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Guidelines for a North Dakota Industrial Education System Manual

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GUIDELINES FOR A NORTH DAKOTA INDUSTRIAL EDUCATION SAFETY MANUAL

by

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This independent study submitted by Hubert Loucurtiss Ivie in partial fulfillment of the requirements for the Degree of Master of Education from the University of North Dakota is hereby approved by the Faculty Advisor under whom the work has been done.

Myron Bender
Advisor

Dean of the Graduate School

Permission

Title GUIDELINES FOR A NORTH DAKOTA INDUSTRIAL EDUCATION SAFETY MANUAL

Department Industrial Technology

Degree Master of Education

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Date April 21, 1976

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ABSTRACT

This study was designed to ascertain the following: (1) if the industrial arts educators in North Dakota saw a need for a state-wide safety manual, (2) what the 50 United States use as guidelines for the content of their safety guidebooks, (3) what topics the industrial arts teachers in North Dakota think are pertinent enough to be part of a proposed state-wide safety manual, (4) from the data collected and analyzed the topics that would possibly become the outline for the safety handbook, (5)if the industrial arts teachers in North Dakota felt there is a need for in-service training on the latest safety concepts and laws, (6) if the teachers would attend a summer seminar to receive this training.

The conclusions reached were based on responses from 45 states consultants for industrial education and 84 industrial arts educators in North Dakota, as well as information obtained locally and from national published sources.

Conclusions

The following conclusions were drawn from the findings of this study:

1) It was concluded that there is a definite need for a North Dakota industrial education safety manual.

2) The topics listed in Table 5, Part I, should be included in any safety guidebook proposed for state-wide use.

3) It can be concluded that some type of in-service safety training should be provided to the industrial arts teachers in North Dakota.

4) The safety classes/seminars should be taken to where the educator works for more participation.

5) Little differences are apparent between the topics tendered by the states who have safety manuals and the ones thought most important by the industrial arts teachers in North Dakota.

Recommendations

It is recommended that as soon as possible the development of a state-wide safety manual be started. It is suggested that a committee be formed under the auspices of the North Dakota Department of Vocational Education to be the directors for the development of this manual.

It is recommended that not only the topics discerned as being worthy of inclusion in this proposed safety manual be used but that additional suggested topics be solicited from the educators who will have to respond to the manual.

It is recommended that a safety education course, keyed to industrial education teachers be offered through the University's Division of Continuing Education. Credit may then be obtained for the participants, which would be an added incentive for them to attend. It should be sponsored by the Department of Industrial Technology because of the shared interest and the expertise available. It is suggested that the safety education course be taken out in the environment where

the educators are teaching. This way realistic solutions for local situations can be obtained.

Lastly it is recommended that the Department of Industrial Technology at the University of North Dakota offer a course on industrial safety. The course should be required to be taken by all the majors in industrial technology and open to area businesses and industry. There is a definite need for industrial safety education in this area.

CHAPTER I

INTRODUCTION

Moral, Social and Legal Aspects

If one accepts the statement that the major purpose of the schools is to help individuals develop into adequate members of our society, then safety education becomes an important part of the curriculum. Every individual, throughout his life, will be involved in safe or unsafe behavior in driving a car, living in a house, participating in recreation, working at a job and many other activities. Statistics show that most of our people have accidents which could have been prevented, but which were costly in death, injury, and property losses. In addition to this, safety education must concern itself with voluntary self-control and the acceptance of responsibility for one's own behavior. It must deal with understanding of self and the need to cooperate with others. Since these behavioral factors are also important at work, within the family, and in social relationships, the carryover benefits are obvious.

The transition from student to family life, and professional or business employment is a rapid one. Safety knowledge and proper attitudes acquired in school will in large part determine the future safety of the graduate as a producer, citizen, and family member. His safety knowledge and attitudes will also be transmitted to his family, his professional business and social acquaintances.

In the world of work, rapid changes in technology is taking place. Our materials, processes, machinery, techniques, and concepts are moving us all into a technology boom. These changes are coming about so fast that they are creating new and hitherto unheard of hazards. We must look to the experts in industry, business, government and education to assist us in keeping up with ways to make our learning environment free from safety hazards as much as possible.

It is known that industrial arts teachers cannot assure that each of his students will remain accident free while in his custody, but the teacher must by virtue of his position realize that he has a certain amount of responsibility to make the learning environment for the student as safe as possible. His position bears the relationship of being in place of the students' parents and he is expected to use reasonable care in the performance of his duties. The potential exists for the teacher and/or the school district to become involved in legal action if the pupil is injured. It therefore would be prudent for an industrial arts teacher to reduce the possibility of legal action by assuring that the learning environment is safe. This has been recognized as a secondary function of any good industrial arts safety program. But the moral and social aspects of injuries to pupils must remain the primary concern and reason for having a safety program.

The Problem

The purpose of this study is to develop the safety guidelines for a proposed safety manual for industrial education teachers in North Dakota. The following information needs to be ascertained to derive the guidelines for such a handbook:

(1) if the industrial arts educators in North Dakota saw a need for such a manual, (2) what the 50 United States use as guidelines for the content of their safety guidebooks, (3) what topics the industrial arts teachers in North Dakota think are pertinent enough to be part of a proposed state-wide safety manual, (4) from the data collected and analyzed the topics that would possibly become the outline for the safety handbook, (5) if the industrial arts teachers in North Dakota felt there is a need for inservice training on the latest safety concepts and laws, (6) if the teachers would attend a summer seminar to receive this training.

