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A Recommended Program And Layout For Rural High Schools Shop

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Approved
W. Pittman

A RECOMMENDED PROGRAM AND LAYOUT FOR
RURAL HIGH SCHOOLS SHOP

By

J. C. Brown, Sr.

--

A Problem in Shop Management, Submitted
in Partial Fulfillment of the Require-
ment

for the

Degree of Bachelor of Science

in

Industrial Education

Prairie View State College

Prairie View, Texas

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CHAPTER I

INTRODUCTION

The history of industrial education in the small high school in Texas has been the history of an Experimental attempt at Shop Management. A general shop, involving some four activities, under the charge of one man, having some thirty boys each trying to learn some particular skill that he is interested in, present bedlam at its worse unless there is some purposeful organization running throughout the entire shop program.

The progress made in the small general shop is made in direct proportion to the extent of the organization that existed in the shop.

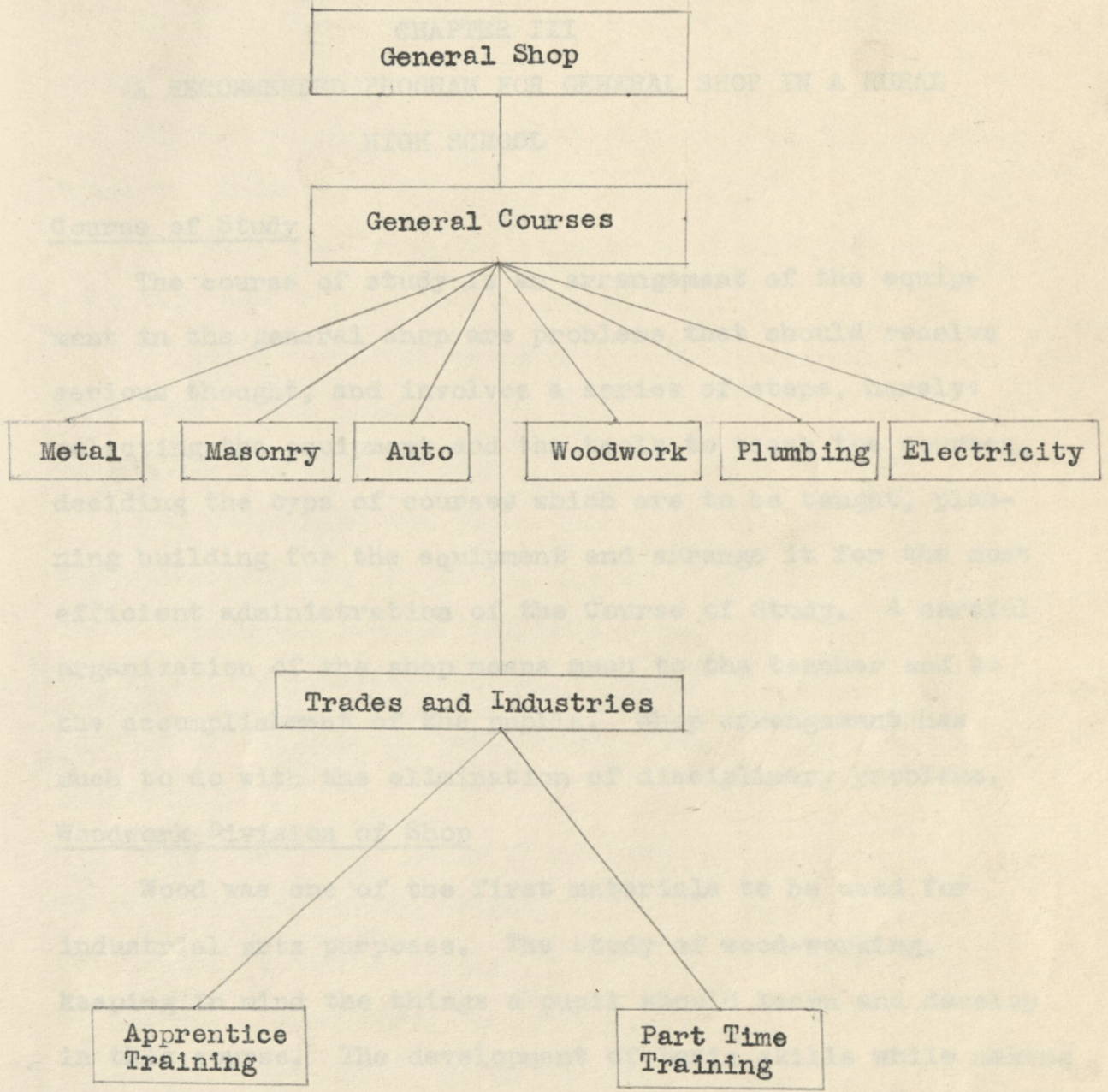
The Rural High School has a tremendous responsibility in its trying to meet the interest needs of the number of boys that come to school. The problem is how can such an organization be effected. This Study is an attempt to outline a program that is workable in a small rural situation.

