours Average
1.	Prepare wood for painting	42	½-5	1	22	½-2	1	23	½-2	1	2	1	1
2.	Apply paint and varnish	37	½-3	1	37	½-4	1½	27	½-6	1½	13	1-4	1½
3.	Select and mix paint	36	½-2	1	32	½-3	1	11	½-2	1	11	½-5	1
4.	Prepare and paint surface	8	½-2	1	8	½-3	1	4	1	1	2	1	1
5.	Clean paint brushes	44	½-3	1	26	½-2	1	14	½-2	1	4	1	1
6.	Replace window pane and putty	27	½-3	1	31	½-5	2	19	½-3	1½	10	½-10½	2½
7.	Refinish furniture	4	1	1	2	1-3	2	3	½-2	1	2	1-4	2½
8.	Select brushes	18	½-1½	1	12	½-1½	1	6	1	1			
9.	Select varnish and shellac				3	1	1	1	½	½			
10.	Estimate material needed	15	½-2	1	11	½-2	1	8	½-2	1	3	1-2	1½
11.	Store paint	9	1	1	8	½-2	1	7	½-2	1	3	½-3	1½
12.	Cut glass	18	½	½	17	½-2	1	9	1	1	3	1	1
13.	Remove paint	4	½-1½	1	4	1	1	2	1	1			
14.	Spray paint	11	½-3	1½	12	½-3	1½	8	½-2	1	6	1-2	1½
15.	Clean and store spray equipment	1	½	½	3	½	½	3	½	½	1	1	1
16.	Prepare and apply white wash	7	½-2	1	8	½-2	1	5	1-3	1½	2	1-2	1½
17.	Use of glue	3	½	½				1	½	½			
18.	Use of wood fillers	1	2	2	2	1	1	1	1	1			
19.	Composition of paint	11	½-2	1	4	½-3	1	3	1	1	1	1	1
20.	Care of equipment				5	½-2	1	1	½	½	3	½	½
21.	Study and demonstration	3	1	1	2	2	2	3	1	1	1	1	1
Total for area		56	2-16	6	50	2-18	6	33	½-12	6	23	1-15	6

[a]Number of teachers reporting - 92.

Electricity

Instruction planned in the area of electricity is concentrated in the upper grades. Table VII shows that all but one teacher planning to teach the area of electricity planned instruction in simple activities the first year and more difficult activities the following years. This one teacher proposed to teach Agriculture I students how to draw plans for wiring a building in ten hours.

Of the eighty-nine teachers planning instruction in the area only eleven planned to give instruction in Agriculture I. The range was two to eleven hours with an average of five and one-half hours.

Thirty teachers planned to give instruction in electricity to students in Agriculture II. The range was two to fourteen hours with an average of eight hours. Twenty-one jobs were planned to be taught with an average ranging from one-half hour to three hours per activity.

In Agriculture III sixty-seven teachers planned to give instruction in electricity. The range was three hours to twenty-two hours with an average ranging from one hour to three hours per activity.

In Agriculture IV there were fifty-six teachers planning to give instruction in electricity. The range was one to fifteen hours with the average being eight hours. Twenty-five activities were planned to be taught and the average for these activities was not less than one-half hour and not more than three hours.

TABLE VII

ELECTRICITY

	Activities	Instruction Planned in Agriculture[a] I: Number of Teachers	I: Hours Range	I: Hours Average	II: Number of Teachers	II: Hours Range	II: Hours Average	III: Number of Teachers	III: Hours Range	III: Hours Average	IV: Number of Teachers	IV: Hours Range	IV: Hours Average
1.	Reading meter and figure cost	8	1-4	2	15	½-2	1	37	½-3	1½	12	½-2	1
2.	Select materials	1	1	1	6	1	1	24	½-2	1	16	½-3	1
3.	Splice wire	5	1-4	2	16	1-3	1½	43	1-5	2	15	1-5	2
4.	Make extension	6	1	1	25	½-5	2	32	½-2	1½	18	½-2	1
5.	Install meters							9	1-2	1½	15	1-4	2
6.	String wire	1	2	2				3	1-2	1½	1	1	1
7.	Wire junction box				6	1-2	1½	5	2	2	7	1-3	2
8.	Wire 3-way switch				1	2	2	10	1-2	1½	8	1-3	2
9.	Test voltage				1	1	1	4	1	1			
10.	Run circuit				3	1-2	1½	5	1-3	2	2	½-3	2
11.	Clean or recondition electric motor	1	½	½	4	1-2	1½	26	½-3	1½	21	1-5	2
12.	Electrical terms	3	1	1	7	1-2	1½	14	1-3	2	8	1-2	1½
13.	Fuses	1	1	1	2	1	1	16	½-2	1	3	1	1
14.	Draw plans for wiring Building	1	10	10	3	1-4	3	14	½-4	2½	21	1-8	2
15.	Attach wire to terminal				1	½	½	7	1	1	5	½	½
16.	Install electric fence				3	1-3	2	9	1-4	2	11	½-3	2
17.	Install 220 switch box				1	1	1	3	2	2	2	2	2
18.	Wire receptacle				3	1	1	10	1	1	1	1	1
19.	Select electric appliances							3	2	2			
20.	Wire 2-way switch	1	1	1	2	1	1	5	1	1	5	1-2	1½
21.	Safety							1	1	1			
22.	Dry cells							1	1	1			
23.	Code	1	1	1	4	1-3	1½	5	½-7	3	4	1	1
24.	Wire outlets				3	2	2	7	½-3	2	8	1-2	1½
25.	Wire main panel										2	2	2

TABLE VII

ELECTRICITY (continued)

Activities	Instruction Planned in Agriculture[a] I: Number of Teachers	I: Hours Range	I: Hours Average	II: Number of Teachers	II: Hours Range	II: Hours Average	III: Number of Teachers	III: Hours Range	III: Hours Average	IV: Number of Teachers	IV: Hours Range	IV: Hours Average
26. Change 115 volts to 230 volts										2	1-2	1½
27. Figure cost of job							1	1	1	3	2	2
28. Simple repair in home	1	1	1	3	1	1	8	1-5	2	6	1-5	2½
29. Repair own equipment	2	1-5	3	7	½-4	2	26	1-5	2	30	1-5	2
30. Study and demonstration	2	1-2	1½	7	1-3	2	17	1-3	2	10	1-5	3
Total for area	11	2-11	5½	30	2-14	8	67	3-22	8	56	1-15	8

[a]Number of teachers reporting - 89.

