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A Safety Program For Industrial Arts Wood Shops

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A SAFETY PROGRAM FOR INDUSTRIAL
ARTS WOOD SHOPS



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1968

A SAFETY PROGRAM FOR INDUSTRIAL ARTS WOOD SHOPS

A Thesis

by

Lee E. Odom

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**Submitted to the Graduate School of
Prairie View Agricultural and Mechanical College
In Partial Fulfillment of the
Degree of
MASTER OF SCIENCE**

August, 1968

Industrial Education

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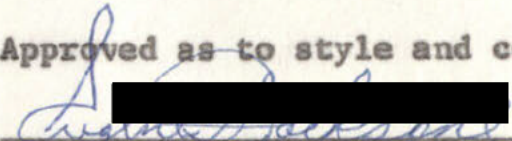
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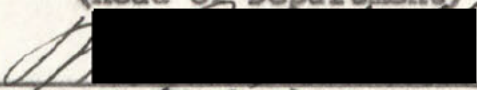
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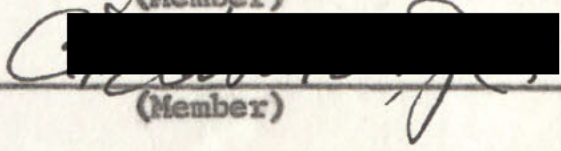
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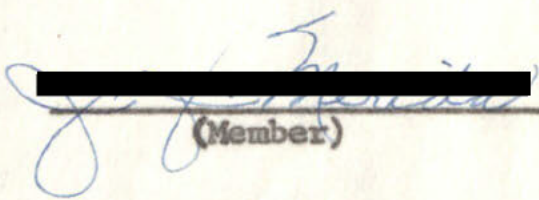
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TABLE OF CONTENTS

CHAPTER	PAGE
I. INTRODUCTION	1
The Problem	2
Statement of the problem	2
Purpose of the study	2
Limitations of the Study	2
Need for the Study	2
Review of Related Studies	2
II. THE SAFE CONDITIONS OF PLANT AND EQUIPMENT	4
Size of Classes.	5
Proper Lighting	6
Ventilation	7
Flooring	8
Guards	9
Layout of Equipment	9
III. INSTRUCTIONAL PROCEDURES FOR SAFETY.	13
Appearance of Shop.	14
Care of Tools and Equipment.	14
Demonstrating the Safe use of Machines	15

CHAPTER	PAGE
Industrial Plant Visitation	16
Accident Reports	16
First Aid Equipment	16
Safety Posters.	17
Housekeeping	17
Shop Inspections.	18
Classroom Supervision	19
Face and Eye Protection	20
IV. SHOP MANAGEMENT AND DISCIPLINE	21
Shop Conduct Rules	21
Safety Rules.	22
General safety rules	25/
Specific safety rules	27
Class Organization.	34
Discipline in the Shop	36
V. SUMMARY AND CONCLUSIONS	39
BIBLIOGRAPHY	41

CHAPTER I

INTRODUCTION

Statement of the Problem. Industry has long since accepted accident control in the factory as a major administrative function of management. The growing importance of safety as an instructional obligation of the public schools is rapidly becoming a matter of general public interest. Notwithstanding the many injuries received on stairs, in science laboratories, on the playground, and on the athletic field, the public seems to be most aware of and sensitive to accidents in the shop. It is therefore of particular urgency that the school shop teacher be constantly concerned with and always alert to the prevention of accidents in the shop.

Two important factors enter into the problem of safety. They are: (1) the safe condition of plant and equipment or environmental conditions, (2) proper instruction for safe use of all facilities or personal conditions.

It is the responsibility of each shop teacher to determine some means of developing safe conditions and a plan for the safe use of the facilities available in the shop.

Purpose of the Study. It is the purpose of this study to develop processes and techniques to enhance accident prevention in Industrial Arts Wood Shops.

Limitations of Study. This investigation is limited because its primary concern is Industrial Arts Wood Shops.

The data for this study were obtained from the following sources:

1. Utilization of resource materials
2. Survey of literature in the area of school shop safety

Need for the Study. More accidents occur in the wood shop than any other area of Industrial Arts. Information in this study can be used by wood shop teachers to reduce the number of accidents. While the rate of accidents is probably not unduly high in most wood shops, their frequency can be further reduced, and to this task every sincere teacher should dedicate himself.