The Study shall concern itself with modern trends in shop program making and at the same time keep in mind the barrenness of the locality, the irregularity of attendance, the lack of adequate space, and the indifference of some parents to that kind of training. The program shall be concerned more with the boy. It will be so organized that he will play an important in its development and its success.

CHAPTER II

TYPES OF GENERAL SHOP

A shop in which more than one type of activity may be taught is referred to as a general shop. It probably began when a wood-working teacher brought a soldering iron, a blow-torch, a roll of solder, and a pair of tin snips into the shop. The term general shop is very broad. There are many types, and varied conflicting opinions as to their practicability. A classification of existing shops may be made as follows: (1) The general unit shop, which refers to the room in which many courses may be taught with the same media; (2) Specific unit shop, which is one equipped to teach one course, such as, printing or shoe making; The laboratory of industries, which is one where one teacher offers as many courses as his training, the equipment, the need of pupils and the enrollment will permit. The multiple activity shop are of two types: (1) there is the shop with major and minor divisions, a room with enough space, and woodworking benches for an entire class; supplemented by very limited provisions for such other courses as metal working, electricity, and auto-mechanics. The second is a combination shop where the equipment is such that it may all be used by an entire class for several unit courses.



General Shop

General Courses

Metal

Masonry

Auto

Woodwork

Plumbing

Electricity

Trades and Industries

Apprentice Training

Part Time Training

CHAPTER III
A RECOMMENDED PROGRAM FOR GENERAL SHOP IN A RURAL
HIGH SCHOOL

Course of Study

The course of study is an arrangement of the equipment in the general shop are problems that should receive serious thought, and involves a series of steps, namely: selecting the equipment and the tools to teach the courses, deciding the type of courses which are to be taught, planning building for the equipment and arrange it for the most efficient administration of the Course of Study. A careful organization of the shop means much to the teacher and to the accomplishment of the pupils. Shop arrangement has much to do with the elimination of disciplinary problems.

Woodwork Division of Shop

Wood was one of the first materials to be used for industrial arts purposes. The study of wood-working, keeping in mind the things a pupil should learn and develop in this course. The development of basic skills while making useful projects for practice purposes. There are six Units in the Woodwork division.

1. Units involving the kind and use and care of tools. The unit gives the history of tools.

2. Units involves the making of projects from materials purchased from the local lumber yard.

3. Units involving projects that require working on curves and turning.
4. Units involving projects that require the different types of joints.
5. Units involving the repairing of home maintenance jobs that can be repaired in the shop.
6. Units involving the repair and improvement of any work jobs in the home.

Electrical Division of Shop

The purpose of the Electrical Division is to achieve some understanding of the principles of electricity. Involved in making several simple electrical devices, the importance of electricity in all phases of modern life, a study of the various occupations found in the electrical industry.

Unit number one deals with electricity of low voltage. It involves the making of bell circuits, simple battery connection, electro-plating, simple motors, and the study of currents, conductors, and small motors.

Unit Number Two - 32 to 110 volts - Here the pupils achieve some understanding and skill in making an extension cord, installation of wall switches, lamp sockets, the making of various kinds of connections, a meter reading, the replacing of fuses, and the use of a test lamp.

Unit number three - This assignment is to achieve some understanding and skill in appliance repair in the shop;

in the home under the direction of the instructor.

It is suggested that pupils bring to the shop electrical appliances to be repaired, such as, motors to be cleaned and oiled, heating units, extension cords and hot plates.

Unit number four offers credit for repairing many kinds of electrical appliances at home. To receive credit in this unit pupils may install a buzzer line, repair electrical fixtures of some kind, replace a blown fuse, and other similar approved jobs.