Some of the common activities were: splicing wire, reading meter and figuring bill, selecting materials and clean or recondition electric motor.

Farm Machinery

Of the 108 teachers, eighty-seven planned to schedule farm machinery in at least one class. As shown in Table VIII more teachers planned to provide instruction in this area in Agriculture III and Agriculture IV, which indicates that the study of farm machinery follows the study and practices of basic skills in metal work.

Eleven taught some of the thirteen different jobs in farm machinery in Agriculture I. The time allocated for this area in Agriculture I ranged from four to fifteen hours with an average of eight hours.

Twenty-nine taught some of the twenty-six jobs in this area to Agriculture II students. The range in the area of farm machinery for this grade was three to twelve hours with an average of seven.

Seventy-three planned instruction for one or more of the thirty-eight different activities in Agriculture III. Time allocated by teachers to this area ranged from two to nineteen hours with an average of nine hours.

Seventy-six teachers planned for instruction in one or more of the thirty-six different activities in Agriculture IV. A very wide range of three to forty-three hours was allocated for the area with an average of ten hours.

TABLE VIII

FARM MACHINERY

Activities	Instruction Planned in Agriculture[a] I: Number of Teachers	I: Hours Range	I: Hours Average	II: Number of Teachers	II: Hours Range	II: Hours Average	III: Number of Teachers	III: Hours Range	III: Hours Average	IV: Number of Teachers	IV: Hours Range	IV: Hours Average
1. Inspect for needed repair	2	1	1	6	1-4	2	24	1-4	1½	11	½-2	1
2. Oil and grease machinery	4	1-2	1½	8	½-2	1	25	½-2	1	10	1-3½	1½
3. Replace harrow tooth	3	1-3	1½	1	1	1	8	½-3	1	5	1-5	3
4. Replace parts	2	1-4	2	8	1-5	2	27	½-7	2	24	½-5	2
5. Paint machinery	2	1-4	2	6	½-3	2	34	1-4	2	36	1-10	3
6. Replace and adjust bearings							2	1-2	1½	4	1-2	1½
7. Align parts	1	1	1	1	2	2	5	1-3	2	7	1-2	2
Repair and adjust:												
8. Plow	3	1-3	1½	6	1-6	3	23	1-4	2	12	1-4	2
9. Cultivator	2	1-2	1½	3	1-2	1½	6	1-2	1½	10	1-3	1½
10. Disc	2	1	1	4	1-3	1½	12	1-3	1½	12	1-4	2
11. Grain drill				2	1-2	1½	9	1-4	2	9	1-3	2
12. Corn planter				3	1-2	1½	10	1-4	2	14	1-4	2
13. Fertilizer drill				2	1	1	5	1-2	1½	7	1-4	2
14. Mower	6	1-3	2	10	1-4	2	19	½-6	2	24	½-8	2
15. Hay rake	1	1	1	2	2-3	2½	6	1-2	2	4	1-2	1½
16. Binder							1	1	1	2	3-4	3½
17. Hammer mill							3	1	1	2	2	2
18. Combine				2	1	1	5	1-2	1½	8	1-3	2
19. Baler							9	1-2	1½	6	2	2
20. Corn picker							2	1-2	1½	3	1-2	1½
21. Manure spreader							2	2	2	2	2	2
22. Sharpen mower blade							5	½-2	1½	4	1	1
23. Store machinery	3	1-3	2	5	½-2	1	12	1	1	10	1-3	1½
24. Select and use wrenches				2	1-2	1½	8	1	1	3	1	1
25. Clean machinery				1	1	1	1	1	1	1	1	1
26. Adjust hitches				1	1	1	4	1	1			
27. Using operators manual	1	3	3	2	2	2	4	2	2	4	½-2	1½
28. Order parts				1	1	1	5	½-2	1	3	½-4	2
29. Select machinery				2	1	1	2	2-3	2½	6	2	2
30. Install alamites							1	2	2	1	½	½
31. Lubricate and maintain tractor	1	2	2	6	1-8	3	12	1-8	3	18	1-21	7

TABLE VIII

FARM MACHINERY (continued)

Activities	Instruction Planned in Agriculture[a] I: Number of Teachers	I: Hours Range	I: Hours Average	II: Number of Teachers	II: Hours Range	II: Hours Average	III: Number of Teachers	III: Hours Range	III: Hours Average	IV: Number of Teachers	IV: Hours Range	IV: Hours Average
32. Power transmission belts				1	1	1						
33. Sharpen cutting edges				4	2	2	9	½-2	1	7	½-2	1
34. Set up machinery							4	1-3	2	2	1-2	1½
35. Identify parts							1	2	2			
36. Repair sprocket and chain							1	1	1	1	2	2
37. Adjust sprayer							1	1	1	2	2-4	3
38. Safety										1	1	1
39. Loosen rusty nut or pipe							1	1	1			
40. Repair water pump							1	1	1			
Projects												
41. Build implement carrier				2	4	4	3	1-5	3	3	6-15	12
42. Repair wagon box				1	3	3	1	5	5			
43. Install hay fork										1	2	2
44. Build labor saving equipment				1	2	2	3	2-3	2½	11	2-15	5
45. Repair own machinery	3	1-5	3	8	1-5	3	24	1-12	4	26	1-12	5
46. Optional							1	1	1	1	4	4
47. Study and demonstration	1	1	1	3	1	1	4	1	1	11	1-3	2
Total for area	11	4-15	8	29	3-12	7	73	2-19	9	76	3-43	12

[a]Number of teachers reporting - 87.

