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A Study of Safety Education in Secondary-School Shops (Grades 7-12) in Southwestern Michigan

Wallace Frederick Fillingham

A STUDY OF SAFETY EDUCATION IN SECONDARY-SCHOOL SHOPS (GRADES 7-12) IN SOUTHWESTERN MICHIGAN

By

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A Thesis Submitted in Partial Fulfillment of the Requirements for the Degree of Master of Arts in Western Michigan College of Education

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Sincere appreciation is given to my wife for her diligent work in typing the copy necessary to accomplish this final form.

Wallace Frederick Fillingham

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CHAPTER I

THE PROBLEM AND ITS BACKGROUND

Purpose of the Study

The purpose of this study is (1) to obtain information concerning the organization, administration, and teaching of safety in the secondary-school shops and (2) to offer recommendations to serve as guides to secondary-school administrators, teachers and teacher-training institutions in handling the problem of safety.

Methods Employed

The investigation was carried out by sending questionnaires to teachers in secondary-school shops in order to determine (1) the status of safety education in the secondary-school shops of Southwestern Michigan, (2) the methods and devices used to teach safety in the shops, (3) the degree of preparation that administrators and shop teachers have with respect to handling accidents, and (4) the degree of effort taken to prevent accidents.

Definitions of Terms Used

The following is a list of the terms used throughout the study together with their definitions.

Safety Education - that phase of education, the direct purpose of which is to prevent and treat accidents.

Accidents	-	any act that results in the disability of a person in whole or part, temporarily or permanently, or one that requires medical treatment.
Secondary-School	-	a school with grade levels between the 7th and 12th.
Industrial Arts	-	that phase of general education based on values derived from manipulative activity and study of materials, processes, and products of industry.
Vocational Education	-	a specialized area of study for the purpose of preparing for remunerative employment.
Industrial Education	-	that area which includes both Industrial Arts and Vocational Education.
Teaching Devices	-	physical aids used to make teaching methods more effective.
Teaching Methods	-	practices or procedures used for carrying on instruction.
Safety Equipment	-	physical aids used for the direct purpose of preventing and treating accidents.
Areas of Instruction	-	learning activities concerned with specific skills, materials and processes.

Southwestern Michigan - the area of Michigan which is bordered on the north by Route 21, on the east by Route 127, on the south by the state border, and on the west by the shore line of Lake Michigan.

Importance of the Study

In educating our youth for life adjustment in the highly technological culture enjoyed by this country, it is necessary to recognize the place of safety education in the school curriculum. However, mere recognition will not instill the proper attitudes, habits, and physical skills necessary for safe and healthful living by our youth. The author of this study believes there is a wide gap between the recognition of safety education and the practical application of its objectives. This is evidenced by statistics reported to the National Safety Council by school systems during the 1948-1949 school year.[1] The manner by which the statistics were assembled is not indicated. However, this report indicates that twelve percent of accidents in school buildings take place in the shops. By comparing the relatively small amount of time spent in the shop with that in other school activities, this represents a more serious problem than is at first suggested.

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[1] Spadafora, Jennie, "School Shop Accidents." Safety Education XXX (March 1950), 3

The practical importance of this study is dependent on two factors: (1) that further and more intense research will be undertaken, and (2) that the school administrators, shop teachers, and teacher-training institutions will make a genuine use of the evidence indicated in this and other studies.

Techniques

It was decided to poll the instructors in a sampling of the school shops in Southwestern Michigan with respect to their attitudes toward, and activities in, safety education. The most feasible way to accomplish this was by means of the questionnaire technique since it was impossible to see readily all the shop teachers, and further there was no particular reason for doing so. The use of the questionnaire in this type of study is justified by Good, Barr and Scates[2] who state the following:

> "The questionniare is an important instrument in normative survey research, being used to gather information from widely scattered sources. It must be recognized that the versatility of the questionnaire and the freshness of its returns tend to make it an indispensable instrument for current information and for research."

Review of Related Literature

A number of studies have been carried out with respect to

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[2] Good, Barr, Scates, The Methodology of Educational Research, Appleton-Century Company, New York, (1936) 325

the problems of safety education in the school. Hughes[3] studied the problems of accidents in secondary-school shops (1) by examining shop programs in secondary schools, (2) by surveying practices in industrial education in teacher-training institutions of the nation, and (3) by analyzing the attitudes of those in charge of programs of teacher training. The techniques, however, were not stated specifically. The purpose of his study was to obtain information with respect to safety in school shops, that would serve as a guide to institutions preparing teachers of industrial education. He found that safety programs of teacher-training institutions and high schools were generally inadequate for present day needs. Although a wide variety of subject-matter topics in safety education was reported as being included in the curricula, it was evident that time permitted only superficial instruction in them. Prospective teachers were found guilty of the same unsafe acts as high school students. Physical conditions of the shops varied from superior to bad with respect to accident hazards.