REVIEW OF RELATED STUDIES

Silvius and Curry, in their book, Teaching Successfully

the Industrial Arts and Vocational Subjects, devoted a chapter to safety in the shop.¹ Their discussion dealt with safety in broad terms and did not relate specifically with any particular area of Industrial Arts or Vocational Education.

Ericson and Seefeld, in their book, Teaching the Industrial Arts, also devoted a chapter to the prevention of accidents in the shop.² This chapter also dealt with safety in a general manner.

The Texas Education Agency, in "Bulletin 565, Industrial Arts in Texas Schools," included a chapter outlining a safety program for Industrial Arts.³ This publication gave only some suggestions to the industrial arts teachers on how to plan a safety program.

Malone, in an article in School Shop Magazine, "Industrial Arts Safety", gave some excellent ideas on safety that

¹ Harold G. Silvius and Estell H. Curry, Teaching Successfully the Industrial Arts and Vocational Subjects. (Bloomington: McKnight & McKnight Publishing Co., 1953), p. 153.

² Emanuel E. Ericson and K. Seefeld, Teaching the Industrial Arts. (Peoria: Chas. A. Bennett Co., Inc., 1960) p. 163.

³ The Texas Education Agency, Industrial Arts in Texas Schools. (Austin: The Texas Education Agency, 1955) p. 63.

was an outgrowth of a project to improve the safety that is emphasized in the program in the Euclid, Ohio, Public Schools.⁴ The study described in detail the new features to be added to the present program but did not describe the entire safety program.

⁴

Richard Malone, "Industrial Arts Safety," School Shop, XXIII (March, 1964), 20.

CHAPTER II

THE SAFE CONDITIONS OF PLANT AND EQUIPMENT

Industrial Arts teachers include safety instruction in all facets of the education program. Instructors in this area must teach students to recognize industrial hazards, think clearly while working with tools and equipment, and practice safety procedures in the shop as well as in everyday activities. Safety instruction is a required part of all industrial education. One of the greatest responsibilities of the industrial arts wood shop teacher is to provide for the students a safe plant and safe equipment.

SIZE OF CLASSES

The size of classes in most cases cannot be controlled by the shop teacher. Most wood shop teachers agree that a class in industrial arts wood work should not exceed 24 pupils. The amount of floor space per student should be from 75 to 125 square feet.¹ The size of the shop will determine how many students can work safely and should serve

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Arthur B. Mays and Carl H. Casberg, School-Shop Administration (Milwaukee: The Bruce Publishing Company, 1954), p. 11.

as a guide to class sizes. If the class size appears to be too large for instructional efficiency and safety, the shop teacher should bring it to the attention of the administration.

PROPER LIGHTING

One of the most important considerations in the wood shop is adequate lighting. The most desirable light is natural or sunlight permitted into the shop so as to avoid either great inequalities in the intensity of illumination in different parts of the room or glare from reflecting surfaces. If the shop teacher is involved in the planning of the shop, a good rule to follow in planning window sizes is to provide 1 square foot of glass for every 5 square feet of shop floor space and place the top of the windows a distance above the floor equal to half the width of the room.² However well planned the windows may be, there will be many days during the school year when artificial lighting will be needed to supplement natural lighting.

Regardless of the type of lighting, shops should never be allowed to have less than from 12 to 15 foot-candles of

²

Ibid., p. 24.

illumination on work surfaces. When available light falls below 12 foot-candles, electric lights should be turned on. A shaded droplight hanging low over a machine, both because of glare on the work surfaces and the unequal or spotted illumination of the shop is very undesirable. Most new shops are installing neon lights arranged in parallel rows so as to give uniform illumination throughout the room.

VENTILATION

The problem of school shop ventilation has not proved to be as serious as school-shop lighting. The opening of windows usually will supply enough outside air to insure comfortable working conditions. However, this is not true in areas where the humidity is high or other weather conditions such as the temperature being extremely high during the summer months. Air conditioning is highly desirable for this type of condition. If air conditioning is not possible, some type of substitute should be used to insure comfort of the students. An exhaust fan can often improve the situation. It must be remembered that comfort of the personnel is important to insure maximum alertness on the part of the students.

Another problem involved in ventilation is to prevent "stuffiness" or "closeness" which is caused by body odors and not by poisons from the lungs, as is commonly believed.³ Any wide-awake, intelligent shop teacher can usually prevent any serious conditions of bad air by merely giving attention to the matter during the time the pupils are in the shop.