Some of the most common activities include the following: inspecting for needed repair, replacing parts, repairing and adjusting plow and painting machinery.

Concrete and Farm Masonry

Of the 108 teachers planning a farm mechanics program 77 per cent planned to give instruction in the area of concrete and farm masonry. Table IX shows that of the eighty-four who planned to teach concrete and farm masonry only 12 per cent planned to schedule instruction in Agriculture I, 37 per cent in Agriculture II, 58 per cent in Agriculture III and 50 per cent in Agriculture IV.

Very little time was allocated for the teaching of activities in the area of concrete and farm masonry in Agriculture I. An average of only four hours was planned for in Agriculture I. In Agriculture II an average of nine hours, six and on-half hours in Agriculture III and seven hours in Agriculture IV were planned.

Some of the most common activities include the following: laying brick and block, testing for silt, mixing cement and selecting materials.

Some of the most common projects made by the students were: laying concrete walk, making post and making shoe scraper.

TABLE IX

CONCRETE AND FARM MASONRY

Activities	Instruction Planned in Agriculture[a] I: Number of Teachers	I: Hours Range	I: Hours Average	II: Number of Teachers	II: Hours Range	II: Hours Average	III: Number of Teachers	III: Hours Range	III: Hours Average	IV: Number of Teachers	IV: Hours Range	IV: Hours Average
1. Selecting materials	7	½-2	1	9	1	1	18	½-2	1	9	1	1
2. Building forms	3	½-2	1	13	½-3	1	13	½-4	1	14	½-6	2
3. Curing concrete	2	½	½	6	½-1½	1	10	½-4	1	7	½-2	1
4. Laying brick and block	3	1	1	15	1-5	2½	17	1-4	1½	18	1-5	2½
5. Silt test	3	1	1	10	1-2	1½	15	1-1½	1	10	½-2	1
6. Lay out foundations				4	½-2	1	7	1	1	10	1-3	1½
7. Figure cost				5	½-2	1	6	½-5	2	5	½-2	1
8. Water proof concrete				3	1	1	3	1	1	2	2	2
9. Mixing cement	5	½-2	1	14	½-2	1	28	½-2	1	15	½-2	1
10. Finishing concrete	4	½	½	11	½-3	1½	11	½-3	1	10	½-3	1
11. Composition of concrete				1	1	1	2	1-2	1½	2	1	1
12. Estimating amount materials				10	1-2	1½	15	½-2	1	10	½-2	1
13. Proportion of material	6	1	1	12	1-2	1½	18	½-2	1	9	1	1
14. Identifying tools and equipment				4	1	1	4	½	½	1	1	1
15. Mixing mortar	1	½	½	3	½	½	2	1	1			
16. Testing concrete				3	1	1	4	1	1	2	1	1
17. Mixing color in concrete							1	2	2	2	1-2	1½
18. Mixing trial batch concrete	1	1	1	3	1-2	1½	2	1	1	1	1	1
19. Reinforcing concrete	1	½	½	2	1	1	3	1	1	2	1-2	1½
20. Pouring concrete	3	½	½	4	1	1	11	½-3	1	4	½-3	1
Projects												
21. Make post				5	1-3	2	9	1-3	2	7	1-2	1½
22. Make hog trough				6	1-5	2½	4	½-5	3	5	1-5	2½
23. Lay concrete walk	1	1	1	5	2-8	5	11	1-4	2	12	1-5	2½
24. Make mail box				2	2-3	2½	5	2	2	2	2	2
25. Make shoe scraper				2	1-2	1½	6	1-3	1½	3	1-2	1½
26. Make steps				4	1-3	1½	3	2	2	4	2-10	4
27. Projects	1	4	4	2	4	4	7	1-8	4	6	2-4	3
28. Study and demonstration	1	½	½	4	1	1	5	2	2	7	1-2	1½
Total for area	10	2-6	4	31	2-20	9	49	2-22	6½	42	2-20	7

[a]Number of teachers reporting - 84.

Soil and Water Management

Instruction in soil and water management involves not only understandings and abilities in farm mechanics, but also soils and crops. Because of the mechanical skills involved in performance, the instruction is usually classified as an instructional area in farm mechanics rather than as a part of instruction in soils or crops.

Of the 108 teachers who planned a course of study in farm mechanics, seventy-nine planned for some instruction in this area. The data in Table X show that approximately one-half of them planned some instruction in Agriculture III and IV. This would indicate that approximately one-half of those who planned instruction for the third year planned to continue instruction into the fourth year.

Only eleven teachers planned some instruction in Agriculture I and eighteen in Agriculture II.

The number of hours planned for this area would indicate very elementary instruction. In Agriculture I an average of six hours was planned, in Agriculture II seven hours, Agriculture III eight and one-half hours and Agriculture IV ten hours. These averages include both practice and study time.

The most common activities include the following: adjusting and setting the level, making contour lines, laying out terraces and staking out ponds. Not more than an average of four hours or less than one hour was planned for each activity.