Little if any difference in accident frequency has been established between schools emphasizing industrial arts and those emphasizing areas in industrial vocational training. Wood

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[3] Hughes, Wayne P., "Safety Procedures In the School Shop", Twenty-Five Years of Research In Safety Education, New York University (1951) 13-14

and metal areas seem to be the most hazardous of school shop work, the general woodworking and machine shops having the highest accident frequency. Hand-tool accidents are twice as numerous as machine-tool accidents. Chisels are involved more frequently than any other tools and sharp-edged woodworking tools cause great numbers of injuries. The jointer and the circular saw are the most dangerous of machine tools, yet they are considered essential in school shops.

Accidents tend to increase in frequency as class enrollments increase up to twenty-five students. They decrease as the size of the class increases beyond twenty-five.

Because of crowded conditions, inadequate equipment, failure to provide or use safety equipment, inadequate lighting and poor housekeeping, school shops do not yet seem to be maintained safely. Often there is no uniformity in recording accidents, nor, for that matter, even any requirement that accidents be reported. This makes meaningful analysis impossible. To a large extent, regulations for school shops are under the control of the school itself, and the school is governed by the regulations applying to all public buildings. In some places, these standards are dangerously low.

Specific recommendations disclosed in this study are as follows:

(1) Prospective teachers of industrial education in the

secondary-schools should be made familiar with present practices and procedures in school shops with respect to safety education.

(2) They should be made aware of the strengths and weaknesses of existing policies and conditions and with the fundamental need for a safety program.

(3) They should be informed concerning the accident situation as it exists, and with the value of uniform, accurate and complete records of all shop accidents.

(4) They should be instructed in the interpretation and use of accident statistics, and the institutions should adopt uniform procedures for reporting their accidents.

(5) Finally, the teacher-training institutions should assume major responsibility for the development of a sound program of school safety. It should include a separate course in school shop safety; a comprehensive, definite plan of safety instruction in the teaching of skills; physical conditions in shops so set up that standards of state departments of labor and of fire departments will be met; shops so set up and operated that they will serve as standards for secondary-schools; proper instruction given in

shop and equipment; proper instruction given in the techniques for making safety inspections and opportunities afforded for participation in such inspections.

The teacher will be called upon to administer first aid treatment for shop injuries. Hence it was recommended that all teachers and students in teacher-training institutions in industrial education be required to take a Red Cross course in first aid. A well-equipped first aid cabinet is essential in all school shops.

Prospective shop teachers should be made familiar with the facts regarding legal responsibility of both teachers and schools for accidents, as well as with state and national codes. It is suggested also that directors of departments of industrial education in teacher-training institutions be instructed in the necessity for obtaining protective insurance for staff members, and they should recommend that where possible, the insurance be carried by the school.

MacMillan[4] undertook investigation in the area of safety education. It was a survey of the procedures for safety education in the public schools of the nation for the years 1933 through 1935. The techniques used in the study are not stated. The con-

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[4] Mac Millan, Robert, "Safety Education in the Public Schools of the United States", Twenty-Five Years of Research In Safety Education, N. Y. University (1951) 6-7

clusions reached in this study are listed below.

(1) School systems and communities in general are becoming convinced that some form of safety education should be adopted by every school system.

(2) The fact that the urge to teach safety has come from outside sources does not in any way reduce the responsibility of the school in this respect.

(3) Safety education can be administered through the school more efficiently, more wisely, and more economically than by any other means.

(4) Safety is a nationwide problem and as such should have the recognition of federal authorities and of every state and local government.

(5) Safety education should be given in all grades from kindergarten through senior high school.

(6) Every school system should keep accident records. These should be compiled by a central city school authority and combined with other city accident records. In this way the records become a source of information regarding the phases of safety requiring emphasis throughout the city or in a particular section of the community. Publicity is an important element in the safety campaign.

(7) Integration of safety education with other subjects

is not likely to be effective unless definite assistance and direction are given the teacher in undertaking such integration. Care must be taken to see that safety education is not forced into the background.

Estabrook[5] conducted a study at Pennsylvania State College in 1939. The purpose of his study was to determine the phases of health and safety, the practices, and the methods and devices taught or used or recommended for use, as well as those not recommended for use, to insure health and safety in the school shops. Some of the points mentioned in his study are these:

(1) Many of the teachers believed that the task of filling out the check list served to stimulate their interest in safety and gave them new ideas for improving their safety programs.

(2) A detailed analysis was made of the responses and the data were classified according to the types of shops in which the respondents were located. Thus a comparison of various safety procedures was available against which various teachers could compare their practices.

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[5] Estabrook, Edward C. "Safety and Health Instruction and Practice In School Shops", Twenty Five Years of Research In Safety Education, New York University (1951) 15

(3) Many ways were discovered for developing a permanent safety consciousness in the minds of students.

(4) A composite accident report form was developed that was suitable for reporting school accidents.

(5) The study revealed that a quantity of free instructional material on safety and health is available to shop teachers upon request.

Some pertinent conclusions of his study were as follows:

(1) The most popular method of teaching safety in the shop was by lectures on safety.