Need and Purpose

Safety hazards are evident in all areas where people are employed, and there is no excuse for their continued existence. This point has been expressed several times in a series of interviews with industrial safety directors and industrial arts teachers. Schools, especially industrial arts laboratories, have similar safety problems to those found in industry and it is imperative for teachers in all school laboratories to do their utmost in providing a safe environment for their students and visitors. It has long been known that no work activity or environment can ever be made entirely hazard-free, but logic would dictate that the best safety performance will be to reduce all environmental hazards to a minimum. General recognition of the safety problem in the school is important, but recognition alone isn't the answer.

As the one who deals most directly with the student in laboratory settings, the industrial education teacher bears great responsi-

bility for originating and implementing a good safety and health program for his students.

The educator needs appropriate authority, assistance and support from his state and local superiors. This authority should be put in writing as a policy statement so that everyone concerned will be aware that safety awareness and accident prevention is a matter of personal interest on the part of the school officials.

The assistance needed can be given through a comprehensive safety manual and professional consultation services. There are available any number of good, comprehensive general safety manuals he could utilize, but to give him a manual that will meet his needs in the unique situations in his specialized operations, a state-wide manual must be developed.

Presently there are no guidelines available for classroom industrial education teachers in North Dakota that reflect the uniqueness of our heritage, school and environment. To meet these unique needs it is the author's purpose to develop the safety guidelines for a state-wide industrial education safety manual. It is expected that the information gathered from this study will be accepted by the North Dakota Department of Vocational Education as evidence of the need for this safety guidebook.

Scope and Limitations

This study was limited to 50 industrial arts state consultants and 200 industrial arts teachers in North Dakota.

The study was designed to develop guidelines to be used later as a framework to develop a state-wide industrial arts safety manual.

Terminology

Some of the terms used in this study are confusing without definition. The following operational definitions clarify the terms used:

The term "Safety" is defined as the quality or condition of being safe and free from danger, injury, or damage. The term is often confused with and considered to be synonymous with security. While there is often some interaction between the two functions, they cannot be considered to be one and the same.

An "accident" is an unplanned event that takes place during normal operations which may or may not result in personal injury and/or property damage.

"OSHA" is an abbreviation for the Occupational Safety and Health Act of 1970, also known as the Williams-Steiger Act. Most commonly the term Act is dropped and Administration is inserted to denote the bureaucratic organization within the Department of Labor who administers the Act.

"Industrial arts" identifies a phase of general education that concerns itself with the materials, processes, and products of manufacture, and with the contribution of those engaged in industry.

"Industrial vocational education" is a term used to describe those functions which are a means of preparing youth for gainful employment or as a means of upgrading individuals in industrial occupations at certain levels of society.

"Technical education" is a term that identifies those programs that propose to prepare persons for employment in jobs of a

technical nature, at a level above those falling in the realm of vocational education.

"Industrial education" is a term which is used to describe the entire scope of functions identified with the terms, industrial arts, industrial vocational education and technical education.

"Unsafe conditions" is used to describe a state of being that involves the mechanical or physical (such as a broken handle of a hammer or worn brakes of a lift truck).

"Unsafe practices" identifies those acts of a person (such as working near the moving parts of a machine without first stopping it and lifting with the back muscles instead of the leg muscles).

CHAPTER II

REVIEW OF RELATED LITERATURE

Discussion

Safety instruction in our schools is rarely regarded as an academic discipline. Consequently, safety education is taught as part of the student's skill development instruction or as part of his supplementary training. The literature suggests that safety and accident prevention are part of the school's overall responsibility.

The first objective of a school safety program is immediate and urgent, and that's to prevent accidents which might result in injury or harm to students, teachers, other school personnel or visitors, damage to facilities and equipment, or interruption of the educational processes. Williams stated it this way:

"We live in an era of technological change and development, characterized by new hazards growing out of new concepts and techniques, new power sources, new materials, and new industrial processes. Consequently, there is a particularly significant need for safety, and the educational programs of our schools must reflect our concern for accident prevention." 1/

1/ Williams, William A. "An Accident Prevention Program for School Shops and Laboratories, A Suggested guide for School Administrators." U.S. Department of Health, Education, and Welfare, Washington, D.C., 1967, p. 1.

The brunt of this responsibility, mentioned by Williams, is of course, delegated to the teacher, but effective fulfillment of the teacher's responsibility can be accomplished only with the active support and cooperation of administrative and supervisory staffs. Public education should recognize the importance of safety education and follow the lead taken by industry and business in adopting a positive approach to the problem of accident prevention. Williams went on to say, "School shops and laboratories which include safety instruction as an integral part of their curriculum will, as a result, have made an important contribution to our nation's program of occupational safety while protecting students, teacher, and facilities." 2/

The problem of reducing environmental hazards resolves itself primarily to one of engineering, design, preventive maintenance and inspection. Recognition of environmental safety and the approach to a good workable program was highlighted in a recent article in a safety journal by Thomas Gallagher.

"Unreal safety programs, however, are another matter. Human lives depend on a realistic approach to industrial accident and disease prevention. It is unrealistic to expect that safety will take care of itself, aided only by a few harsh words of reproach and a stern warning to do better in the future each time a worker is injured or killed. On the other hand, it is eminently realistic to hire a safety professional to tailor an accident and disease prevention program to fit the business, then involve everyone in it, from the most senior executive

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2/ Ibid, p. 2.

to the most recently employed unskilled worker." 3/

Research indicates a realistic approach has been taken in some areas. Safety professionals are providing inspections for fire and health environments and state laws are mandating eye safety protection. School shops and laboratories are handling and storing materials safer and very strict control is provided for driver education safety, along with sports that have physical contact.