Dust control is another problem involved in ventilation. Dust collectors are available to meet every shop requirement. It is believed by the writer that the most efficient type collector picks up dust from every piece of dust producing equipment and deposits the dust in a bin located at the base of the collector. This not only prevents the dust from entering the air but also allows floor sweeps to be located at desirable points to aid in keeping dust to a minimum while sweeping. The system should be in operation each time dust producing equipment is in use.

FLOORING

The flooring in the shop should be of a durable material, and it should provide insulation from noise. It should be

3

Ibid., p. 26.

pleasing in appearance and in harmony with other details of the laboratory. It is a good custom to mark the working space for each machine on the floor and to allow only the operator within the marked area. Mats, made out of some nonslip material, are valuable as a support for the operator. In the absence of these, some paint or glue with fine sand may serve the same purpose. When mats are used, it becomes necessary to secure all edges firmly.

GUARDS

Machines should be equipped with safety guards that cover all moving parts except those which are exposed necessarily while the machines are in use. Self-adjusting guards should be designed to overcome interference with the operation of the machine. The guards should be in place at all times while the machine is in use.

LAYOUT OF EQUIPMENT

The layout of equipment is utmost in importance to a good safety program. Listed below are suggestions that should be followed when placing equipment in the wood shop.⁴

⁴The Texas Education Agency, Industrial Arts in Texas Schools, (Austin: The Texas Education Agency, 1955), p. 87.

1. All machines should be located so that the proper sequence of operations can be performed. For example, a jointer is usually placed to the right and rear of the circular saw. The circular saw should be placed where it does not interfere with lumber storage.
2. Work benches should be placed so that the best use can be made of natural lighting. A distance of four feet should be allowed between benches bearing vises. If large projects are to be constructed, these distances would have to be increased. Work benches usually are located in an area free from machine operations.
3. Cabinets and tool panels should be located in the general areas to be served. To facilitate storage and ease of identification, tools used in different areas may be painted in appropriate colors. Silhouette outlines may be painted in on inner cabinet walls to indicate location of tools and to aid in checking tools.
4. Equipment should be arranged so that there is free access to aisles and an easy flow of traffic throughout

the laboratory. For safety and convenience of operations, place frequently used equipment near the center of the operations to be performed.

5. Avoid placing a machine on or adjacent to columns, pipes, or structural supports of the building which might amplify and transmit operating sounds to other parts of the building.
6. Locate machines so that maximum size of materials to be used can be accommodated.
7. Consider light sources when locating equipment. If natural lighting causes shadows, provide sufficient artificial illumination with localized sources.
8. Heavy machines should have sound-absorbing foundations.
9. All machines should be visible from any spot in the laboratory.
10. Machines presenting safety hazards should be isolated from traffic.

Machines that are out of order either should be removed from the laboratory or their electrical circuits made immobile. Regular inspection and maintenance of machinery and

equipment should be the joint responsibility of the teacher and students. Advanced students particularly should participate in laboratory maintenance.

The teacher should recognize immediately any unsafe conditions or practices at school. He is responsible for keeping in safe working order all facilities, tools, and equipment assigned to him, and recommends to the administration action that is needed to provide a safe environment. Usually it is advisable to put such recommendations in writing, particularly if a safety hazard or equipment deficiency is involved. Teachers should set an example for safety by using the equipment and tools properly during all demonstrations, lectures, and other teaching procedures.

CHAPTER III

INSTRUCTIONAL PROCEDURES FOR SAFETY

The instructor is of necessity the central factor in preventing accidents and bears the responsibility for an efficient and safe laboratory. This responsibility must be accepted even though certain conditions exist that could be corrected by the administration. Better teaching and better organization will assist in accident prevention under any conditions. The most conscientious and able teachers have the fewest number of accidents in the laboratory even though there may be cases where accidents occur through deliberate and mischievous acts.

Good safety attitudes are not developed overnight, but they grow out of a progressive experience. Students need to be aware of the possibilities of accidents when placed in a new environment. It is important for teachers to stress that working conditions, health, alertness, and dress of individuals are important factors. It has been said that: "Safety cannot be purchased or manufactured; it must be acquired through orderly, well-regulated thinking and experience."¹

¹Committee, School Shop Safety Manual (New York: Board of Education, 1948), p. 17.