TABLE X

SOIL AND WATER MANAGEMENT

Activities	Instruction Planned in Agriculture[a] I: Number of Teachers	I: Hours Range	I: Hours Average	II: Number of Teachers	II: Hours Range	II: Hours Average	III: Number of Teachers	III: Hours Range	III: Hours Average	IV: Number of Teachers	IV: Hours Range	IV: Hours Average
1. Adjust and set level	6	1-3	2	10	1-3	2	32	½-5	1½	28	½-5	1½
2. Use rod and target				2	1	1	9	½-2	1	4	½-2	1
3. Determine slope	3	1-2	1½	2	1-2	1½	10	½-2	1	10	½-2	1
4. Measure field area				2	1-4	2½	11	1-3	2	8	½-2	1½
5. Make contour lines	2	1-3	2	8	1-3	2	28	1-4	2	31	1-4	2
6. Draw home farm	7	1-5	2½	4	2-4	2½	12	1-5	2	10	2-5	2½
7. Lay tile for drainage	1	1	1	2	2-3	2½	11	1-4	2	8	½-3	1½
8. Grass water ways				4	2-4	3	5	½-2	1½	8	1-3	2
9. Stake out ponds				1	3	3	10	1-3	2	23	1-5	2
10. Lay out drainage ditch				2	1-3	2	14	1-3	1½	15	1-4	2
11. Plan drainage system	1	3	3				11	1-3	2	16	1-5	2
12. Lay out terraces	4	2-6	4	10	1-8	4	26	1-9	3	38	1-9	3
13. Lay out strips				1	2	2	8	1-3	2	2	1	1
14. Stake outlets	1	3	3	1	2	2	5	1	1	10	1-4	2
15. Run straight lines							3	1	1	3	1	1
16. Maintain road				1	2	2	3	1-3	2	4	1-3	1½
17. Plan irrigation system							3	1-5	3	5	1-2	1½
18. Plan diversion ditches							4	1	1	3	1-2	1½
19. Plan spillways							2	1	1	5	1-2	1½
20. Identify equipment										2	1-4	2½
21. Study and demonstration	1	2	2	1	1	1	17	1-3	2	18	1-5	2½
Total for area	11	1-13	6	18	2-13	7	51	2-20	8½	53	1-23	10

[a]Number of teachers reporting - 79.

Welding

It is elementary to say that modern machines are made largely of iron and steel but to show the importance of welding it is essential to stop and think for a minute. How many pieces of equipment today are constructed of wood? How many are largely or entirely made of iron and steel? A few years ago when a piece of equipment broke it was usually the wooden part breaking. The farmer could find a good piece of wood and do the repair job himself. Today with iron being used so extensively it is essential to know some of the fundamentals of welding.

Of the 108 teachers planning a farm mechanics program seventy-seven planned for instruction in the area of arc and acetylene welding. Electric and acetylene welding is shown as one area in Table XI because a large per cent of the teachers' plans showed them together.

Only twelve teachers planned any instruction in this area for Agriculture I, forty-two in Agriculture II, sixty-one in Agriculture III and forty-five in Agriculture IV.

Some of the most common activities in acetylene welding include the following: cutting, welding, brazing, lighting tips and adjusting tips.

Some of the most common activities in electric welding include the following: welding, preparing metal for welding, cutting and vertical weld.

TABLE XI

WELDING---ELECTRIC AND ACETYLENE

Activities	Instruction Planned in Agriculture[a]											
	I			II			III			IV		
	Number of Teachers	Hours Range	Hours Average	Number of Teachers	Hours Range	Hours Average	Number of Teachers	Hours Range	Hours Average	Number of Teachers	Hours Range	Hours Average
Acetylene												
1. Identify metals				2	1	1	4	1	1	4	1	1
2. Identify parts and equipment				8	1	1	4	1	1	4	1	1
3. Light and adjust tips				19	½-2	1½	12	½-2	1	4	1	1
4. Select tips	2	½	½	6	1	1	8	1	1	4	1	1
5. Cutting	4	1	1	8	1	1	20	½-2	1	12	1	1
6. Select rods	4	1	1	8	1	1	15	½	½	4	1	1
7. Select flux				4	1	1	4	½	½	2	½	½
8. Welding	8	2	2	40	1-5	2	32	½-5	2	16	½-2	1
9. Setting gauges	4	1	1									
10. Butt weld	4	1	1	4	1-2	1½	4	1	1			
11. Vertical weld				6	2	2						
12. Hard surface metals							8	1-2	1½	6	1-2	1½
13. Brazing				19	1	1	30	1-3	2	10	1-2	1½
14. Safety	3	1	1	8	½-2	1½	12	½-2	1	5	1	1
Electric welding												
1. Care of welder				4	1	1	7	1	1	5	1	1
2. Safety	4	1	1	8	½-2	1	13	½-2	1	6	1	1
3. Weld cast				2	1	1	6	2	2	4	1	1
4. Prepare metal for welding	2	½	½	18	1	1	15	½-2	1	6	1	1
5. Select electrodes	4	1-2	1½	10	½	½	16	½-2	1	6	½	½
6. Select amperes	6	2	2	10	1	1	6	½	½	4	½	½
7. Welding	2	1	1	36	½-5	3	36	1-5	3	20	1-4	2
8. Cutting				10	1	1	16	1	1	7	½-2	1
9. Vertical weld	2	1	1	8	1	1	12	1	1	4	1	1
10. Lap weld				2	½	½	4	1-2	1½	2	3	3
11. Butt weld	2	1	1	6	1	1	2	3	3	2	2	2
12. Identify metals				4	1	1				2	1	1
13. Hard surface metals				4	1	1				6	2	2

TABLE XI

WELDING--ELECTRIC AND ACETYLENE (continued)

Activities	Instruction Planned in Agriculture[a] I: Number of Teachers	I: Hours Range	I: Hours Average	II: Number of Teachers	II: Hours Range	II: Hours Average	III: Number of Teachers	III: Hours Range	III: Hours Average	IV: Number of Teachers	IV: Hours Range	IV: Hours Average
Projects												
1. Home projects	4	2	2	12	1-3	2	32	1-6	3	36	1-12	4
Make:												
2. Kettle rack										2	2	2
3. Milk stool							2	3	3	2	2	2
4. Table							2	3	3	2	3	3
5. Foot scraper							2	1	1	2	1	1
6. Milk can cart				2	1½	1½	6	½-3	2	6	½-3	2
7. Post							2	2	2			
Total for area	12	2-10	8	42	2-23	10	61	3-30	10	45	2-30	10

[a]Number of teachers reporting - 77.

Plumbing

Plumbing is a relatively new area in many vocational agriculture farm mechanics courses of study in Tennessee. This has been brought about because a vast number of rural people in Tennessee heretofore had little opportunity to use electricity to pump water. In the past few years more rural people than ever before have been given the opportunity to get electricity on their farms and in their homes.