(2) Individual safety demonstrations were given by seventy-eight percent of the teachers; group demonstrations by seventy-five percent.

(3) Group discussions on safety and occupational health were conducted by fifty-five percent.

(4) A total of seventy-one percent of the respondents used accident and safety posters.

(5) Fifty-five percent of the respondents had a safety bulletin board in the shop.

A study by Cressman[6] on "Safety Education In Pennsylvania

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[6] Cressman, Paul L. "Safety Education In Pennsylvania School Shops" Twenty Five Years of Research In Safety Education, New York University, (1951) 16-17

School Shops" was based upon 1,041 accident-injury reports received from 153 school districts in Pennsylvania. This study was made with the purpose of (1) reducing accidents in school shops, (2) producing safety minded workers, (3) emphasizing specific social responsibilities, (4) contributing to more accurate accident reporting and (5) presenting recommendations for safety-education programs. Conclusions that emerged from the study were as follows:

(1) There is a need for a more concise differentiation between descriptions and causes of accidents.

(2) The greater number of injuries by far were to the fingers, namely 458. The hand came next with 155; the thumb next with 95.

(3) More than seventy-six percent of the injuries were cuts, a little less than half of which were finger cuts.

(4) The chisel heads the list as a cause of accidents.

(5) Since in 1,001 out of 1,041 cases of accident first aid was given in the shop, it follows that every shop should be supplied with a suitable first aid kit and that definite safety procedures and policies for first aid should be worked out.

(6) There is evidence that crowded, inadequately-lighted and poorly kept shops add to the toll of accidents.

(7) The accidents in the wood shops were almost twice as numerous as those in machine shops, and fully twice as numerous as those in automotive and electrical shops. However, it must be kept in mind that there are more wood shops than any other kind of shops.

(8) Parental consent for pupils to operate power machine tools was obtained in 569 cases as against 12 cases in which this was not done.

(9) The appointment of student safety engineers for each school shop is a desirable safety practice.

Among the recommendations made in this study are these:

(1) A general interest in eliminating school shop accidents calls for a common system of reporting, tabulating, and evaluating accident data. These data sheets might well be summarized in each school district. Much valuable information and interest would result from such continuous reporting and comparison on a statewide basis.

(2) The positive approach should be utilized in the teaching of safety.

(3) Safety instruction is sufficiently important to call for a united effort on the part of all teachers.

(4) There should be definite safety tests for equipment such as the jointer and printing press.

(5) Students should be trained to "work" and "think" safety if succeeding generations are to be safe workers. Hence it will be necessary that teachers also practice safety.

(6) Prospective teachers should be properly taught so as to enable them to instill in their pupils habits and ideals of safety that will have a marked effect upon their efforts to reduce accidents in their school and adult lives.

In brief, these studies indicate:

(1) That safety education has a definite place in the program of secondary-school shops.

(2) That accurate and complete recording of accidents is still neglected. This hinders further study of the problem of safety education.

(3) That the physical conditions of many shops are below acceptable standards.

(4) That prospective teachers should have a sound philosophy with respect to safety and to the use of effective teaching methods and devices that will instill that philosophy in their pupils.

(5) That safety education in teacher-training institutions is taught incidentally rather than directly at the present time.

However, much research still needs to be undertaken in safety education in secondary-school shops. In comparison with other areas, safety education is relatively new in the school curriculum. So that it can become co-ordinated into a sound program and be considered as indispensable subject matter, it is essential that common goals, procedures and problems be worked out. Research on a broad scale is necessary in this accomplishment. Hence this study was undertaken for the purpose of:

(1) Determining the status of safety education in shops in the secondary-schools of Southwestern Michigan.

(2) Determining the most commonly accepted teaching methods and devices in safety used in these schools.

(3) Finding the most common policies regarding accidents in these schools.

(4) Providing information for safety-education programs in teacher-training institutions.

(5) Adding to the data obtained from previous studies thereby increasing the scope of information available for programs in safety education.

CHAPTER II

PREPARATION AND DISSEMINATION OF THE QUESTIONNAIRE

Purpose

The purpose of this chapter is (1) to describe how the questionnaire was developed and (2) to indicate how it was disseminated.

Organization of Questionnaire

In order to develop the questionnaire, a list of areas on which information was to be sought was made. A number of questions were then prepared for each of these areas. Thus a tentative form of the questionnaire was established. This form was then submitted to a number of specialists in industrial education for suggestions and criticisms. In light of these suggestions and criticisms a revision of the questionnaire was made. A few copies of the questionnaire were sent out with the thought of discovering possible misinterpretations. These returns were examined and again changes were made. A final form was then drawn up, a copy of which is included on the following pages. Letters of transmittal and sponsorship prepared and sent out with the questionnaire are also included.

Please return in attached
stamped envelope to:

Wallace Fillingham
Campus School
Western Michigan College
Kalamazoo, Michigan

A STUDY OF SAFETY EDUCATION IN SECONDARY-SCHOOL SHOPS (Grades 7-12) IN SOUTHWESTERN MICHIGAN

Please indicate the answers to the following questions in the appropriate manner. Please do not sign your name.