APPEARANCE OF SHOP

Teaching safety begins with the appearance and condition of the room and equipment. It is impossible to make any headway in the teaching of safety if the condition of the room and equipment is disorderly. The teacher needs to be alert for conditions which might cause accidents. As soon as a situation is detected, steps must be taken to immediately correct the condition.

CARE OF TOOLS AND EQUIPMENT

It has been stated that: "Dull and partially damaged tools cause more accidents than tools which are kept sharp and in good condition."² An organized plan for maintaining and keeping tools sharp is necessary. Having students work with sharp tools at all times enables them to do better work with less likelihood of accidents. An individual who has an opportunity to work with sharp tools while attending school will likely discipline himself to work under similar con-

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Harold G. Silvius and Estell H. Curry, Teaching Successfully the Industrial Arts and Vocational Subjects. (Bloomington: McKnight & McKnight Publishing Co., 1953), p. 161.

ditions at home or on the job. The program that teachers should follow to maintain the tools and equipment in his shop will depend on his class load, age of the students, and the organizational ability of the teacher.

DEMONSTRATING THE SAFE USE OF MACHINES

Teachers should use the positive approach in demonstrating the safe use of machines, tools, and other laboratory equipment. Silvius and Curry state that: "Safety instruction should be a part of every demonstration."³ During his first attempt to use a machine, the pupil should be supervised directly by the teacher or by someone to whom the teacher has delegated this authority. A safety check list or progress chart can be used for each machine to show the names of class members who have had an opportunity to see a demonstration of the safe operation of the machine. Such a list also identifies those who, under direct supervision during a performance test, have qualified themselves to operate or use specific machines.

2

Ibid., p. 192.

INDUSTRIAL PLANT VISITATION

Industrial plants with effective safety programs should be visited. Class discussions that follow the visits may emphasize the application at school of the effective safety program procedures observed. Safety personnel from industry may also give lectures and demonstrations to the class.

ACCIDENT REPORTS

Any accident occurring in the shop should be investigated thoroughly by the teacher, and the cause of the accident should be called to the attention of all students. Accident forms should be filled out according to school regulations and a copy kept on file by the teacher. Some schools are using forms devised by the National Safety Council for reporting accidents.

FIRST AID EQUIPMENT

First aid equipment should be a part of the wood shop. The teacher should be trained in administering first aid, and should not overlook opportunities for instructing the class in the importance of first aid treatment. Injuries requiring

medical attention, of course, should be reported to the proper medical authority with such urgency as is indicated by the nature of the injury.

SAFETY POSTERS

It has been observed by the writer that often the students will not stop to read a sign in the school shop but will notice a poster. It is because of this that safety programs play an important part in the safety poster. The instructor should use this method to a good advantage by having new posters put in the shop at regular intervals. There should be a bulletin board in a conspicuous place, accessible to all pupils, on which these posters are mounted. If the instructor makes frequent changes of the material on this board, the pupils will look forward to reading any new materials that may appear.

HOUSEKEEPING

A clean and orderly laboratory is a necessary part of the safety program. Pupils may assume such responsibilities as checking and arranging the materials and supplies, cleaning the floors, windows, and lighting fixtures, storing hand tools

in an orderly manner, and removing scrap material. There is some question as to where the students' responsibility leaves off and that of the janitor begins in housekeeping. Groneman states that: "The shop teacher should be alert and require only that activity concerned with housekeeping that is essential to safety and appearance to be done by the students."⁴ The care of tools and equipment is definitely a part of the shop activity and should be done by the students. Proper housekeeping is a part of class organizations, and emphasis should be placed on the importance of it in the safety program.

SHOP INSPECTIONS

The school shop should be inspected frequently. The best practice for the shop teacher to follow is to use a maintenance check list and plan his time so as to make regular and frequent inspections of equipment as part of his routine duties. Many pieces of equipment need daily inspection by the teacher. If repairs are needed or dull cutting edges need to be

⁴

C. H. Groneman, "Safety in the School Shop," Industrial Arts and Vocational Education, XL (May, 1961), 27.

sharpened, this should be done promptly. Machines and electrical connections need to be inspected a frequent intervals. The shop building needs frequent inspection for fire hazards. Even though inspection for shop facilities should be constantly carried on, it would be wise of the shop teacher to organize the inspections at frequent intervals to insure that they are carried out.