Plumbing will probably become more important as more farmers install water and irrigation systems.

Table XII shows that approximately 70 per cent of the teachers planning a farm mechanics program planned to offer instruction in plumbing.

Of the seventy-three teachers planning to offer instruction in this area ten teachers, or 14 per cent, planned to teach one or more of eleven jobs in Agriculture I.

Thirty teachers, or 42 per cent, planned to offer instruction in one or more of the sixteen jobs listed in plumbing in Agriculture II.

More teachers planned to teach plumbing in Agriculture III than in any other grade. Fifty-four teachers, or 77 per cent, planned for instruction in one or more of the eighteen activities listed.

Twenty-eight teachers, or 40 per cent, of the number planned to teach plumbing in Agriculture IV.

Some of the most common activities were: cutting and threading pipe, connecting pipe, repairing valve and faucet and identifying fittings.

TABLE XII

PLUMBING

Activities	Instruction Planned in Agriculture[a] I: Number of Teachers	I: Hours Range	I: Hours Average	II: Number of Teachers	II: Hours Range	II: Hours Average	III: Number of Teachers	III: Hours Range	III: Hours Average	IV: Number of Teachers	IV: Hours Range	IV: Hours Average
1. Measure pipe	4	½-2	1	8	½-2	1	11	½-2	1			
2. Cut and thread pipe	10	1	1	22	½-2	1	51	½-5	2	10	½-2	1½
3. Identify fittings	8	1-3	1½	22	½-2	1	22	½-2	1½	6	1-2	1½
4. Connecting pipes	2	1	1	18	½-3	1	33	½-3	1½	15	1-8	2
5. Repair valve and faucet	6	1	1	19	½-2	1	32	½-2	1	16	½-4	2
6. Using compound				2	2	2	3	1	1	2	2	2
7. Connect septic tank				2	1½-3	2	12	½-6	2½	8	2-5	2½
8. Use of tools	3	1	1	11	½-3	1	18	½-5	2	6	½-2	1½
9. Install fixtures	1	2	2	9	1-3	2	14	1-3	2	7	2-5	3
10. Reaming pipe	2	1	1	8	½	½	10	½	½	1	½	½
11. Repair pipe				4	1-2	1½	5	1	1	1	½	½
12. Repair water pump				2	2	2	6	2-4	3	1	2	2
13. Plan water system	1	3	3	2	1	1	9	2-7	4	6	1-4	3
14. Bending pipe				4	1	1						
15. Making nipples	1	1	1				2	1	1	2	1	1
16. Lead pipe connections				2	1	1	5	½-2	1	1	2	2
17. Install water pump				2	2	2	4	2-3	2½	3	2	2
18. Solder copper pipe							3	1-3	1½			
19. Clean drain	1	½	½				3	½	½			
20. Study and demonstration	6	1	1	9	2	2	8	2	2	6	2	2
Total for area	10	2-11	5	30	2-19	6	54	2-12	6	28	1-15	6

[a]Number of teachers reporting - 73.

Fencing

Regardless of the kind of fence a farmer has on his farm he will at one time or another probably be confronted with problems of fencing. Whether it be building a new permanent fence, a temporary fence or the repair and upkeep of fences already built he will need to know what and how to do the job.

Although fencing is an important area in the field of farm mechanics, Table XIII shows that only 44 per cent of the teachers planned to include fencing in their program. Of the forty-eight teachers planning to give instruction in fencing only 16 per cent planned for instruction in fencing in Agriculture I, 27 per cent in Agriculture II, 41 per cent in Agriculture III and 50 per cent in Agriculture IV.

The number of hours planned for this area would indicate that very little time was allocated for this area. In Agriculture I an average of six hours was planned, in Agriculture II seven hours, Agriculture III six hours and Agriculture IV six hours.

The most common activities include the following: identifying and selecting wire, lining posts and treating posts.

Drawing and Sketching

What would be the end product if a boy was turned loose in the shop with no plans for him to follow? Before a project or job is started a plan must be made, either in the mind or drawn on paper.

TABLE XIII

FENCING

Activities	Instruction Planned in Agriculture[a] I: Number of Teachers	I: Hours Range	I: Hours Average	II: Number of Teachers	II: Hours Range	II: Hours Average	III: Number of Teachers	III: Hours Range	III: Hours Average	IV: Number of Teachers	IV: Hours Range	IV: Hours Average
1. Identify and select wire	2	1-2	1½	10	½-2	1	6	¼-1½	1	8	½-2	1
2. Setting and bracing corner posts	6	1-4	2	10	½-2	1	14	½-2	1½	13	½-2	1
3. Setting line posts	5	½-2	1	8	1-2	1	9	½-2	1	6	½-2	1
4. Stretching wire	2	1	1	3	1	1	8	½-8	3	6	1-8	2
5. Swinging or repair gate	1	1	1	7	½-3	1½	6	1-3	1½	7	1-3	2
6. Install electric fence				4	½-3	1½	9	1-2	1½	7	½-4	2
7. Test electric fence							1	1	1	3	1	1
8. Figure cost of fence	1	2	2	5	1-2	1	3	1	1	4	1-2	1½
9. Repair old fence	1	2	2	3	1-3	2	4	1	1	2	3	3
10. Select posts	1	1	1	7	½-2	1½	1	¼	¼	6	½-2	1
11. Treating posts	4	2-4	3	7	½-2	1½	9	1-3	2	12	½-2	1½
12. Splicing wire				4	1	1						
13. Make cattle guard				1	2	2	6	1-3	1½	12	½-4	2
14. Build temporary fence							1	2	2	2	1-2	1½
15. Plan fence system				5	1	1	3	1-4	2	3	1-2	1½
16. Make gate				1	2	2	1	2	2	1	2	2
17. Make water gap				1	1	1	2	1-2	1½	2	1-2	1½
18. Study and demonstration				1	3	3						
Total for area	8	2-10	6	13	2-18	7	20	2-2	6	24	2-16	6

[a]Number of teachers reporting - 48.