Example:

1) In North Dakota, the fire marshal's office has the responsibility for the fire safety of the school environment as well as the inspections of the facility. If compliance for safety isn't adhered to, the complex could be shut down. The school has the responsibility of teaching basic fire safety to its students.

2) In August, 1963, Ohio Senate Bill #237 stated, "every student and teacher of a school, college, or other educational institution shall wear industrial quality eye protective devices at all times while participating in or observing any of the...." 4/

3/ Gallagher, Thomas W. "Monitor", Division of Safety and Hygiene, The Industrial Commission of Ohio, February 1973, Vol. 46, No. 2, p. 3.

4/ Amended Substitute Senate Bill No. 237, "An Act," Ohio Legislative Service Commission, File No. 225. Date: June 22, 1973.

3) The Industrial Safety Commission of Minnesota, Safety and Hygiene and the State Occupational Safety & Health Divisions have the responsibility of the physical facilities and the health environment of the complex.

General recognition of the health and safety problem in the school is important, but recognition alone isn't the answer. More must be done, especially with the students, teachers, and the administrator. This was expressed in a statement by Whitney when he said:

> "The necessity for health and safety education in schools has been demonstrated and generally recognized. The industrial course, as the connecting line between education and industry, can be adapted to meet the specific situations presented by occupational pursuits. The school authorities who plan the industrial course have three distinct responsibilities with respect to safety:
>
> (1) the general responsibility of all schools to develop an attitude of mind which will fit the student for safety living; (2) to safeguard the student in his shop work; (3) more specifically to educate young people to become safe workers in industry." 5/

5/ Whitney, Albert W. "Industrial Safety Education in Schools," School Health Monograph No. 10, Metropolitan Life Insurance Company, 1950, p. 9.

As previously stated, the problem of reducing environmental shop hazards is of prime importance to all. One of the largest insurance companies in America put it this way:

> "effect of the safety movement has been a reduction in accidents; some individual establishments, for example, have decreased their accidents 80 to 90 per cent. A second effect has been increased efficiency and a third has been the development of a common objective for management and labor...safety today has a recognized and permanent place in industry."[6/]

Numerous organizations exist today for the sole purpose of safety. Safety is a complex thing. This was stated quite well in a policy statement by the National Safety Council.

> The elimination of accidents is vital to the public interest. Accidents produce economic and social loss, impair individual and group productivity, cause inefficiency and retard the advancement of standards of living. [7/]

The Council in its Accident Prevention Manual for Industrial Operations commented that:

[6/] Metropolitan Life Insurance Company, Industrial Safety, 1 Madison Avenue, New York, New York, Monograph #10, p. 12.

[7/] National Safety Council, Accident Prevention Manual for Industrial Operations, 6th Edition, Chicago: National Safety Council, 1973, p. 2.

> It was a rather short step from this to the realization that a large proportion of accidents could be prevented and that the same industrial brainpower that could produce vast quantities of goods could also be used for accident prevention. Industry soon discovered that production and safety were related. From this beginning grew the safety movement as it is known today. The process is reducing the number of hazards or operations which cannot be overcome by practical safety measures. [8]

In accident prevention and safety, the National Safety Council summarized some reasons for its continuing efforts to prevent accidents:[9]

(1) Needless destruction of life and health is a moral evil.

(2) Failure to take necessary precautions against predictable accidents involves moral responsibility for those accidents.

(3) Accidents severely limit efficiency and productivity.

(4) Accidents produce far-reaching social harm.

(5) The safety movement has already demonstrated that its techniques are effective in reducing accident rates and promoting efficiency.

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[8] Ibid.

[9] Ibid, p. 3.

(6) Nothing in the available data suggests that safety people are near a limit in their ability to extend the moral and practical values of accident prevention.

Other organizations interested in safety and the preservation of life are Underwriters' Laboratories (UL) which has been in existence for approximately 75 years. This organization is dedicated to "testing for public safety" and is neither a commercial enterprise nor a governmental agency, but is a part of the private sector whose sole function is to serve, not profit.

The basic objectives of UL are:

A. By scientific investigation, study experiments, and tests, to determine the relation of various materials, devices, products, equipment, construction, methods, and systems to hazards appurtenant thereto or to the use thereof, affecting life and property and to ascertain, define, and publish standards, classifications and specifications for materials, devices, products, equipment, constructions, methods, and systems affecting such hazards, and other information tending to reduce and prevent loss of life and property from such hazards.

B. To contract with manufacturers, governmental agencies and others, for examination, classification, testing and inspection of

> materials, devices, products, equipment, constructions, methods, and systems with reference to hazards appurtenant thereto or to the use thereof affecting life and property; and to report and circulate the results of such examination, test, inspection and classification to insurance companies, public safety authorities, governmental bodies or agencies, other interested parties and the public by the publication of lists and descriptions of such examined, tested, inspected or classified materials, devices, products, equipment, constructions, methods and systems by the provision for the attachment of markings or labels thereto or issuance of certificates thereon, or in such other manner as from time to time may be deemed advisable. [10]

The National Electrical Code is an American National Standard and through the years has called for continuous improvement in basic electric safety. As a result, today's electrical accidents are primarily the result of carelessness, ignorance, lack of compliance with the code, or use of poor-quality electrical devices.