Metal Work Division of Shop

The metal work division is divided into five Units and may be listed as follows: (1) Sheet metal, (2) Forging, (3) Soldering; (4) Home Repair Projects dealing with metal. (5) Home maintenance jobs related to any of the above units.

Next to wood, metal was one of the first materials to be used for industrial arts purposes. The teacher must constantly be alert to keep the offering of this division from becoming too narrow. A broad course in metal is of greater value to the pupil than a specific course.

Plumbing Division of Shop

The plumbing division is divided into six units and may be listed as follows: (1) Recognition of size and kind of pipe and fitting; (2) Use and care of plumbing tools; (3) Cutting, reaming and threading of pipe; (4) Installing plumbing fixtures; (5) Repairing of plumbing fixtures; and (6) Pumping and storing of water.

Automechanic Division of Shop

Unit I - Fuel System

Unit II - Ignition

Unit III - Transmission

Unit IV - Brakes

Unit V - Lubrication

Unit VI - Maintenance of Body Finish

Unit VIII - Cooling

Unit VIII - Driving

Masonry Division of Shop

Masonry construction is one for permanency:

Unit I - Cements

Unit II - Motars

Unit III - Concrete

Unit IV - Forms Construction

Unit V - Brick

Unit VI - Plaster

Suggestive Tool and Equipment List:

These suggested lists represent an attempt to select those tools which are quite adequate for the several divisions possible in the general shop and are believed to contain all necessary tool to conduct a general shop course adapted to the needs of the rural boy. The list of tools will begin on the following page.

Wood Work Hand Tools

Name of Article	No. of Articles	Make of Tools
Jack planes	4	Stanley
Smoothe plane	2	Stanley
Jointer Plane	1	Stanley
Block plane	6	Stanley
Back saw	4	Henry Diston or equal
Rip saw 24"-6 Pt.	4	Henry Diston
Cross Cut Saw 24"-14 pt.	2	Henry Diston
Miter Saw 24"-14pt	1	Henry Diston
Cross Cut Saw 26"-10 Pt	4	Henry Diston
Compass Saw	4	Henry Diston
Coping Saw	4	Henry Diston
Framing Square	6	Stanley
Combination Sq.	6	Stanley
Marking Guage	6	Stanley
2 fold 2' Rule	6	Stanley
Socket Firmer Chisel	2 sets	Stanley
Hickory Mallet	6	Shop Made
Bevel Square 8"	6	Stanley
Screw Drivers 10	6	Stanley
Screw Driver 8	6	Stanley
Screw Driver 6	6	Stanley

Tool List (Cont.)

Name of Article	No of Articles	Make of Tools
Hand Scrapers 3"x5"	6	Stanley
Spoke Shaves	2	Stanley
Draw Knives 10"x12"	4	Stanley
Carbonundum Stone 2 faces 1"x2"x8"	2	Stanley
Level 24"x30"	2	Stanley
Claw Hammers 12 oz, 14 oz. & 16 oz.	12	Maydole
Broad Hatchet 4" face	2	Maydole
Wing Dividers 6" & 8"	2	Maydole
Expansion Bits 7/8 to 3"	1	Stanley
Yankee Drill	1	Stanley
Oilers	2	Stanley
Ratchet Brace 10" and 12"	2	Stanley
Bar Clamps 24" to 48"	18	Cincinnati Tool Co.
Putty Knives	4	Stanley
Glass Cutters	2	Red Devil
Screw Driver Assorted	4	Stanley
Glue Pot	1	Russel
Tack Hammer	2	Maydole
Auger Bit Set 1/2" to 1"	2 Set	Irvin
Counter Sink (Wood)	2	Irvin

Wood Work Tools (Cont.)