Even with tools and material at ones' disposal there must be a plan of action, the first step, the next step and so on until we visualize the end product. Very few people can visualize the end product to the dimensions so it is imperative that plans with dimensions be drawn before attempting to make a project.

Some of the areas in farm mechanics have jobs of drawing and making plans; this is probably the reason for so few of the teachers participating in the area of drawing and sketching.

Thirty-seven teachers, or 34 per cent of the total of 108 planning a farm mechanics program, planned to give instruction in the area of drawing and sketching, as shown in Table XIV.

Ninety per cent of the teachers who planned to offer instruction in the area of drawing and sketching planned instruction in Agriculture I, 57 per cent in Agriculture II, 20 per cent in Agriculture III and 21 per cent in Agriculture IV.

The range for this area was two to nineteen hours with an average of seven in Agriculture I, one to twenty-two hours with an average of six in Agriculture II, one to six hours with an average of three in Agriculture III and two to eleven hours with an average of seven in Agriculture IV.

Some of the most common activities were as follows: making working drawings, lettering and numbering, and sketching.

TABLE XIV

DRAWING AND SKETCHING

Activities	Instruction Planned in Agriculture[a] I: Number of Teachers	I: Hours Range	I: Hours Average	II: Number of Teachers	II: Hours Range	II: Hours Average	III: Number of Teachers	III: Hours Range	III: Hours Average	IV: Number of Teachers	IV: Hours Range	IV: Hours Average
1. Lettering and numbering	30	1-3	1½	12	1-4	2	5	1-3	1½	4	1-3	2
2. Make working drawings	32	1-9	2½	19	1-6	2	7	1-5	2	7	1-3	2
3. Prepare bill of materials	7	½-2	1½	6	1-10	3				3	½-3	2
4. Reading blue prints	8	1-5	2½	4	1-4	2	3	1-3	2	3	2-5	3
5. Sketching	9	1-5	2	4	1-2	1½	1	1	1	2	1-2	1½
6. Cost of materials	5	½-2	1	1	1	1				2	½-3	1½
7. Isometric drawings	3	2-5	4	1	3	3				2	½-3	1½
Total for area	33	2-19	7	21	1-22	6	7	1-6	3	8	2-11	7

[a]Number of teachers reporting - 37.

Farm Power

With the increasing number of tractors and other motor driven power on the farm it seems alarming that the area of farm power was participated in by such a small per cent of the teachers planning a farm mechanics program of instruction. There are probably many good reasons why farm power was not planned by more teachers. Possibly the main reason is that many Vocational Agriculture teachers have not received adequate technical training to do a creditable job of instructing their high school classes.

Only thirty-one teachers planned to give instruction in the area of farm power. This represents less than 30 per cent of the total of 108 planning a farm mechanics program as shown in Table XV.

No teacher planned to teach farm power in Agriculture I, six in Agriculture II, eighteen in Agriculture III and twenty-six in Agriculture IV.

The most common activities included the following: cleaning cooling system of tractor, adjusting carburator of tractor, studying ignition system of tractor and making minor adjustments of tractor. Twenty-two of the twenty-eight activities planned to be taught in the area of farm mechanics centered on maintaining tractors.

Power Transmissions

Little interest was shown in the area of power transmission. This could probably be attributed to several factors. One of the

TABLE XV

FARM POWER

Activities	Instruction Planned in Agriculture[a] I: Number of Teachers	I: Hours Range	I: Hours Average	II: Number of Teachers	II: Hours Range	II: Hours Average	III: Number of Teachers	III: Hours Range	III: Hours Average	IV: Number of Teachers	IV: Hours Range	IV: Hours Average
1. Use of belts										1	2	2
2. Care of motors				2	1-2	1½	5	1-2	1½	11	1-5	3
3. Clean and paint machinery										1	1	1
4. Safety							1	2	2	2	1	1
5. Order parts												
Tractor												
6. Principle of operation				3	1-4	2½	4	1	1	5	1-2	1½
7. Operating							5	1-3	2	5	1-3	2
8. Check oil and fuel							3	1	1	1	1	1
9. Check tires				2	2	2	3	1	1	6	1	1
10. Align front wheels										2	2	2
11. Adjust brakes	2	1	1				2	1	1	9	1	1
12. Clean and adjust plugs	1	1	1				4	1	1	4	1	1
13. Adjust fan belt	1	1	1				1	1	1	1	2	2
14. Clean air filter	1	½	½				2	1	1	2	1	1
15. Change oil filter	2	1	1				2	1	1	1	1	1
16. Clean cooling system	4	1	1				8	1	1	13	1-2	1½
17. Lubricate	5	1-2	1½				11	½-2	1½	10	1	1
18. Minor adjustments	3	1-3	2				4	1-3	2	8	1-4	2
19. Adjust carburator	1	2	2				7	½-2	1½	16	1-4	2
20. Check points										4	1	1
21. Install lights							4	1	1	7	1-8	2½
22. Winterize							1	1	1	2	1-3	2
23. Use of power takeoff							1	1	1			
24. Cost of operation										1	1	1
25. Ignition system							4	½-2	1	10	1-2	1½
26. Operator's manual							5	1-3½	1½	4	1-4	2
27. Inspect for needed repair							7	1-4	2	2	1-4	2½
28. Select tractor	1	2	2				3	2	2	2	1-4	2½
29. Study and demonstration										1	3	3
Total for area	6	5-14	7				18	3-12	7	26	2-18	9

[a]Number of teachers reporting - 31.

factors could be that too much time was planned in other areas of less importance. Another could be that the teachers have not had adequate technical training in this area. Regardless of the factor or factors it seems that more emphasis should be placed on power transmissions than was shown by the 108 farm mechanics course of study analyzed. More power equipment is constantly being purchased by farmers and it is the duty of the vocational agriculture teacher to lead the way in teaching the farmer to best operate his equipment.