The basic objectives of the National Electrical Code (NFPA, No. 70 - 1975) are:

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[10] Underwriters' Laboratories Inc., Testing for Public Safety, Chicago, Illinois, 207 East Ohio Street 60611, 1971, pp. 4 - 5.

a) The purpose of this Code is the practical safeguarding of persons and of buildings and their contents from hazards arising from the use of electricity for light, heat, power, radio, signaling and for other purposes.

b) This Code contains provisions considered necessary for safety. Compliance therewith and proper maintenance will result in an installation essentially free from hazard, but not necessarily efficient, convenient, or adequate for good service or future expansion of electrical use.

Hazards often occur because of overloading of wiring systems by methods of usage not in conformity with the Code. This occurs because initial wiring did not provide for increases in use of electricity. For this reason it is recommended that the initial installation be adequate and that reasonable provisions for system changes be made as may be required for future increase in the use of electricity.

c) This Code is NOT intended as a design specification nor an instruction manual for untrained persons. [11]

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[11] National Fire Protection Association, National Electrical Code 1975, 60 Batterymarch Street, Boston, Massachusetts, 1975, pp. 70-1.

The American National Standards Institute (ANSI) provides the machinery for creating voluntary standards among 4,000 makers, sellers, and user groups.

The basic objective of ANSI is:

> An American National Standard is intended as a guard to aid the manufacturer, the consumer, and the general public. The existence of an American National Standard does not in any respect preclude anyone, whether he has approved the standard or not, from manufacturing, marketing, purchasing, or using products, processes, or procedures not conforming to the standard. 12/

The Underwriters' Laboratories (UL), National Fire Protection Association (NFPA), and the American National Standards Institute (ANSI) are three of the major safety organizations that recommend the "voluntary standards" we currently operate under. This term "voluntary standard" is a term that has received very wide usage in recent years but there doesn't seem to be a uniformly accepted definition of the meaning. To some the term encompasses a process of voluntary participation. To others, it means that compliance with a standard is strictly voluntary, without governmental enforcement authority, while to still others, it simply means industry developed standards in contrast to government developed standards.

12/ American National Standards Institute, American National Standard for Leakage Current for Appliances, 1430 Broadway, New York, New York, 10018, 1973, p. 2.

Regardless of whose standard we use, there is a definite need for basic existing standards for the implementation of a basic safety program.

> As industry developed some experience in safety, it discovered that engineering could prevent accidents, that employees could be reached through education and (it also found, by trial and error) that safety rules could be established and enforced. Then the "Three E's of Safety" ... Engineering, Education, and Enforcement... were developed.
>
> In recent years a fourth E (for Enthusiasm) has been added. Top management, supervision, staff personnel, and the employees must be enthusiastic about safety. 13/

In a report on occupational safety given by the Honorable James P. Mitchell, it was stated:

> The only formal safety instruction that millions of our new young workers will receive before they go on the job is that given them as part of their education. Safety should be a conscious effort in education from the earliest years. 14/

13/ National Safety Council, Accident Prevention Manual for Industrial Operations, Chicago, Illinois 60611, 6th Edition, 1973, pp. 6-7.

14/ U.S. Department of Labor, Bureau of Labor Statistics, The President's Conference on Occupational Safety, Washington, D.C.: March 1960, p. 5.

One of the foremost leaders of accident prevention was H. W. Heinrich, formerly Superintendent, Engineering and Loss Control Division, The Travelers Insurance Company. His approach to safety is as follows:

> First there must be the desire, or course, the opportunity and the authority to take action coupled with knowledge of method. Necessary personnel, planning, and organization follow. Facts as to both probable and existing causes of accidents are then found, these are analyzed, remedies based on the facts are selected, and finally the remedies are applied.
>
> There is a striking analogy between accident prevention and the practice of medicine. To begin with, the physician has the desire, opportunity, and the authority to act. He has the necessary basic philosophy and knowledge. He knows that a wholly normal person living under normal and proper circumstances and conditions should not be suffering an illness, just as the accident preventionist knows that accidents should not normally occur. The physicial diagnoses the case, i.e., he identifies the particular illness and its cause or source just as is done in the case of the accident. After analyzing all available facts, both the physician and the accident preventionist

selects appropriate remedies which they then apply, prescribe, or recommend. [15]

The growing importance of safety as an instructional and institutional obligation of the public schools is rapidly becoming a matter of interest. On December 29, 1970, the President of the United States signed into law the Occupational Safety and Health Act (OSHA), which sets up rules and regulations that cover everyone that affects commerce, exempting states and political subdivisions. At the present time therefore public school districts do not come under the provisions of OSHA, but with more and more state governments accepting the Act as their standards, it is only a matter of time until our schools will be guided by the Act, whose standards and penalty provisions surpass our current North Dakota Industrial Safety Code. It therefore is our obligation as educators to become familiar with the Act and provide a program in our shops and laboratories that will meet and even surpass its provisions.

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[15] Heinrich, H. W., Industrial Accident Prevention, McGraw-Hill, 1959, p. 7.

CHAPTER III

METHOD AND PROCEDURE

Type of Research

The type of research used in this study was descriptive, with the survey as the method of research and a written questionnaire as the survey instrument. The written questionnaire was chosen as the main survey instrument because it was the only means of reaching the participants.

Participant Selection and Questionnaire Design

The 1975 American Industrial Arts Association Directory of State Supervisors and the North Dakota Industrial Arts Association Directories were used as the sources to identify to whom in the fifty state departments of public instructions and to whom in North Dakota the request for data should be mailed. The participants of the 50 states were selected to provide information to the researcher so that it could be determined what is the consensus of opinion throughout the nation on safety and accident prevention in schools. Additionally, North Dakota industrial education teachers were selected to receive a different survey instrument so that input of ideas from those educators who will be affected by a safety manual could be obtained.