I Type of School: (Please check)

2 year junior high school ___ 3 year junior high school ___
3 year senior high school ___ 4 year senior high school ___
6 year high school ___ technical high school ___
Other (Please state) _____

II Size of School: (Total enrollment) (Please check)

Under 150 ___ 150 to 250 ___ 250 to 350 ___ 350 to 450 ___
450 to 550 ___ Over 550 ___

III Grade level you teach: (Please check as many as appropriate)

7th ___ 8th ___ 9th ___ 10th ___ 11th ___ 12th ___

IV Areas you teach: (Please check as many as appropriate)

Hand Woodwork ___ Machine Woodwork ___ Art Metal ___
Bench Metal ___ Sheet Metal ___ Machine Shop ___ Welding ___
Farm Shop ___ Auto Mechanics ___ Printing ___ Electricity ___
Leather Craft ___ Plastics ___ Home Mechanics ___ Plumbing ___
Ceramics ___ Other (Please specify)_____

V Total number of students in all your shop classes: (Please check)

Under 25 ___ 25 to 50 ___ 50 to 75 ___ 75 to 100 ___ 100 to
125 ___ 125 to 150 ___ 150 to 175 ___ 175 to 200 ___
Other (Please specify)_____

VI Types of Machines (Place a single check (/) behind the name of each machine found in your shop. Place a star (*) behind those that for safety reasons 7th and 8th graders are not allowed to use. (Disregard this if your shop services only a high school.)

Arbor Press _____

Band Saw _____

Bar Folder _____

Beading Machine _____

Belt Sander _____

Brake _____

Buffer _____

Circular Saw _____

Crimping Machine _____

Disc Sander _____

Drill Press _____

Forge _____

Forming Rolls _____

Furnace (Gas) _____

Furnace (Electric) _____

Grinder (Wheel) _____

Grinder (Surface) _____

Jig Saw _____

Jointer _____

Kiln _____

Lathe (Wood) _____

Lathe (Engine) _____

Lathe (Metal Spinning) _____

Loom _____

Milling Machine _____

Mortiser _____

Paper Cutter _____

Planer (Metal) _____

Power Hack Saw _____

Printing Press _____

Rotary Machine _____

Router _____

Seaming Machine _____

Shaper (Wood) _____

Shaper (Metal) _____

Shear _____

Spraying Outfit _____

Surfacer _____

Welding Unit (Gas) _____

Welding Unit (Arc) _____

Wire Brush Wheel _____

Other (Please specify) _____

_____

VII In what way or ways do you teach safety? (Please check)

Separate subject ___ Unit in course ___

Integrated in shop courses ___ Other (Please state) ___

_____

_____

_____

VIII Which of the following methods do you use for teaching safety? (Please check)

Safety lecture by teacher ___

Safety lecture by an authority on safety education ___

Individual safety demonstrations ___

Group safety demonstrations ___

Written and skill safety tests on power equipment ___

Group discussions on safety ___

Information sheets on safety rules ___

Oral reports, term papers, essays ___

Concentration on attitudes and ideals of safety ___

Concentration on proper physical skills ___

Other methods (Please state) _____

_____

_____

_____

_____

_____

IX Which of the following devices do you use for teaching safety?

Accident charts and safety posters ___

Safety pledge ___

Best record trophy ___

Slides, film strips, movies on safety ___

Student safety foreman or engineer ___

Periodic safety inspection by student foreman ___

Periodic safety inspection by teacher ___

Periodic safety inspection by administrator ___

Periodic safety inspection by an authority on safety ___

Safety bulletin board ___

Other device (s) (Please state) _____

_____

_____

X What types of safety equipment do you have? (Please check)

First aid kit ___

Safety zones around power equipment ___

Guards on all power machines with high speed cutters ___

Guards covering all moving belts and gears ___

Push sticks and push blocks for saw and jointer ___

Eye shields or goggles for machines where eye hazards exist ___

Provision for "locking off" electrical switches when teacher is out of shop ___

Sufficient number of fire extinguishers ___

Fire alarm and sufficient number of unblocked exits ___

X What types of safety equipment do you have? (Con't)

Metal container for oily rags ___

Metal cabinet for inflamable fluids ___

Exhaust fan for fumes ___

Sufficient lighting to eliminate shadows over machines ___

Other (Please state) _____

_____

_____

XI Which of the following measures are taken in case of an accident? (Please check)

An accident report form ___

Report all accidents (minor scratches) ___

Notify parents regardless of seriousness of accident ___

Usually take steps to prevent a recurrence of a similar accident ___

Students must have parent permission to operate power equipment ___

School carries accident insurance for students ___

Teacher is certified to administer first aid ___

School has a full-time doctor ___ Part time ___

School has a full-time nurse ___ Part time ___

XII If you would like to comment concerning the types, frequencies or occurences of accidents in your shop, or any other topic, Please do so in space below.