Of the 108 teachers planning a farm mechanics instructional program, only 14 per cent planned some instruction in power transmission as shown in Table XVI.

Of the fifteen teachers planning instruction in this area two planned to teach in Agriculture II, six in Agriculture III, ten in Agriculture IV and none in Agriculture I.

The average amount of time planned for teaching was four and one-half hours in Agriculture II, four hours in Agriculture III and four hours in Agriculture IV.

Some of the most common activities were: studying pulley sizes and speeds, lacing a belt and selecting belts.

Home Farm Shop

Some farmers store their tools all over the farm and work on equipment wherever and whenever it breaks down if they can find their tools while other farmers have a certain building to store their tools

TABLE XVI

POWER TRANSMISSION

Activities	Instruction Planned in Agriculture[a] I: Number of Teachers	I: Hours Range	I: Hours Average	II: Number of Teachers	II: Hours Range	II: Hours Average	III: Number of Teachers	III: Hours Range	III: Hours Average	IV: Number of Teachers	IV: Hours Range	IV: Hours Average
1. Pulley sizes and speeds				1	3	3	5	2	2	10	1-4	2
2. Selecting belts				1	1	1	3	1	1	4	1	1
3. Care of belts				2	1	1	2	1	1	4	1	1
4. Use of power take off							1	5	5	3	2	2
5. Installing belts							2	1	1			
6. Lace belt							4	1	1	3	1	1
7. Measure belt				1	1	1	2	1	1	1	1	1
8. Lagging a pulley				2	1	1						
9. Repair belts							2	1	1			
10. Align pulley							1	2	2			
Total for area				2	4-5	4½	6	2-8	4	10	2-10	5½

[a]Number of teachers reporting - 15.

and a place to repair and maintain requipment. The farmer who has a shop usually keeps his machinery in a high state of repair and considers a shop very important. Normally a person will do a good job if he has been properly trained.

The data in Table XVII show that thirteen teachers planned for instruction in the area of home farm shop.

Of the thirteen who planned to offer instruction nine planned to teach in Agriculture I, nine in Agriculture II, eight in Agriculture III and six in Agriculture IV. The average number of hours per year per teacher ranged from three to five hours.

Some of the most common activities include the following: selecting plan for home shop, selecting tools and constructing home shop.

Leather

Tractors and other forms of motor driven vehicles are replacing animals that at one time were used almost exclusively for power on the farm. With the decline of animal power, the problems in the area of leather also decline. This is shown very definitely in Table XVIII. Only twelve teachers or about 11 per cent of the teachers planning a farm mechanics program included leather in their farm mechanics course of study.

Ten teachers planned to teach the area of leather in Agriculture I, three in Agriculture II and Agriculture III and two in Agriculture IV.

TABLE XVII

HOME FARM SHOP

Activities	Instruction Planned in Agriculture[a] I: Number of Teachers	I: Hours Range	I: Hours Average	II: Number of Teachers	II: Hours Range	II: Hours Average	III: Number of Teachers	III: Hours Range	III: Hours Average	IV: Number of Teachers	IV: Hours Range	IV: Hours Average
1. Selecting plan for home shop	8	2	2	5	2	2	2	2	2	3	2	2
2. Selecting tools	6	1	1	2	1	1	4	2	2	4	1-4	2
3. Inventory	6	1	1	3	1	1	2	1	1	1	½	½
4. Construct home shop	3	1-3	2	4	1-3	2	3	2	2	2	3-4	3½
5. Care of tools	2	1	1	3	1	1				2	1	1
6. Install equipment	2	1	1	3	1	1	2	1	1	2	1	1
7. Fit and sharpen tools	1	1	1	1	2	2	1	2	2	2	1	1
8. Order tools	1	1	1	1	1	1	1	1	1	1	1	1
Total for area	9	4-7½	5	9	2-5	3	8	2-8	3	6	2-7	4

[a]Number of teachers reporting - 13.

TABLE XVIII

LEATHER

Activities	Instruction Planned in Agriculture[a]											
	I			II			III			IV		
	Number of Teachers	Hours Range	Hours Average	Number of Teachers	Hours Range	Hours Average	Number of Teachers	Hours Range	Hours Average	Number of Teachers	Hours Range	Hours Average
1. Brad and repair	2	1	1									
2. Make leather halter	5	1-4	2				1	2	2	1	2	2
3. Repair harness	5	1-2	1½							2	1-2	1½
4. Clean and oil harness	3	1	1	2	1	1	2	1	1	1	1	1
5. Care of leather	1	1	1									
6. Make check lines				1	4	4						
7. Cut leather	1	1	1									
Total for area	10	1-5	2½	3	1-4	2	3	1-3	2	2	1-2	1½

[a]Number of teachers reporting - 12.

The two activities appearing most frequently in the course of study were making leather halters and repairing harness.

Shop Orientation

In shop orientation, instruction was planned to acquaint the students with the farm mechanics program, including shop policies and organization, identification and location and use of tools.

Only three of the 108 teachers who planned a farm mechanics program of instruction included the area of shop orientation.

As shown in Table XIX three teachers planned instruction in this area in Agriculture I, two in Agriculture II, Agriculture III and Agriculture IV.

Probably the reason there were so few planning for participation in this area was that in most of the other areas either care and use of tools or study and demonstration time was allocated to inform the students in each area.

TABLE XIX

SHOP ORIENTATION

Activities	Instruction Planned in Agriculture[a] I: Number of Teachers	I: Hours Range	I: Hours Average	II: Number of Teachers	II: Hours Range	II: Hours Average	III: Number of Teachers	III: Hours Range	III: Hours Average	IV: Number of Teachers	IV: Hours Range	IV: Hours Average
1. Mechanics program	1	1	1	1	½	½						
2. Orientation	2	2	2	2	1	1	1	1	1	1	1	1
3. Identify tools	2	1	1	1	1	1	1	1	1	1	1	1
4. Location of tools	2	1	1				1	½	½	1	½	½
5. Policies	2	1	1	1	½	½	1	½	½	1	½	½
6. Power tools	1	½	½				1	½	½	1	½	½
7. Revising program				1	1	1	1	1	1	1	1	1
8. Tour of shop	1	1	1									
9. Safety	1	1	1	1	1	1	1	1	1	1	1	1
Total for area	3	3-5	4	2	2-4	3	2	3	3	2	3	3

[a]Number of teachers reporting - 3.