CLASSROOM SUPERVISION

The teacher should not leave a class unsupervised. If an emergency should occur, the class should be so organized that a student foreman will be in charge. His duties must be spelled out and the obligations of the class to this foreman understood by the members of the class. There should also be a safety foreman on duty to assist the student foreman in maintaining a safe shop. This foremen is also performing this duty when the instructor is in the shop.

Power controls should be centralized on a master panel near the teacher's station. All power should be turned off if the teacher is not in direct supervision of the classroom.⁵ This should be practiced whether a class is in session or not.

5

Ibid., p. 26

FACE AND PROTECTION

The shop teacher should be thoroughly familiar with "Standards for Face and Eye Protective Devices in Public Schools," which were adopted by the Texas State Board of Health on June 14, 1965. These standards are the results of S. B. No. 121, and act to require teachers and public school pupils in Texas Public Schools to wear protective eye devices in certain vocational, industrial arts, and chemical-physical courses or laboratories; and declaring an emergency.⁶ The teacher must enforce this law.

The instructor must emphasize the importance of safety in every instructional phase of the shop. It should be constantly explained to the student that the development of skills and the acquiring of knowledge is of little value if he will let a careless act leave him physically handicapped. The student should also be taught to be concerned not only for the safety of himself but for other members of the class. The teacher must, through an instructional program, develop safety attitudes within the student that will enhance accident prevention in the school shop.

⁶Adam E. Darm, "Make A Safety Inspection of Your Shop," School Shop, XXVII (January, 1968), 51.

CHAPTER IV

SHOP MANAGEMENT AND DISCIPLINE

From the time that shopwork was first introduced in schools, the possibility of accidents has weighed heavily upon the conscientious teacher. The teacher with a well organized shop and effective discipline is less likely to have as high an accident rate as one with poor organization and ineffective discipline. A teacher can lecture or conduct recitations with little or no class organization, but where any sort of manual work is to be performed by the class some sort of carefully planned organization is necessary. Since the shop is a place of continuous and lively activity, both of a mental and physical character, it follows that discipline is of a major importance to safety.¹

SHOP CONDUCT RULES

In order to have a well organized shop, the teacher should have certain rules of conduct. As soon as possible in

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Emmanuel E. Ericson and Kermit Seefeld, Teaching the Industrial Arts (Peoria: Chas A. Bennett Co., Inc., 1960) p. 124.

the course these rules should be discussed with the students. The rules should be presented to the students in such a way as to give the students the feeling that they are making the rules that they plan to follow. If this is done, the student may develop the attitude that the rules are not an instrument made by the teacher and forced on the student and that he must obey the rules because the teacher made the rules. After the rules are well understood by the students, they should be adopted by the entire class. When a rule is violated, it should be brought to the attention of the student that he participated in the making of the rule. This method can be very effective if planned and carefully used.

SAFETY RULES

Every shop teacher should have a set of safety rules developed by him to fit his particular situation. These rules should be posted on or near each machine. It should be pointed out to the student that the rules were made to protect him, and any time a rule is violated there is a possibility of injury or death. The student should also be told why a rule is made and what is likely to happen if violated. Each

student should get a copy of safety rules as soon as possible in the course. The teacher must realize that the most important element in safety is to develop a positive attitude toward it. No matter how many rules are memorized, if the students are not safety conscious, the rules will have little effect. Safety rules are not something to be memorized but should aid in the development of safety consciousness within the students.²

A comprehensive survey of literature on safety rules for wood shops was made, and it was found that some sources emphasized certain rules more than others. It was found that basically all the sources are the same. The amount of emphasis placed on some rules varied with the type and amount of equipment available, and the attitude of the individual toward the equipment. The following safety rules were compiled from four resource books and have been used and revised by the author.³

²Richard Malone, "Industrial Arts Safety," School Shop, XXIII (March, 1964), 21.

³Willis H. Wagner, Modern Woodworking (Homewood: Goodheart Willcox Co., Inc., 1967), p.2; John L. Fierer, Industrial Arts Woodworking (Peoria: Chas A. Bennett, Co., Inc., 1965), pp 252-3; Dewitt Hunt, John Cermak, Machine Woodworking (Oklahoma: Harlow Publishing Corporation, 1961), pp 5-8; Dewitt Hunt, John Tate, Hand Woodworking (Oklahoma: Harlow Pub. Corp., 1962), 59-63.