_____

_____

_____

_____

XIII If you would like a report of this survey, please give name and address here:

_____

_____

_____

_____

Campus School
Western Michigan College
Kalamazoo, Michigan

Dear

One of the major problems in the teaching of industrial arts and vocational education is that of safety. This is evidenced in the many bulletins of the National Safety Council and other organizations interested in school safety.

Hence this study was undertaken by the undersigned to determine to what extent safety measures and practices are followed in the schools of Michigan. You were selected as one of the leading teachers in industrial arts or vocational education in the state. Thus, the enclosed questionnaire is being sent you with the hope that you will answer the questions thereon and return it to me in the enclosed self-addressed stamped envelope.

Under no circumstances will your answers be identified. However, if you wish a copy of the results you may sign your name and address in the space provided in the questionnaire or forward it to me on a postcard.

Your cooperation is earnestly solicited and will be sincerely appreciated.

Very truly yours,

/s/ Wallace Fillingham

Wallace Fillingham

November 26, 1951

TO: Shop Teachers of South Western Michigan

Dear Friend:

I am sure you will agree with me that safety in the school shop is an important aspect of our work.

The attached study is being made by one of our graduate students with a view towards determining what is being done in this area of Michigan.

I would like to urge that you cooperate in this activity as I am sure the results will be both interesting and worthwhile.

Anything you can do to help Mr. Fillingham will be greatly appreciated.

Yours truly,

/s/ J. L. Feirer

John L. Feirer, Head
Industrial Arts Department

encl.
jlf/mw

Dissemination of the Questionnaire

It was decided to send questionnaires to all the shop instructors in Southwestern Michigan whose names could be obtained. This area has already been designated on page 3. A mailing list of these teachers was completed from the 1951 membership directory of the Michigan Industrial Education Society. The list contained the names of one hundred forty persons, to each of whom was sent a questionnaire. Eighty-seven (sixty-two percent) usable responses were received.

CHAPTER III

TABULATION OF DATA

Purpose

The purpose of this chapter is to tabulate the data from the responses to the questions on the questionnaire.

Methods Employed

For convenience it was decided to tabulate the responses according to each question on the questionnaire. The tabulations follow.

Table 1

Type of School in which Shop Instructor Taught

Type of School	Number Reporting
2 year junior high school	2
3 year junior high school	18
3 year senior high school	11
4 year senior high school	31
6 year high school	13
technical high school	5
5 year junior-senior high school	7

The instructors from four-year senior high schools reported most frequently with thirty-one responses. The instructors from three-year junior high schools were second with eighteen responses.

Table 2

Size of School from which Instructors Came

Size of School	Number Reporting
Under 150	2
150 to 250	4
250 to 350	5
350 to 450	4
450 to 550	10
Over 550	62

Over seventy percent of the responses were from schools with a total enrollment of over five hundred and fifty.

Table 3

Grade Level at which Instructors Who Responded Taught

Grade Level	Number Reporting
7th	32
8th	50
9th	62
10th	55
11th	59
12th	58
Post Graduate	1

Most of the responses were received from instructors in grades nine through twelve with little difference between the number of responses for each grade.

Table 4

Areas of Shop Taught by Instructors Who Responded

Areas	Number Reporting
Hand Woodwork	57
Machine Woodwork	46
Art Metal	26
Bench Metal	42
Sheet Metal	35
Machine Shop	30
Welding	28
Farm Shop	6
Auto Mechanics	4
Printing	11
Electricity	15
Leather Craft	8
Plastics	16
Home Mechanics	18
Plumbing	3
Ceramics	2
Foundry	2
Electroplating	1
Drafting	2
Driver Education	1

Of the twenty areas listed on the questionnaire, Hand Woodwork was taught most frequently with Machine Woodwork and Bench Metal second and third.

Table 5

Total number of students taught by Instructors who responded.

Total Number of Students	Number Reporting
Under 25	4
25 to 50	9
50 to 75	11
75 to 100	18
100 to 125	19
125 to 150	16
150 to 175	4
175 to 200	3
Over 200	2

The total number of students in all the shop classes of the respondents ranged chiefly from seventy-five to one hundred and fifty.

Table 6

Types of Machines in Shops of Respondents. (Place a single check ( ) behind the name of each machine found in your shop. Place a star (*) behind those that for safety reasons 7th and 8th graders are not allowed to use. (Disregard this if your shop services only a high school).