Name of Articles	No. of Articles	Make of Article
Gimlet Wood Bits (Assorted)	6	Irvin
Tool Grinder	1	Any Good Make
Saw Filing Clamps	2	Diston
Wrecking Bars 24" & 30"	4	Stanley
Plug Cutter	1	Stanley
Clamp Hand Screw	12	Stanley
Nail Set	12	Stanley
Saw Set	1	Diston
Steel Tape 100'	1	Stanley
Wood File $\frac{1}{2}$ Round	4	Nicholson
Wood File Round	4	Nicholson

Electrical Division

Name of Article	No. of Articles	Make of Article
Flat Nose Pliers 8"	4	Crescent
Round Nose Pliers 8"	4	Crescent
Side Cut Pliers 8"	4	Crescent
Screw Drivers 6"	6	Stanley
Ball Pin Hammer	2	Stanley
Claw Hammer	2	Stanley
Romex Splitter		Shop Made
Ratchet Erace Extra long shank bits	1 set	Stanley

Plumbing Work

Name of Article	No. of Articles	Make of Articles
Pipe Die and Stock Set $\frac{1}{2}$ " to 2"	1	Crane
Pipe Cutter $\frac{1}{2}$ " to 2"	1	Crane
Pipe Wrenches 10"	1	Crescent
Pipe Wrenches 12"	1	Crescent
Pipe Wrenches 16"	1	Crescent
Pliers 6" and 8"	2	Crescent
Hack Saw Frame Adjusted	1	Stanley
Hack Saw Blades 12"	12	Red Tip
Plumbers Furnace	1	
Blow Torch 1 qt. Cap.	1	Any Good Make
Pipe Reamer Square Shank	1	Crane
Metal Folding Rule 6'	1	Stanley
Chisels Assorted	1 Set	Stanley

Concrete and Masonry Work

Mixing Board		Shopmade
Shovels-Square Point	4	Good Make
Water Buckets	2	
Tamping tools		Shop Made
Sand Sieve		
Finishing Trowel	2	Stanley
Pointing Trowel	2	Stanley
Cement Edger	2	Stanley
Grover	2	Stanley

Concret and Masonry Work Tools (Cont.)

Wood Float	4	
✓ Made in Shop		
Hoes Motar	4	
Brick Masons Trowel	6	Stanley

Hot and Cold Metal Work

Anvil	2	
Ball Pein Hammers	4	
Hardies	2	
Hot Cut Chisel	2	
Hack Saw Frame Adjusted	1	
Steel Machinist Vise	2	
Tong, Set of 4	2 sets	
Bolt Clippers	2	
B. Smith Hammers	2	
Sharpening Sledge Hammer	2	
Hot and Cold Cutter	4	
Bolt Tongs	2	
Assorted Hand Punch	2 sets	
Assorted Cold Chisel	1 set	
Tap and Dies $\frac{1}{4}$ " to 1" (in SS)	1 set	

Automobile and Gas Engine

-
- 1 set Socket Wrenches
 - 1 set S Wrenches
 - 1 set Cresent Wrenches

Automobile and Gas Engine (Cont.)

1 Feeler Guage	1 Tead Mallet
1 Valve Grinding Tools	1 Auto Jack
4 Pair 6" pliers	1 Tube Repair Kit
4 - 4" Screw Drivers	1 Set Box Socket Wrenches
4 - 6" Screw Drivers	1 Set Tappet Wrenches
4 - 8" Screw Drivers	2 Sets end Wrenches
2 - 10" Screw Drivers	1 Valve Lifter
6 Assorted Files	1 Wheel Puller Set
4 Ball peen Hammers	2 Side Cut pliers
2 Sets Cold Chisels	2 Battery Pliers
1 8 lb. Sledge Hammer	1 Set Fender Tools

Suggested Equipment for Auto and Gas Work

Name of Article	No. of Articles	Make
10" Circle Saw	1	Delta
6" Jointer	1	Delta
Hand Saw	1	Delta
Grinder	1	Delta
Lathe	1	Delta
Combination Drill Press	1	Delta
Glue Pot	1	Russel
Anvils	2	
Forge	2	
Electric Drill	1	
Work Bench-Wood shop	6	Shop Made
Drawing Tables	6	Shop Made
Stools and Display Tables		Shop Made

Planning the Building for Equipment and Class Work

The third consideration is the available space in which to arrange the needed equipment. The following factors must be considered if the shop is to be efficient:

- (1) lighting - natural and artificial;
- (2) ventilation;
- (3) placing equipment in relation of divisions;
- (4) location of tools and supplies,
- (5) machinery;
- (6) assembly space;
- (7) finishing;
- (8) working space; and
- (9) teacher's observation.

Lighting : - In a small shop it is most desirable to have all the light coming from one side of the room. In larger shops this would be impractical, as windows must be placed on two or more sides. Artificial light should be so arranged so as to prevent any glare.