These safety rules may be used to help develop safety consciousness within the students, however, the teacher must be ever on guard against permitting any relaxation of his enforcement of all safety rules.

GENERAL SAFETY RULES

1. Never use a power tool without proper authority.
2. All cuts, slivers, and all splinters must receive immediate first aid.
3. Never use a power tool until it is at full speed and never use it while it is coasting.
4. Avoid loose clothing such as sleeves and ties,; people with long hair should wear caps.
5. Do not use a power tool as a work bench.
6. Never use a tool that is dull or improperly set.
7. The guards should be in place and in good condition at all times.
8. Make no adjustments on a tool while it is in motion.
9. The teacher shall set up all special work.
10. Do not leave the tool until it is entirely stopped.
11. Keep your work area clear of scraps and tools.

12. Concentrate on your work. Let no one distract you and do not distract others.
13. Absolutely no running or horse-play in the shop.
14. Stand on a dry surface while using all portable power tools.
15. Do not enter occupied safety zones.
16. Place oily rags in safe metal containers.
17. All portable tools must be grounded.
18. A face mask or goggles must be worn while operating a machine.
19. Before using any power tool, turn on power, stand to one side, and be alert for dangerous irregularities of sound and sight.
20. When it becomes necessary to touch moving parts the main switch should be turned off first or the plug should be pulled.
21. When a helper is necessary, the operator shall control all feed speeds.
22. Examine stock for knots, splits, checks, and nails.
23. Avoid placing any type of power tools on a bench while it is running.

SPECIFIC SAFETY RULES

Woodturning Lathe

1. Understand how to start and stop the lathe.
2. Tuck in your tie, roll up your sleeves above the elbow.
3. Set the spindle clamp tight on the tailstock before turning on the power.
4. Move the tool rest to within one-eighth inch of the work and parallel to it. Revolve the work by hand to make sure it clears the tool rest before starting the lathe. Always be sure the tool rest is secure.
5. Keep the tool rest as close as possible to your work and at the proper height.
6. Dull tools cause accidents. Use only sharp tools.
7. Use slow speeds when roughing off or turning large stock.
8. When cutting near the live center end of the piece, be careful that the edge of the tool does not strike the revolving spurs of the live center.
9. In making a horizontal cut with the skew chisel, the cutting should always be done with the heel of the skew.

10. In making concave cuts, cut with the grain only, and do not cut beyond the center of the groove.
11. Fasten the work securely to the face plate before turning.
12. Always stop the lathe when inside calipers are used.
13. Outside calipers should have rounded ends.
14. Make all adjustments while the lathe is stopped.
15. Remove the tool rest before sanding.
16. Put all spoiled turnings into the scrap box.
17. Only one person should be in the work area at the lathe.

Power Jointer

1. Always keep your hands on top of your work or push block.
2. Do not hold your hands too near the end of the stock.
3. Always hold your work firmly on the table and against the fence.
4. Use a push block when necessary.
5. Stop the machine before cleaning off shaving or moving the fence.

6. Never run a piece shorter than 12 inches across the jointer.
7. Always have the guard in place before starting the jointer.
8. Wear no loose clothing and no gloves. Tuck in your necktie and roll up your sleeves.
9. Keep the floor around the machine clean.
10. Too heavy a cut may cause a kickback.
11. See that the machine is running full speed before you attempt to run stock across the jointer.
12. Place your stock on the base of the table with the concave side down.
13. After starting the stock across the jointer, do not move the position of your feet. As the stock advances, throw the body forward.
14. If you wish to do special jobs, such as tapers or rabbits, see your instructor for help.

Band Saw

1. Understand how to start and stop the machine.
2. See that the belt is not fouled with scrap before starting band saw.
3. See that all guards are in place and the table is free of all scraps and tools.

4. See that the saw blade is in the guides before starting the band saw.
5. Keep the floor around the machine clear of scraps.
6. Do not force the saw.
7. The cut must not be started until the saw has attained full speed.
8. Having another student watching you operate the saw is a bad practice.
9. Use a stick to clear scrap away from the table.
10. Do not saw small pieces.
11. Use left hand in reaching around the saw.
12. Reaching too far back of the blade brings the face and head too close to the blade.
13. Make no adjustment on height of guide while the machine is running.
14. Do not wear loose clothing or gloves around the bandsaw.
15. If the curvature of the outline is sharp, the waste stock should be kerfed before starting to cut along the outline.
16. Hands should always be kept out of line of saw blades.