The questionnaire is widely used by educators to obtain facts about past, present, and anticipated events, conditions and practices and to make inquiries concerning attitudes and opinion. [16]

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[16] Van Dalen, Deobold B., Understanding Educational Research. New York: McGraw-Hill Book Company, Inc., 1973.

These questionnaires were not designed to prove or disprove anything. They were designed to verify and compile educational information which could be used as input in structuring a guideline for a state-wide industrial education safety manual.

The questionnaires designed for this study were of the closed form type, modified to include open-ended questions to ascertain information which could not otherwise be obtained. The questionnaires consisted of one having a single sheet printed on one side and the other having a single sheet printed on two sides. They were designed so that a minimum number of questions would evoke the maximum amount of data.

Cover Letter

A cover letter accompanied each questionnaire to inform the participants the purpose of the study and ask for their cooperation in completing the questionnaire. The cover letter was signed by the author and the chairman of the department of industrial technology to demonstrate a personal interest in their responses. Suggestions and recommendations were strongly encouraged and a summary of the results of this study would be available to those interested and/or involved in further development of a safety manual. The initial mailing of the survey instrument to the state departments of public instruction was on January 23 of this year, and the mailing of the questionnaire to the North Dakota industrial arts teachers came on March 29, 1976.

Follow-up

On February 28, 1976, 61 per cent of the surveyed state departments had responded to the initial mailing of the instrument, and on

February 29, 1976 a follow-up letter was mailed to the remaining 39 per cent, explaining the importance of their professional opinion and how critical the furnishing of materials were to the success of the study. They were asked to mail the requested materials the soonest. The survey ended on April 16, 1976, at which time 45 of the original 50 states had responded. This represents 90 per cent of the state departments of public instruction initially contacted to complete the survey questionnaire.

On April 20, 1976, 84 of the 200 surveyed industrial arts teachers in North Dakota had responded to the questionnaire. This represents 42 per cent of those surveyed, and as time was of the essence, no follow-up letter was initiated for this study. As this study will hopefully culminate into a state-wide safety manual, a follow-up letter will be sent to acquire a higher percentile or response.

Treatment of Data

After completion of the survey, the data from the questionnaires and documents were tabulated to give clarity to the results. The data was subjected to a descriptive analysis with each topic discussed in a narrative summary. Certain data were recorded in tables according to its nature and were discussed.

A final summary of the study was sent to each participant who had requested one.

CHAPTER IV

PRESENTATION AND ANALYSIS OF DATA

Survey Design and Data Instrumentation

The research was a descriptive survey type since no attempt was made to change, modify, or manipulate any of the variables being investigated.

The data was gathered by means of a survey, using the questionnaire as the survey instrument. The findings were based on information received from 45 of the 50 states and 84 of the 200 industrial arts teachers and graduate students in North Dakota.

Introduction

The first part of the presentation and analysis of data will concern itself with the data received from the 50 states and will try to satisfy objectives two and four tabulated under the intent of the study section.

The second part of this chapter will analyze the raw information received from the industrial arts educators in North Dakota and will hopefully resolve the problems raised in objectives one, three, four, and five.

Analysis of the Fifty States Data

Inquiries were sent to state industrial supervisors in each of the fifty states requesting a copy of their state-wide safety manual for industrial education laboratory activities. Forty-five states responded to the inquiry for a 90 per cent response rate. Table 1 shows that of

the 45 states who responded, 15 indicated they had a state safety manual and 14 did not at this time. Of the 45 responding states, five had eye safety laws only, while two had developed safety checklists only. Five of the states have developed safety instructions which they thought important listed in their curriculum guides only. There was no response from five states even after a follow-up letter was sent out. One state listed only machine guarding and eye safety instructions as their state-wide safety publication. There is one state that simply reviewed the Occupational Safety and Health Administration Standards (OHSA) and removed those standards from the act that would apply to their laboratory environment. Two states adopted the safety guides from other state's guides with little modification. Two states have only safety checklists for their teachers to use. One state has a very good manual but it only applies to one school district in the state and is not representative of what the entire state's safety policy is. Therefore the information was not used in this study.

Table 1 is a tabulation of the 50 states alphabetically arranged with the resulting information received from each one summarized along side their name.

TABLE 1

THE NATIONS STATUS IN RESPECT TO STATE-WIDE SAFETY MANUALS FOR INDUSTRIAL EDUCATION EDUCATORS

State	Safety Manual Contents and Remarks
Alabama	No Manual
Alaska	No Manual
Arizona	Eye Safety Law only - uses New Mexico's Safety Guide
Arkansas	No Manual - uses OSHA standards that are applicable to laboratories of industrial arts activities

TABLE 1 - CONTINUED

California	Has Manual - In process of revising it to include OSHA standards
Colorado	No Response
Connecticut	No Response
Delaware	Eye Safety Laws only
Florida	Has Manual - Prepared for industrial arts teachers, but used widely by T & I and first one-half has been adopted by association of industrial arts supervisors
Georgia	Eye Safety Laws only
Hawaii	Has Manual - For sale only
Idaho	Has Manual
Illinois	No Manual
Indiana	No Manual - In process of printing one
Iowa	No Manual
Kansas	No Manual
Kentucky	No Manual
Louisiana	Has Manual - An adaptation of 3 other states guidebooks
Maine	Has Manual
Maryland	No Response
Michigan	No Manual
Minnesota	No Manual - Sent some checklists they use in laboratories
Mississippi	No Manual - Eye Safety Law
Missouri	No Manual - Lesson plans available for teaching safety in the laboratories
Montana	No Response