Ventilation: -- Fresh air should circulate freely through the shop at all times. Ventilation is much easier to control when breeze windows are provided.

Equipment: -- Equipment should be so arranged as to facilitate the work of the pupil and to relieve congestion or needless passing from one section to another.

Tools and Supplies: -- Tools and supplies should be centrally located so as they might be easily accessible to the entire shop.

Machinery: - Very little machine should be provided in the general shop for the rural high school. The shop must lend itself to the need of the community and hand tool work must be stressed, as the rural boy will not have machinery

at home. However it is advisable to install some machinery.

Assembly Space: - The rural shop should be planned either for assembly work in the regular class room or at the benches in the workshop.

Finishing:- A room should be planned for the finishing of the completed articles. This room should be well lighted and ventilated.

Working Space - Machinery must be installed so as to provide free working space on all sides sufficient to handle with ease the material with out interfering with other shop activities.

Teachers' Observation:- The shop room should be arrange so the teacher could keep a check on all students and their activities with ease.

CHAPTER IV

ORGANIZATION AND MANAGEMENT OF SHOP

Organization of Learning Units

The "Learning Units" are divided into three groups or classes: namely, (1) class instruction, (2) group instruction, and (3) individual instruction.

Class Instruction: - This type of instruction may be use to present problems of immediate need and interest to the entire class. The major portion of the students time should be spent in active gathering of knowledge under competent supervision. Example of class instruction are the presenting of general related, and technical knowledge, a discussion of occupational information, and problems related to shop needs by all.

Group Instruction: - Good planning of group instruction is necessary to make the best use of the teacher's time. The instruction should be short and to the point, and not average over five minutes.

Individual Instruction: - The shop "set-up" demands individual instruction. The larger percent of the teacher's time should be given to directing individual pupil activity. With an improve pupil control organization to take care of routine tasks about the laboratory, the instructor has a splendid opportunity to direct the pupils in performing shop activities or gathering knowledge.

Demonstration

The success of teaching in general shops is more dependent upon a good demonstration than upon any other form of teaching device. It is a means of giving information accurately and economically. It cannot be given successfully if rushed. It requires the utmost skill to demonstrate tools, tool processes, and operations. It requires a rehearsal.

The pupil should have an accurate record in his note book covering the essentials of the demonstration, but should not be required to take notes. Mimeograph material should be supplied by the teacher, which states the procedure and information covered by the demonstration. Experience indicates that pupils copying or taking notes, doing work or anything else during a demonstration is very unsatisfactory. It permits divided attention.

Other Teaching Devices

Reference Material: - It is important to keep reference material available in a library for every reference given on an instruction sheet or chart. It should be so marked that every pupil can find the reference without help. Various references related to the same unit should be refined and assembled into an information sheet.

Pictures and Slides: - Motion pictures, as a teaching device, has great possibilities in the general shop. Occupational information, related knowledge can be successfully presented.

Illustration: - Charts, pictures and other forms of visual instruction requires very little of the instructor's time. Numerous charts are available and should be obtained for use in the shop.

Class Excursions: - Carefully planned excursions to special points of interest are educationally sound. They should be taken outside of school hours. Carefully prepared mimeographed instruction should be given each pupil so that he may be an active gatherer of knowledge under a competent supervisor. An excursion that does not give more education than the same amount of time spent in the shop is either a poorly selected or misdirected undertaking.

Instruction Sheets: - Instruction sheets are essential to the teaching of a well organized course in shop work. It is well to keep in mind that instruction sheets are not to be used as a "correspondence course". They are designed to supplement instruction, and not to take the place of the instructor. There are various forms of instructional sheets, namely; (1) the operation sheet, (2) the information sheet, (3) the assignment sheet, (4) the job sheet.

Shop Organization

Successful teaching in a shop demands shop management of the highest order. This means:

1. Dividing the class into working groups;
2. Organization of pupils - controlled shop for administration and socialization purposes.

3. Placing equipment and supplies in such a manner as to allow use with least interference with others working near by.

4. Selecting suitable jobs for each division that can be used for demonstrating the learning Unit in each.

5. Preparing skillful demonstration.

6. Having an arrangement whereby each student individually may begin a new job just as soon as his assignment is completed. Individual, not groups, rotate from job to another. Groups rotate from division to division-for example from wood work to metal work.