17. If the blade breaks, shut off the power and step back from the machine.
18. If you need to cut a bevel, have your instructor set the saw blade table and help you get started.
19. A curve of small radius should be cut with narrow blades only.
20. Think through the cutting operation before starting the saw.

Table Saw

1. Understand how to start and stop the machine.
2. Keep your attention on your work.
3. When setting up the saw for any sawing job, see that the saw revolves freely.
4. The saw table should be free from all tools and scraps.
5. Use the proper guards.
6. Always stop the saw before making adjustments.
7. Do not look around and carry on a conversation while operating the saw.
8. Stock to be sawed must be held against one of the fences.

9. Stock to be sawed must be cut or jointed before it is cut on the circular saw.
10. The saw blade must not project more than 1/2 inch above the stock being sawed.
11. When ripping, the operator and others should stand to one side of the saw.
12. Do not reach over the saw. Let the stock sawed drop off the back of the saw table to the floor.
13. Never use the rip fence as a stop when crosscutting. It may cause a kickback.
14. Roll up your sleeves above the elbows, or wear a shop coat with tight-fitting or short sleeves. Tuck in your tie.
15. Put the guards in place before operating the saw.
16. In ripping a board that is warped, turn the convex side up.
17. Have boards in warp or wind checked by the instructor.
18. Always use a crosscut or combination saw blade for cutting stock to length.
19. It is absolutely necessary to remove trimmings.
20. After finishing your sawing, do not leave the machine until it has completely stopped.

Spindle Shaper

1. Under no condition are you to operate the shaper without first having your instructor's permission.
2. See that knives are correctly set and are tight.
3. See that the spindle turns freely before turning on the power.
4. Remove all wrenches and tools from the shaper table.
5. See that the floor is clear around the shaper.
6. Use all guards and hold-down devices which will add to the safety of the operation.
7. Tighten all clamps, fences and hold-down devices before starting the machine.
8. Roll up your sleeves above the elbows.
9. Tuck in your tie.

Jig Saw

1. Understand how to start and stop the jig saw.
2. Do not get your face too close to the blades.
3. Set the guide so that it almost touches the stock being cut.
4. Keep your fingers away from the blades.
5. Do not cut cylinders on a jig saw.

6. Before starting the saw, see that the guide is set tight.
7. See that the blade is securely fastened in the chucks.

Surfacer

1. Before planing a warped board or plank, straighten one of its surfaces by running it over the jointer.
2. Know how to start and stop the machine.
3. Set the surfacer to cut 1/16 inch less than the thickness of the stock at the thickest point.
4. Learn how to stop the feed rollers.
5. Pieces less than 12 inches long should not be run through the surfacer.
6. Do not hold the fingers along the edges of the stock or underneath the stock.
7. Have your instructor show you how to feed narrow pieces through the machine.
8. Get the instructor's permission before attempting to reduce stock less than 3/8 inch in thickness.
9. Stop the machine before attempting to pick broken knots away from the feed rollers.
10. Never change the depth gauge while the machine is running.

CLASS ORGANIZATION

It is the teacher's responsibility to organize his classes so that students may receive maximum benefits from assisting in problems of shop routine. The degree and method of student participation will vary according to ages of students, types of work engaged in, and the ability of the teacher to plan and make the plan work. The participation of students in management requires careful planning. A definite list of responsibilities should be worked out and posted, showing in detail what is expected in each position. The members of the class are told of their role in the class organization. It should be made clear that the teacher is in direct overall control of the organization at all times and each position will be given the proper respect.⁴

There are many positions that can be assigned to the students. A shop foreman can be used as a direct assistant to the instructor. His principal duty would be to see to it that all other persons perform their duties. Other foremen can be

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Harold G. Silvius and Estell Cutty, Teaching Successfully the Industrial Arts and Vocational Subjects (Bloomington: McKnight & McKnight Publishing Company, 1953), p. 174.

personnel, safety, tool, and cleanup. They should be identified with badges and their duties explained in detail.

Where the teacher functions as general manager and the students as functional foremen, it is desirable to use an organization chart. The chart should show graphically the lines of authority and the specific duties of each foreman. It should be carefully drawn and hung in a conspicuous place on the wall. Any questions that should arise regarding the duties or authority of a foreman, should be answered by referring to the organization chart. The success of the class organization chart depends largely on the shop teacher's enthusiasm for it and his ability to plan and supervise it.