TABLE 1 - CONTINUED

Nebraska	No Manual - Uses some of the information Utah has
New Hampshire	Has Manual
New Jersey	No Manual - In process of developing a guide
New Mexico	Has Manual - Covers Vocational and Industrial Tech.
New York	Eye Safety Laws only - In process of developing a guide
North Carolina	Has Manual - Includes all activities in the entire school environment. They are in process of developing a safety manual just for industrial arts departments.
North Dakota	No Manual - Uses the North Dakota Industrial Safety Code
Ohio	Has Manual
Oklahoma	Has Manual
Oregon	No Manual - Sent some copies of statutes that are applicable to safety in general
Pennsylvania	No Manual - Eye Safety Law and checklists only
Rhode Island	No Manual
South Carolina	No Manual - Has 2½ pages in the state curriculum guide on safety guidelines in general
South Dakota	No Manual
Tennessee	No Manual - Eye Safety Laws
Texas	No Manual - Indicated a need for one
Utah	Has Manual - A very good one
Vermont	Has Manual - Only for sale and supply exhausted now
Virginia	No Manual
Washington	No Manual - Are developing one now. They sent an outline of the items that will be on the agenda when they meet soon to develop a guidebook

TABLE 1 - CONTINUED

West Virginia	No Manual - Will adopt the Association of Industrial Arts Supervisors Guidebook when published
Wisconsin	No Manual
Wyoming	Has Manual

The 12 states who sent their guides and are of a concern in this study represent 80 per cent of the total existing state-wide safety handbooks for industrial education teachers in the nation.

Table 2 lists topics that are identical to the ones that were in the survey instrument sent out to all North Dakota industrial arts teachers for their opinion of worthiness for inclusion in a proposed North Dakota safety guide. This was done so that a correlation between the opinions of North Dakota educators and the opinions of the other 49 state departments of industrial education could be made.

TABLE 2

THE TYPE OF TOPIC AND ITS FREQUENCY AND PERCENTILE OF OCCURRENCES IN THE SAFETY MANUALS OF THE RESPONDING STATES

Topic	Frequency of Occurrences in Guide	Percentile of Occurrences in Guide
Responsibility Delineated	2	16
Liability/Negligence Defined	9	75
Safety Program Objective Enumerated	12	100
Safety and Health Inspection Checklist for Facilities	4	33

TABLE 2 - CONTINUED

Topic	Frequency	Percentile
Occupational Safety and Health Administration (OSHA) Standards Applicable to Industrial Education Labs	3	25
Safety Recommendations for Each Piece of Equipment	10	83
Safety Recommendations in General	9	75
Records, Forms and Tests Information	12	100
Safety Materials Resource List	6	50
Safety Zone Specifications	4	33
Safety Color Coding Specifications	4	33
Fire Equipment Appliances	12	100
Eye Safety Laws	7	58
Personal Protective Equipment	4	33
Safety Checklists for Each Piece of Equipment	1	8
Fire Prevention Standards	8	67
Ventilation Requirements	3	25
Lighting Requirements	4	33
Emergency First Aid Procedures	9	75
Accident Prevention Measures	12	100

It is shown in Table 2 that of the 20 different topics in these guidebooks, four were common to each other or 100 percent represented in the manuals; these are, safety program objectives, samples of various forms, fire equipment appliances, and accident prevention measures. Fifty percent of all topics listed (10 of 20) were apparently of enough

significance that from Maine to California, the same things were important to all. Only three (25%) of the 12 states listed the Occupational Safety and Health Administration Standards (OSHA) that would apply to their areas of responsibility. In contrast, nine (75%) of the 12 states defined what liability/negligence is and made some recommendations for the teacher to be aware of to lessen chances of being involved in tort. Of the 12 manuals under study, seven (58%) have eye safety laws recorded and defined as they apply to the various operations in all school laboratories. In addition, six more states have eye safety laws in effect, even though they do not have complete safety handbooks. This makes a total of 13 out of the 45 states which represents a 28 percentile. First aid procedures were listed in nine (75%) of the guides with a majority of them indexing step by step procedures of what the instructor should do in the case of injury. Eighty-three percent or 10 of the 12 manuals made safety recommendations for each piece of equipment, spelling out in detail the hazards associated with the equipment, such as, how to guard machines and what accident prevention procedures should be taken. The recommending of safety procedures in general were thought to be of enough importance for nine (75%) of the 12 to list them, and eight (67%) thought that fire prevention standards were of such significance that they should be tabulated separately from general safety procedures. Health items such as ventilation, lighting, noise and personal protective equipment were of such little importance that just four safety guides listed them. Only two (16%) out of the 12 safety handbooks delineated whose responsibility it was for implementing the safety program as outlined in the safety manual and just one (8%) thought it important enough to include safety checklists for each piece of equipment.

Table 3 is a record of the other topics that were in the 12 safety manuals that were not in Table 2. They do not correlate with the inquiry sent out to North Dakota Industrial Arts teachers.