7. Keeping progress chart, record appraisal, etc.

8. Selecting visual aids, planning inspection trips and talks for occupational information.

9. Encouraging work in repairing home maintenance jobs.

Book Foreman	Tool Foreman	Divisional Foreman	Stock Foreman	Safety Foreman
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The offices to be filled are superintendent, secretary, tool foreman, stock foreman, book foreman, safety foreman, and there may be foreman's of bench work.

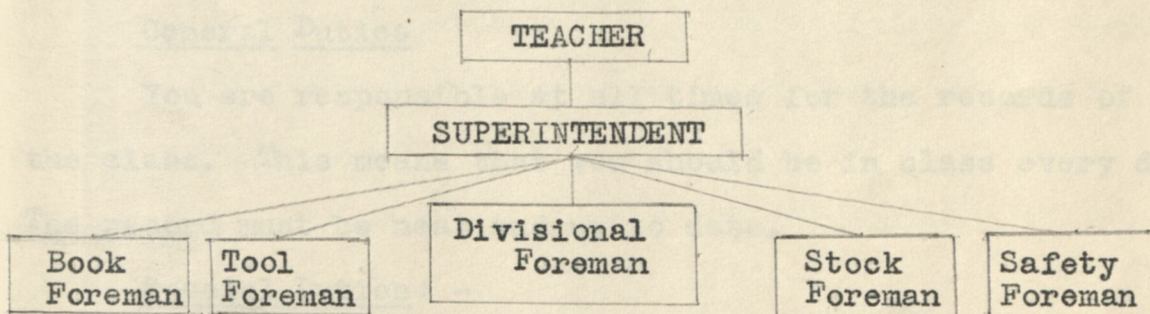
The officers should wear some insignia identifying their office. In some classes it is an option with the

CHAPTER V

ORGANIZATION OF A PUPIL DIRECTED SHOP

The real purpose of developing a pupil-directed shop is not to relieve the teacher of his work, but to enable him to do a real job of teaching. The only possible way to learn to carve a beautifully shaped hull for a model sailboat is practice at the job until success is achieved. The only way to develop boys with a fine insight into social obligations and duties each one owes to society is to give them a chance to practice the duties of citizenship. This the pupil-directed shop will do to a high degree.

The organization chart shows the relation of the teacher to the class. It also graphically shows the various class officers and their relation to the teacher, to the superintendent, and to the various shop activities.



The offices to be filled are: superintendent, secretary; tool foreman, stock foreman, book foreman, safety foreman, and there may be foreman's of bench work.

The officers should wear some insigna identifying their office. In some classes it is an apron with the

office plainly lettered across the front, or it may be a bright metal badge, being worn to identify their activities.

Superintendent

Specific Duties: --

1. See that foreman gives tools and supplies to pupils;
2. Make any adjustment necessary;
3. See that all departments are cleaned and foreman has every thing in order;
4. Ring clean-up bell five minutes before period is up for cleaning and checking purposes;
5. See that class passes orderly.

General Duties

You are to have charge of the shop and to assist the teacher at all times. The orderly conduct of the class is your responsibility.

Secretary

General Duties

You are responsible at all times for the records of the class. This means that you should be in class every day. The record must be neat and up to date.

Special Duties: -

1. Hand out foreman record sheets ,
2. Take up foreman record sheets;
3. Hand out job sheets,
4. See that all records are filled,
5. Make bill for needed supplies

6. Keep records of expenditures.

Safety Foreman

General Duties:- Your job is one of the most important in the shop. It is the one to prevent accidents, and to look after the general health of the class.

Specific Duties: --

1. Attend to all accidents in the shop. You are not expected to help give first aid, and you are to report all accidents when they happen.
2. You are to be on the look out at all times for things which are likely to cause an accident.
3. Instruct boys found using tools in a careless manner.
4. In warm weather see that enough windows are open to provide proper ventilation.
5. Report all scuffling to teacher.
6. See that no student uses a machine without a guard.
7. See that no student uses broken tools, report all broken tools to teacher.
8. Make a violation report at the end of each class.

Tool Foreman

General Foreman: - You are responsible at all times for the neatness of the tool room; the care of the tools in the tool-room, and the conduct in and about the tool-room.