Machines	Number of Respondents Stating Presence of Machines	Number of Shops in which Use of Machine Denied Seventh and Eighth Graders
Arbor Press	21	--
Band Saw	46	21
Bar Folder	29	2
Beading Machine	20	--
Belt Sander	30	9
Brake	18	1
Buffer	37	4
Circular Saw	56	34
Crimping Machine	14	--
Disc Sander	33	5
Drill Press	72	5
Forge	21	3
Forming Rolls	25	2
Furnace (Gas)	43	1
Furnace (Electric)	12	--

Table 6 (Continued)

Machines	Number of Respondents Stating Presence of Machines	Number of Shops in which Use of Machine Denied Seventh and Eighth Graders
Grinder (Wheel)	75	13
Grinder (Surface)	16	2
Jig Saw	54	1
Jointer	45	27
Kiln	6	--
Lathe (Wood)	55	8
Lathe (Engine)	37	11
Lathe (Metal Spinning)	8	3
Loom	1	--
Milling Machine	20	3
Mortiser	18	4
Paper Cutter	10	--
Planer (Metal)	4	--
Power Hack Saw	24	4
Printing Press	9	1
Rotary Machine	2	1
Router	22	11
Seaming Machine	3	--
Shaper (Wood)	25	9

Table 6 (Continued)

Machine	Number of Respondents Stating Presence of Machines	Number of Shops in which Use of Machine Denied Seventh and Eighth Graders
Shaper (Metal)	18	4
Shear	14	4
Spraying Outfit	12	—
Surfacer	16	7
Welding Unit (Gas)	31	12
Welding Unit (Arc)	29	12
Wire Brush Wheel	36	7

The machines reported most frequently were the band saw, circular saw, drill press, wheel grinder, jig saw, jointer and wood lathe. The machines the use of which seventh and eighth graders are most frequently denied are the band saw, circular saw and jointer. Some respondents mentioned that seventh graders were not allowed to use any machines while a few mentioned that the jig saw was the only power tool used by seventh graders.

Table 7

In what way or ways do you teach safety?

Ways	Number Reporting
Separate subject	1
Integrated in shop courses	79
Unit in course	10
All three ways	1

As indicated by the table, the integration of safety with other materials in shop courses is the method used most frequently.

Table 8

Which of the following methods do you use for teaching safety?

Methods	Number Reporting
Safety lecture by teacher	73
Safety lecture by an authority on safety education	8
Individual safety demonstrations	58
Group safety demonstrations	62
Written and skill safety tests on power equipment	33
Group discussions on safety	50
Information sheets on safety rules	33
Oral reports, term papers, essays	2
Concentration on attitudes and ideals of safety	46
Concentration on proper physical skills	37

The safety lecture by the teacher was the method reported most frequently used. The use of group safety demonstrations was reported as the second most common method.

Table 9

Which of the following devices do you use for teaching safety?

Devices	Number Reporting
Accident charts and safety posters	63
Safety pledge	0
Best record trophy	0
Slides, film strips, movies on safety	48
Student safety foreman or engineer	22
Periodic safety inspection by student foreman	18
Periodic safety inspection by teacher	74
Periodic safety inspection by administrator	11
Safety bulletin board	34
Color dynamics	1
Class inspection	1

The respondents reported that the device used most frequently is the periodic safety inspection, the second, accident charts and safety posters.

Table 10

What types of safety equipment do you have?

Safety Equipment	Number Reporting
First aid kit	78
Safety zones around power equipment	45
Guards on all power machines with high speed cutters	62
Guards covering all moving belts and gears	64
Push sticks and push blocks for saw and jointer	49
Eye shields or goggles for machines where eye hazards exist	73
Provision for "locking off" electrical switches when teacher is out of shop	73
Sufficient number of fire extinguishers	81
Fire alarm and sufficient number of unblocked exits	73
Metal container for oily rags	77
Metal cabinet for inflamable fluids	43
Exhaust fan for fumes	35
Sufficient lighting to eliminate shadows over machines	49

Nearly all the devices listed were used frequently as

means for safety. Only half of the respondents reported these devices:

(1) Safety zones around power equipment

(2) Metal cabinet for inflamable fluids

(3) Sufficient lighting to eliminate shadows over machines.

(4) Exhaust fan for fumes

Table 11

Which of the following measures are taken in case of an accident?

Measures Taken	Number Reporting
An accident report form	52
Report all accidents (minor scratches)	38
Notify parents regardless of seriousness of accident	8
Usually take steps to prevent a recurrence of a similar accident	71
Students must have parent permission to operate power equipment	26
School carries accident insurance for students	4
Teacher is certified to administer first aid	26
School has a full-time doctor	2
Part-time doctor	8
School has full-time nurse	17
Part-time nurse	32

Of the items listed above in Table 11, the measure most frequently reported was the steps to prevent a recurrence of a similar accident. A surprising low number reported the following measures:

(1) Parent permission to operate power equipment

(2) Teacher certified to administer first aid

(3) Full or part-time doctor

(4) Full or part-time nurse

CHAPTER IV

TABULATION OF COMMENTS

Purpose

The purpose of this chapter is to tabulate the comments made in the space provided on the questionnaire.

Methods Employed

For clarity and convenience it was decided to tabulate the comments by grouping them under their major headings. The tabulations follow.

Question: If you would like to comment concerning the types, frequencies or occurences of accidents in your shop or any other topic, please do so in the space provided. (The comments were typed verbatim.)

Types of Accidents

"Have had one serious accident (on wood lathe) in 26 years of shop teaching."

"...both cases on a grinder doing what they had been warned many times not to do."

"Our only accidents to date have been of the minor cut and bruise variety."