CHAPTER III

SUMMARY AND RECOMMENDATIONS

Summary

It has been the purpose of this study to determine the areas of instruction included in the farm mechanics course of study, what the activities are in each area, the range in hours planned for teaching each activity and the average number of hours allotted to teach each activity.

In conducting this study the investigator obtained 108 planned courses of study in farm mechanics from Dr. George W. Wiegers Jr., who taught a course including instruction in developing a farm mechanics course of study. Each teacher who took the course planned a farm mechanics course of study for his own school. One hundred and eight programs were selected to represent all sections of the State of Tennessee.

In analyzing and combining the 108 planned courses of study the investigator listed the areas, the activities in each area, the range in hours planned for teaching each activity and the average time planned to teach each activity.

The areas included in the farm mechanics course of study as found in Table XX were woodworking, rope, soldering and sheet metal, tool fitting, forge and cold metal, painting and glazing, electricity, farm machinery, concrete and farm masonry, soil and water management,

TABLE XX

INSTRUCTIONAL AREAS, NUMBER AND PERCENTAGE OF TEACHERS INVOLVED AND NUMBER OF ACTIVITIES INCLUDED IN AREAS IN ONE HUNDRED AND EIGHT INSTRUCTIONAL PROGRAMS IN FARM MECHANICS IN TENNESSEE

Areas	Number of Teachers	Per Cent	Number of Activities in Areas
Woodworking	108	100.0	58
Rope	107	99.0	16
Soldering and sheet metal	104	96.2	30
Tool fitting	103	95.3	26
Forge and cold metal	97	89.8	47
Painting and glazing	92	85.1	21
Electricity	89	82.4	30
Farm machinery	87	80.5	47
Concrete and farm masonry	84	77.7	28
Soil and water management	79	73.1	21
Welding--electric and acetylene	77	71.2	34
Plumbing	73	67.5	20
Fencing	48	44.4	18
Drawing and sketching	37	34.2	7
Farm power	31	28.7	29
Power transmissions	15	13.8	10
Home shop	13	12.0	8
Leather	12	11.1	7
Shop orientation	3	2.7	9

welding, plumbing, fencing, drawing and sketching, farm power, power transmission, home shop, leather and shop orientation.

The activities in the areas varied from seven in drawing and sketching and leather to fifty-eight in woodworking as shown in Table XX.

The data in Table XX show that some of the areas of instruction were planned by only a small percentage of the teachers, for example, shop orientation 2.7 per cent, leather 11 per cent and home shop 12 per cent, while others were planned by practically all teachers, woodworking 100 per cent, rope 99 per cent and soldering and sheet metal 96.2 per cent.

It can be assumed that each service area represented by the courses of study would necessarily be different in some degree. Each service area has its own pertinent problems that must be met in a course of study.

Recommendations

The information in this study should be useful to teachers in setting up a farm mechanics course of instruction.

This study can be especially useful to the new teacher in setting up his farm mechanics course of study. He can select the most important areas and activities and he will have some idea concerning how much time to allocate to each activity.

When teachers have students make student calendars of farm mechanics activities they will have a better idea of how much time should be allocated for each job or activity. The teacher should keep a record of the time it takes for the student to do the job and adjust the time element the following year if necessary. Some teachers are probably more proficient in teaching certain jobs as indicated by the variation in the number of hours planned for teaching.

BIBLIOGRAPHY

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Unpublished Material

Aton, Rex. "The Functions of the Shop in the Smaller High Schools of Nebraska." Unpublished M. S. thesis, University of Nebraska, Lincoln, 1931.

Bartlett, Lawrence Farrell. "A Farm Shop Study." Unpublished M. S. thesis, West Virginia University, Morgantown, 1948.

Clendenen, Max Murray. "Determining the Farm Mechanics Needs for the Vocational Agriculture Department at Maynardville, Tennessee." Non-thesis study, Department of Agricultural Education, University of Tennessee, Knoxville, 1949.

Croom, Walter McDonough. "A Study of the Areas of Farm Mechanics Emphasized in the All-Day Program of Vocational Agriculture in North Carolina with Suggestions for Improvement." Unpublished M. S. thesis, North Carolina State College, Raleigh, 1948.

Greene, Stanley Smith. "A Study of Time and Cost Standards in Performing Farm Shop Jobs." Unpublished M. S. thesis, Cornell University, Ithaca, N. Y., 1927.

Hayden, Lyle Johnson. "Enterprise and Objectives in Vocational Farm Mechanics." Unpublished M. S. thesis, Pennsylvania State College, State College, 1931.

Kindschy, Dwight Lewis. "Course Content in Welding, Farm Machinery and Tractors for the Curriculum in Vocational Agriculture." Unpublished M. S. thesis, Iowa State College, Ames, 1948.

Nellist, Russess Ray. "The Development of a Suggestive Course of Study in Rural School Shopwork for the Richland Consolidated Teacher-Training School at Richland, Michigan." Unpublished M. S. thesis, Cornell University, Ithaca, N. Y., 1932.

Pollom, Lester Boyd. "A Study of the Scope and Content of Farm Mechanics Courses and Organization for Teaching Them in the Vocational Agriculture Schools of Kansas." Unpublished M. S. thesis, Kansas State College, Kansas State Board of Vocational Education, Topeka.

Walker, Clyde. "Determining the Content of Farm-Mechanics Courses of Study for Smith-Hughes Agricultural Departments in High Schools." Unpublished M. S. thesis, University of Nebraska, Lincoln, 1931.