TABLE 3

DATA THAT CANNOT BE CORRELATED
WITH TOPICS IN TABLE 2 BY NUMERICAL AND FREQUENCY COUNT

Topic	Frequency of Occurrences in Guide	Percentile of Occurrences in Guide
Evaluation of Safety Efforts	2	16
Laboratory Maintenance & Housekeeping	4	33
Signs & Tags in Industrial Arts Facilities	1	8
Classroom Size and Layout	5	42
Safety Educational Aids	4	33
Specific Area or Machine Inspection Form	2	16
Eye Protection Chart (Lenses, etc.)	2	16
Employment of Minors Requirements	1	8
Red Cross "Saving a Life" by Artificial Respiration Chart	4	33

In table 3 it can be seen that individual states had unique items listed. For instance, one state included the state laws on the employment of minors recorded. Two more states thought that it was necessary that specific machines needed an inspection form for them and one state presented examples of signs and tags that are such a necessity for use around laboratories, such as no smoking, wear goggles, etc. Five states acknowledged that classroom size and layout were of a concern to them and two thought that it was necessary to list a method of evaluation

of their safety efforts. The usage of safety educational aids were listed by four state manuals along with general laboratory maintenance and housekeeping, a key element of any fire prevention program. Only two charts were of enough interest to be part of the safety handbooks of six states; and these were how to give artificial respiration and an eye protection chart listing shades of lens to use while welding.

Thirty of the 45 responding states or 66.6% do not have complete safety manuals and 14 or 46.6% have nothing at all printed. According to information received from them, they are only concerned with what the general safety laws of their state use, as is done in North Dakota, where little or nothing is spelled out for the specialized unique situations that are found in industrial education laboratories. It was noted however, that 5 or 16.6% of the 30 states mentioned above are in the process of developing a manual of their own. Sixteen of the 25 that are not developing state-wide guides do,however, have some type of safety oriented instructions for the usage of their industrial arts educators; two responding state consultants for industrial education voiced their disappointment that they had no such manual, and were hopeful that they would develop one in the near future.

Analysis of the Industrial Arts Educators Responses

Two hundred survey instruments were mailed out to all the industrial arts teachers in North Dakota that were practicing teachers and to the industrial arts teacher educators and graduate assistants at the University of North Dakota. Eighty-four questionnaires were returned, checked for accuracy in responding to the questions asked, certified valid and the results are being used for this analysis. This return rate

represents a 42% response. This 42 percentile is enough to render our analysis statistically valid.

TABLE 4

NUMERICAL TABULATION OF THE RESULTS OF THE INDUSTRIAL ARTS EDUCATORS QUESTIONNAIRE

Those surveyed were asked:

Part I In your opinion, what particular items from the following list should be included in a proposed state-wide safety manual for industrial education educators? Please indicate Yes, the item should be included; No, it should not be; or No Opinion. A space at the end has been allocated so you can contribute any items you want that are not listed.

	Topic	Yes	No	No Opinion
1.	Responsibility Delineated	61	7	16
2.	Liability/Negligence Defined	78	3	3
3.	Safety Program Objective Enumerated	67	1	16
4.	Safety and Health Inspection Checklist for Facilities	72	4	8
5.	Occupational Safety & Health Administration (OSHA) Standards Applicable to Industrial Education Laboratories	70	4	10
6.	Safety Recommendations for Each Piece of Equipment	74	10	0
7.	Safety Recommendations in General	77	3	4
8.	Records, Forms & Tests Information	60	9	15
9.	Safety Materials Resource List	68	5	11
10.	Safety Zone Specifications	70	8	6
11.	Safety Color Coding Specifications	64	9	11
12.	Fire Equipment Appliances	74	5	5
13.	Personal Protective Equipment	78	2	4

TABLE 4 - CONTINUED

14.	Safety Checklists for Each Piece of Equipment	71	10	3
15.	Fire Prevention Standards	69	3	12
16.	Ventilation Requirements	80	0	4
17.	Lighting Requirements	77	3	4
18.	Emergency First Aid Procedures	73	4	7
19.	Accident Prevention Measures	78	2	4

Please list any other item you think pertinent enough to be included in the safety manual.

		Number of Responses
1.	Seems adequate	1
2.	Definitely need in-service training	2
3.	Good Luck	1
4.	I feel this survey is very beneficial	2
5.	I think your timing is great	1
6.	Should list types of insurance needed	2
7.	I feel the most important items are 1 through 5 and 8 through 11	1
8.	Make it mandatory for all teachers to be certified first aiders	2
9.	Must make safety rules mandatory on school system	2
10.	Items 6 and 7 should not be included because they are in the textbook already	3
11.	Item 9 probably would soon be outdated; therefore provisions should be made for updating	1

TABLE 4 - CONTINUED

12.	Items 6 and 14 would never get done if all are included. You should categorize characteristics on equipment and then proceed	1		
13.	We should have the right to permanently remove a student who is a habitual offender of safety rules. He just puts himself and other students in danger.	3		
14.	Administrations responsibilities to comply should be enumerated	1		
15.	If you try to cover any more, your manual will be six volumes	1		
16.	Does OSHA have authority over public schools?	1		
17.	Item 18 should only be handled by school nurse	1		
		Yes	No	No Opinion
Part II	Do you think there is a need for inservice training?	67	13	4
Part III	If yes, would you be willing to attend a summer seminar at UND?	47	18	19
Part IV	Do you feel there is a need for this proposed state-wide safety manual?	81	1	2

TABLE 5

PERCENTILE TABULATION OF THE RESULTS OF THE INDUSTRIAL ARTS EDUCATORS QUESTIONNAIRE

Those surveyed were asked:

Part I In your opinion, what particular items from the following list should be included in a proposed state-wide safety manual for industrial education educators? Please indicate Yes, the item should be included; No, it should not be; or No Opinion. A space at the end has been allocated so you can contribute any items you want that are not listed.