"Band saw cut a tendon on finger. Grinder caught ring being ground and cut finger. Minor cuts and scratches on sheet metal and wood."

"Only accidents so far have been minor cuts, scratches and slivers."

"One accident on wood jointer, bad burn on back of hand due to carelessness while gas welding, cut finger from moulding cutter on power saw."

"Cuts by plane blade, chisel."

"Minor burn by soldering copper."

"Wood slivers"

"Metal slivers"

"Few cases of shaving in eyes from lathe, some cuts from sharp edges on metal."

"...most serious of which were two eye injuries, one ground thumb on grinding wheel."

"Mostly all accidents are splinters or a small cut from a hand tool that slips."

"Cuts (sheet metal), blisters (screwdriver handles, burns)."

"Most generally fingers cut on saws. In three years, no band saw accidents, one lathe accident, one jointer accident, several on circular saw and several on jig saw. All resulting from carelessness or failure to use safety devices."

"Most of our accidents are cuts from hand tools. A few accidents occur on the jig saw among our junior high school pupils. These amount to minor cuts."

"Bottle broke while drilling hole in it. Glass cut student's hand and arms."

"Most accidents or injuries I have had were scratches and burns from soldering coppers."

"...hitting fingers with hammer; cutting themselves on sharp metal; cutting themselves on drill press; burns from hot metal."

"Most of the accidents in my shop have occured in the metal working section and from burns from forging and welding. All have been of minor nature."

"In metal shops all the accidents have been only scratches and minor cuts."

"Minor cuts on sheet metal and in sharpening tools."

"...took place on squaring shears."

"Two accidents on circular saw in ten years. One on jointer in eight years."

"Almost all accidents in my school shop have been slight cuts, bruises or burns. I can remember only three cuts that might be classed as severe. Each was clearly carelessness or gross disregard for safety instruction."

"I have had to use iodine twice this year for minor scratches."

"I have been very fortunate in that the extent of injuries in my shop has been only minor scratches and bruises."

Accident Frequency

"We have had few serious accidents."

"Accidents are practically none."

"In three years of operation, total accidents not over twelve. I am proud of this record."

"Very few accidents (minor ones)."

"Central High is almost 100% accident free."

"No accident in 30 years of Printing teaching (in the shop). We need improvement outside the building. Too many students (1500), school busses (25), bicycles, motor scooters, automobiles, etc. We have a paid policeman on one corner, student officers, teachers on duty outdoors, and a student court."

"Very seldom does accidents occur, because of proper safety precautions."

"No serious accident in six years. Most serious, sliver of wood under finger nail."

"Have had no accidents greater than scratches in last nine years."

"No one was ever hurt in shop except for minor scratches. This does not make us minimize safety. We have had things happen that could result in serious injury."

"We have been very free of accidents."

"One serious accident within three years of teaching."

"No accidents to date - only slivers."

"Very minor in last fifteen years."

"Fortunately I have never had a serious accident in my thirteen years of teaching and I attribute my record to training each student how to handle each machine tool properly and emphasize safety daily."

"No accidents of a serious nature in the ten years I have been teaching machine shop. Occasional cuts and scratches of a minor nature."

"Over a period of thirty years we have had less than a dozen serious accidents."

"I have been in this one wood shop nine years with never a serious accident to any student. I have had 3 minor accidents to veterans, one major accident to a school employed man. The results show if the safety rules are adhered to, accidents cannot happen."

"I have never had a serious injury in my shop from the operation of power woodworking machines. Accidents can be prevented!"

"Serious accidents in woodshop are conspicious by their presence which very few have occurred in the past 25 years."

"One accident to which student had to be sent to doctor in 25 years."

"Either I have been very lucky or my method has been effective for I have had (to date) no accident resulting in permanent injury. However, I must add quickly that I realize I could and probably should do more to insure the safety of my students."

"Many parents have complimented me on the fine safety record we have had in our school shop."

"In 18 years I have been fortunate not to have any major accidents. Very few except minor cuts that can be taken care of by band-aids."

"Have been very fortunate so far in having no major accidents in shop. I stress safety above all else."

"Since teaching 6 years I have had three serious accidents requiring the services of a doctor."

"None of serious condition."

Accident Policies

"Report all accidents to Administration (Written report on time, place and cause)."

"Students are naturally curious. They should be allowed to run all machines in the shop. If very dangerous machines, should be run under direct supervision of the instructor."

"All accidents at Central High School are sent to me for first aid. I call a doctor if necessary or take the student to the hospital."

"We have 25 shop rules every boy is required to write in notebook. If I find a pupil breaking a rule, he writes it 100 times, the second time he does clean-up work for three days. I have very little trouble."

"Students who are "accident-prone" are not allowed to operate any machine. Two accidents in our shop and you are considered "accident-prone"."

"I have been very fortunate in not having serious accidents, several potentials only. We do not report minor scratches but give first aid on all cuts, etc. Take bad cuts, etc. to either family or school doctor and call parent. We keep always at the boys to avoid serious accidents and keep them safety conscious."