The procedure followed in making appointments for the various positions may differ according to circumstances. Nominations and elections by the class are preferable, since such a method gives practice in democratic living by the group.⁵ An assistant should be selected to serve if the foreman is absent. If a scheme of rotating these positions is followed, each student will have experience in all or practically all the assignments in due time. It might not make a great deal of difference in what position he begins.

⁵Ibid., p. 176.

The shop class presents a special problem of group organization because of the immature and inexperienced students. The lack of organization in the shop inevitably makes for confusion, poor discipline, danger of physical injury and interference with both teaching and learning.

DISCIPLINE IN THE SHOP

Successful discipline in the shop is largely dependent upon the following conditions: (1) interest and understanding on the part of the student, (2) careful planning by the instructor, and (3) suitable working conditions. When approaching the problem of class management and discipline in the shop, the students must first be considered. The following factors should receive consideration: (1) is the student interested, (2) is he definitely occupied, (3) does he make good use of time, (4) does he take pride in his work, (5) does he know what is required, (6) does he think well of the teacher, and (7) is he properly dressed for work?⁶

The teacher and his attitudes have great bearing upon the responses that the students will give. He should examine himself and see if he has failed to do his part. When examining

⁶Ibid., p. 218.

himself, the following factors should receive consideration: (1) is he interested in teaching, (2) is he interested in the subject which he teaches, (3) does he know his subject matter, (4) does he have aptitude to teach, (5) does he speak plainly and convincingly, (6) can he control his emotions, and (7) does he support the administration?⁷

Equal in importance to the pupil and the teacher, in the matter of student reaction and conduct, stand the questions of physical conditions under sometimes which the student work. Industry and school shops as well, perhaps more in school shops, interest in the work is closely correlated with conditions under which one works. Consider the following questions in this regard: (1) does each student have an assigned work station, (2) is there sufficient space between benches or work stations, (3) is there adequate light, (4) are machines and common equipment well located, (5) what is the condition of the equipment, (6) is there order in the toolroom, (7) is there ample ventilation, (8) is cleanliness practiced, and (9) is that a wholesome atmosphere?⁸

⁷

Ibid., p. 219.

⁸

Ibid., p. 221.

Problems in discipline can best be avoided through anticipation of them and making plans for their elimination. There are certain things that the teacher must constantly give close attention to in order to remove the seed of disciplinary troubles. Among these are the following: (1) start the class with definite instructions, (2) be on guard for the first few minutes of the period, (3) check closely on the students' activity, (4) stay in the room, (5) limit the time for closing the period, and (6) be a good supervisor.⁹ Being a good supervisor is probably the most important. The habit of seeing all students and all work at all times can be formed by the teacher. He must be constantly conscious of the entire group and not allow himself to become "lost" in one problem or an individual.

Good discipline requires more than rules and punishment for violation of rules. It requires desirable attitudes on the part of the teacher and pupil. These can be acquired through effective organization and management. It can be safe to assume that an effective organization in the shop will enhance good discipline and good discipline is a key factor in any safety program.

⁹Ibid., p. 223.

CHAPTER V

SUMMARY AND CONCLUSIONS

There are many elements that enter into the problem of safety in school wood shops. Accident control can be made most effective when the administration, teacher, and student work cooperatively together. The teacher is the key factor in this cooperative effort and, in the final analysis, is responsible for an effective safety program.

It is the responsibility of the teacher to accurately evaluate the physical and environmental elements in a school laboratory and to project a program that provides maximum efficiency, safety and accident prevention. Hazards and potential hazards, physical, environmental or of the human variety should be corrected immediately. Those that cannot be corrected must be isolated and reported to the appropriate administrative authority for corrective action.

The teacher, through his instructional procedures, should assist students in developing a wholesome safety attitude of consciousness that is as important to them as the skills and knowledge they learn in the shop. This can be done in such

areas as, the care of tools and equipment, demonstrating the safe use of tools and machines, industrial plant visitation, and housekeeping. The teacher should recognize immediately any unsafe conditions or practices in the shop by constantly inspecting the facilities and evaluating the instructional program to make sure that safety and accident prevention is definitely a part of the program. The key to the instructional phase of a safety program is an effective organization of the classes and the proper supervision of the classroom by the teacher.

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