Topic	Yes	No	No Opinion
1. Responsibility Delineated	72.5	8.3	19.2
2. Liability/Negligence Defined	92	3.5	4.5
3. Safety Program Objective Enumerated	80.5	1.1	18.4
4. Safety and Health Inspection Checklist for Facilities	85.5	4.9	9.6
5. Occupational Safety & Health Administration (OSHA) Standards Applicable to Industrial Education Laboratories	83.5	4.9	11.6
6. Safety Recommendations for Each Piece of Equipment	88.1	11.9	0
7. Safety Recommendations in General	91.5	3.5	5
8. Records, Forms & Tests Information	71.5	10.5	18
9. Safety Materials Resource List	82	6	12
10. Safety Zone Specifications	83.5	9.6	6.9
11. Safety Color Coding Specifications	76.5	10.5	13
12. Fire Equipment Appliances	88	6	6
13. Personal Protective Equipment	92	2.5	5.5
14. Safety Checklists for Each Piece of Equipment	84	12	4

TABLE 5 - CONTINUED

15.	Fire Prevention Standards	82.5	3.5	14
16.	Ventilation Requirements	95.5	0	4.5
17.	Lighting Requirements	91.5	3.5	5
18.	Emergency First Aid Procedures	87	4.9	8.1
19.	Accident Prevention Measures	92	2.5	5.5
Part II	Do you think there is a need for inservice training?	80	15	5
Part III	If yes, would you be willing to attend a summer seminar at UND?	56	21.5	22.5
Part IV	Do you feel there is a need for this proposed state-wide safety manual?	96	1.7	2.3

The limits of the favorable responses were from a low of 71.5 per cent to the high of 95.5 per cent. There were six topics out of the 19 in the 90 percentile block, 10 were in the 80 per cent block and the last three were in the 70 percentile range. The negative ranges were a high of 12 per cent disapproval and a low of 0 per cent. Neutral limits were a high of 19.2 per cent and again a low of 0 per cent. Specifically, the four topics that received the most favorable opinion were liability/ negligence defined, personal protective equipment requirements, ventilation requirements and accident prevention measures. The other two topics in the 90 percentile range were safety recommendations in general and lighting requirements. The topic that received the lowest approval, 71.5 per cent, was the topic, should examples of tests, forms and records be

included in the guidebook. The topic that received the most negative response was about whether safety checklists for each piece of equipment should be part of the manual - this rated a 12 per cent. Two topics received a percentile within the 10 to 12 per cent range, and again they were in relation to specific recommendations for lists or rules on equipment. From the tabulation on specific topics, the no opinion or neutral response column received its highest rating with a 19.2 percentile when the question was raised; should responsibility delineation be included in the guidebook. The safety program objectives topic ran a close second to this topic with a neutral rating of 18.4 per cent, and the topic about fire prevention standards received a surprisingly 14 per cent score. Thirteen per cent of those surveyed had no opinion on whether color coding specification should be included.

Analysis of Training Responses

Sixty-seven or 80 per cent of the 84 respondents stated that they thought that there was a need for inservice training, but the percentile fell to a 56 per cent or 47 responses when the questionnaire asked them if they would attend a summer session seminar at the University of North Dakota. Eighteen or 21.5 per cent answered negatively to this question and 22.5 per cent had no opinion or no commitment to make. But only 15 per cent had a negative view of whether there was a need for training.

Analysis of the Need for a State-wide Safety Manual

Eighty-one of 84 respondents answered in the affirmative when asked, "Do you feel there is a need for this proposed state-wide safety

manual?" This represents a 96 per cent rating. One or 1.7 per cent answered negatively and 2.3 per cent or two had no opinion.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

This study was designed to ascertain the following: (1) if the industrial arts educators in North Dakota saw a need for a state-wide safety manual, (2) what the 50 United States use as guidelines for the content of their safety guidebooks, (3) what topics the industrial arts teachers in North Dakota think are pertinent enough to be part of a proposed state-wide safety manual, (4) from the data collected and analyzed the topics that would possibly become the outline for the safety handbook, (5) if the industrial arts teachers in North Dakota felt there is a need for in-service training on the latest safety concepts and laws, (6) if the teachers would attend a summer seminar to receive this training.

The conclusions reached were based on responses from 45 state consultants for industrial education and 84 industrial arts educators in North Dakota, as well as information obtained locally and from national published sources.

Conclusions

The following conclusions were drawn from the findings of this study:

1) It was concluded that there is a definite need for a North Dakota industrial education safety manual.

2) The topics listed in Table 5, Part I, should be included in any safety guidebook proposed for state-wide use.

3) It can be concluded that some type of in-service safety training should be provided to the industrial arts teachers in North Dakota.

4) The safety classes/seminars should be taken to where the educator works for more participation.

5) Little differences are apparent between the topics tendered by the states who have safety manuals and the ones thought most important by the industrial arts teachers in North Dakota.

Recommendations

It is recommended that as soon as possible the development of a state-wide safety manual be started. It is suggested that a committee be formed under the auspices of the North Dakota Department of Vocational Education to be the directors for the development of this manual.

It is recommended that not only the topics discerned as being worthy of inclusion in this proposed safety manual be used but that additional suggested topics be solicited from the educators who will have to respond to the manual.

It is recommended that a safety education course, keyed to industrial education teachers be offered through the University's Division of Continuing Education. Credit may then be obtained for the participants, which would be an added incentive for them to attend. It should be sponsored by the Department of Industrial Technology because of the shared interest and the expertise available. It is suggested

that the safety education course be taken out in the environment where the educators are teaching. This way realistic solutions for local situations can be obtained.

Lastly it is recommended that the Department of Industrial Technology at the University of North Dakota offer a course on industrial safety. The course should be required to be taken by all the majors in industrial technology and open to area businesses and industry. There is a definite need for industrial safety education in this area.

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