"I follow the plan of safety as nearly as possible as set up by the Liberty Insurance Company, Chicago, Illinois as I have had experience with them for many years following their instructions and inspections."

"Accidents of a serious nature are few and far between because students are selected to run machines on basis of mechanical skills, tests and emotional stability. About 50% of 8th and 9th grade students use machines."

"We fill out an accident report for any student who visits his doctor as a result of an accident in the shop."

"Constant vigilance and rechecking are necessary to prevent carelessness which is the cause of most accidents."

"I believe an important factor in safety is to have firm discipline - and to thoroughly teach proper precedures especially on the more dangerous types of equipment."

Safety Equipment

"I was informed that the school does not have the money for sufficient lighting right now."

"No eye shields or goggles and the Board won't send out any."

"Terrible lighting but will be corrected shortly."

General Comments

"One of the teachers just about carved off two of his fingers on the circular saw this summer."

"Accidents seem to run in periods like when group is disturbed or in high spirits."

CHAPTER V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Purpose

The purpose of this study was to (1) determine the status of safety education in shops in the secondary schools of Southwestern Michigan, (2) determine the most commonly-accepted teaching methods and devices in safety used in these schools, (3) find the most common policies regarding accidents in these schools, and (4) provide information for safety-education programs in teacher-training institutions.

Methods Employed

The questionniare technique was used to poll the instructors in all the school shops in Southwestern Michigan with respect to their attitudes toward, and activities in, safety education. The questionnaire was developed by listing the various areas in which information was desired. Questions were then prepared in each of these areas. After submitting these tentative questions to specialists in industrial education for their criticisms and suggestions, revisions were made. The final form was drawn up and letters of transmittal and sponsorship were obtained. The questionnaire and letters were then sent out to shop instructors in the geographical area previously indicated.

The responses were then tabulated according to the questions on the questionnaire.

Conclusions

In so far as the techniques used and data obtained may be valid, the following conclusions seem defensible:

1. The majority of school-shop instructors in Southwestern Michigan are located in four year senior-high schools with enrollments of 550 students or more. They most commonly teach the areas of hand woodwork, machine woodwork and bench metal in grades nine through twelve. (Tables I, II, III and IV).

2. The shop teachers polled in this study have, in general, seventy-five to one hundred and fifty students enrolled in all their shop classes. (Table V).

3. The data in Table VI indicates the machines most frequently found in their shops are (1) wheel grinders, (2) drill presses, (3) circular saws, (4) jig saws, (5) wood lathes, (6) band saws, and (7) jointers. The data also indicates that the machines numbered 3, 6, and 7 above were, in general, denied use by seventh and eighth grade students.

4. About ninety percent of the school-shop instructors teach safety by means of integrating it with other shop topics and materials. (Table VII).

5. Apparently shop teachers use several methods of teaching safety. The safety lecture is used by nearly ninety percent of the instructors. (Table VIII).

6. Only three of eleven devices listed for teaching safety were indicated by at least half of the polled instructors. They are (1) accident charts and safety posters, (2) slides, film strips, movies on safety, and (3) periodic safety inspection by teacher. Nearly ninety percent of the teachers use the periodic safety inspection. (Table IX).

7. Apparently a large variety of safety equipment is used in the school shops. Three items which are considered essential to a safe school shop are used by only a slight majority of the polled instructors. They are (1) safety zones around power equipment, (2) metal cabinet for inflamable fluids, and (3) sufficient lighting to eliminate shadows over machines. (Table X).

8. Table XI shows that a majority of the shop instructors reported they used only two of the eleven safety measures listed. These two are (1) an accident report form, and (2) usually take steps to prevent a recurrence of a similar accident.

9. The large majority of accidents are of the small cut, scratch and sliver type. (Table XII).

10. Many of the instructors indicate a low-frequency accident record. (Table XI)

11. There is considerable differences concerning policies and philosophies of safety education among the instructors. (Table XI).

Recommendations

In so far as the conclusions are defensible, the following recommendations seem reasonable:

1. That teacher-training institutions include in their industrial-education curricula a separate course in the teaching of safety. This course should include the following units of study.
   (a) A study of the history of industrial-accident prevention.
   (b) The physical conditions of a school shop as they effect safety.
   (c) A study of the various methods of teaching safety and their effectiveness.
   (d) A study of various devices for teaching safety and their effectiveness.
   (e) A study of basic safety equipment and its effectiveness.

(f) A study of accident policies and the effectiveness of such policies in the prevention and treatment of accidents.

(g) A study and interpretation of accident statistics.

(h) A study of the legal responsibilities of teachers regarding accidents.

(i) The administration of first aid.

2. That school administrators require shop teachers to compile accident records or reports for their own use and the use of other authorized parties.

3. That teachers and administrators provide for a periodic evaluation of the safety program and make any necessary changes.

4. That teachers and administrators work in close cooperation with accident-prevention programs of local industries.

5. That teachers and administrators make greater use of aid offered by local, State and National safety agencies.

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