Special Duties

1. Enter toolroom and get report form;

2. Check report made by foreman of preceding class;
3. Check neatness of room and tools;
4. Check for missing or broken tools;
5. Hand out tools to workman;
6. Give report to Superintendent when called for;
7. You may work in shop as soon as the rush is over.

At the End of the Period: -

1. Check in tools;
2. Check for missing tools and make report;
3. Make out tools list and leave for the next tool room foreman.

You are expected to pass a test over the tools illustrated on the tool chart hanging on the tool room door.

Stock Foreman

General Duties: - You are responsible for all stock and templates. See that you become familiar with them so that you will be able to pass a test on them.

Specific Duties: -

1. Take place in or near stock room;
2. Check stock report left by foreman of preceding class;
3. Check stock and record in your report that on which you are low;
4. Check condition of stock;
5. Work in shop as soon as rush is over;
6. Fill out last half of stock report and hang on panel in place.

Book Foreman

General Duties: - You are responsible for all books, magazines, drawing, bulletins and job sheets. Be sure that you become familiar with them.

Specific Duties

1. Take your place at or near the book case;
2. Check over books and other material;
3. Give out books and job sheets;
4. You are expected to supervise the use of the book and magazines;
5. Report to Superintendent any lost books;
6. Work in shop during class time.

At close of Period: -

1. Take up books and job sheets and put them in record;
2. Check upon any that may be missing;
3. Report to Superintendent.

CHAPTER VI

STUDENT PLAN SHEET AND PROGRESS CHART IN SHOP

The Student Plan Sheet

The purpose of using the student Plan Sheet is to help the student to develop ability to plan a job. Answering the following questions will help him realize the value of using the Student Plan Sheet before starting a job:

1. State three or more reasons for selecting the chosen job.
2. What is the purpose of a bill of material?
3. Why estimate cost of material and time required to complete job?
4. State the advantages of reading or making a drawing.
5. What is the purpose of listing the processes and operation of each job?
6. What does job procedure mean? Why should one be required to list the procedures in production order?
7. Why make an appraisal of the job after completing it?

STUDENTS' PLAN SHEET

Class _____ Date _____ Name: _____

General Shop Division: _____

Woodwork : Electricity: Metalwork: Masonry: Auto: Plumbing

1. Job _____ Approved By: _____
Instructor

2. Reason for Selecting job?

a- Use of finished product: _____

b- Number and nature of skills: _____

c- Experiences gained: _____

3. Procedure-

4. Estimate of Material and supplies needed to complete job:

Quantity	:	Items	:	Time Required	:	Cost
	:		:		:	
	:		:		:	
	:		:		:	
	:		:		:	
	:		:		:	
	:		:		:	

Approved by: _____
Instructor

7. State the tool processes or operation involved in this project;

- | | | |
|-------------|--------------|---------------|
| a- Grinding | e- Planing | i- Hardening |
| b- Forging | f. Whetting | j- Assembling |
| c- Sawing | g. Finishing | k- Riveting |
| d- Drilling | h- Amealng | |

8. Appraisal

- a- Estimate for your material-
- b- Estimate of you time-
- c- Is the quality of workmanship suitable?
- d- Does the work show improvement?
- e- Is the work the results of your plans?
- f- Is the work the results of your effort?

What did you learn when making the project that you can carry over into other fields?

The Progress Chart, which may be obtained from the State Department of Industrial Education, Austin, Texas is to be fastened to the wall of laboratory, visible to all pupils. The progress chart lists for each division:

1. The basic skills or type jobs that pupils shall be able to do before they complete the course.

2. The suggested list of technical knowledge they shall know.

- 3 The occupational information assignments.

After the pupil has satisfactorily completed the assignment under "technical knowledge" and occupational information the instructor shall check said accomplishment on progress chart. Also, when the pupil has mastered a skill or completed a type, he shall receive credit on progress chart. Thus the class can see at any time how they are progressing.

CHAPTER VII

CONCLUSION

The general shop is a broad group of educative industrial arts activities embracing techniques of shop organization and teaching methods which enables a community, whether large or small, to present a unified case of content, based on life.

It is only through the industrial arts program which is representative of so many practical activities of home and community life, that the tool subjects are brought into close and vital connection with every day situation in which the subject matter is utilized. Only through this relationship can the tool subjects become a real benefit in the development of useful members of the home, community, State, and nation.