A STUDY OF SAFETY ATTITUDES AND INSTRUCTIONAL PRACTICES OF INDUSTRIAL ARTS TEACHERS IN THE STATE OF VIRGINIA

by

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Dissertation submitted to the Graduate Faculty of the
Virginia Polytechnic Institute and State University
in partial fulfillment of the requirements for the degree of

DOCTOR OF EDUCATION

in

Vocational and Technical Education

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January 1981

Blacksburg, Virginia

ACKNOWLEDGMENTS

The writer gratefully acknowledges the assistance and guidance afforded him in the writing of this dissertation by his major professor, Dr. William E. Dugger, Jr. Gratitude is also expressed to the other members of the Committee, Dr. E. Allen Bame, Dr. James L. Hoerner, Dr. Johnnie Miles, and Dr. J. Dale Oliver.

Recognition is also extended to Dr. James Nolan, and to the professionals in the Lyman B. Brooks Library and in the Computer Center at Norfolk State University. Appreciation is expressed to Mr. Thomas Hughes, State Supervisor of Industrial Arts Education, and to superintendents and teachers of industrial arts in the State of Virginia who supplied data for this study. A special appreciation is extended to friends, neighbors and colleagues who gave of their time and assistance.

Finally, the writer is indebted to his children, Janeen and John, and to his wife, Elaine, for the many sacrifices they made throughout the study. Without their endurance and encouragement this study would not have been possible.

TABLE OF CONTENTS

Page

ACKNOWLEDGMENTS ii

LIST OF TABLES. vi

Chapter

1. INTRODUCTION 1

STATEMENT OF THE PROBLEM 3

NEED FOR THE STUDY 4

DEFINITION OF TERMS. 6

ASSUMPTIONS. 7

LIMITATIONS. 8

ORGANIZATION OF THE STUDY. 8

2. REVIEW OF RELATED LITERATURE 9

HUMAN FACTORS AS ACCIDENT CAUSES 9

Attitudes 10

Safety Attitudes Development and Change 12

ENVIRONMENTAL FACTORS IN ACCIDENT PREVENTION 16

The Williams-Steiger Occupational Safety and Health Act of 1970 16

Research on Selected Environmental Factors in Safety. 18

Safety in the School Laboratory Environment 20

MULTIPLE CAUSE CONCEPT IN ACCIDENT PREVENTION 25

RESEARCH ON INSTRUCTIONAL PRACTICES IN INDUSTRIAL ARTS EDUCATION LABORATORIES 26

Research on Safety Instructional Strategies 26

Expert Opinion on Safety Instructional Strategies 29

Table of Contents, continued

Page

FACTORS INFLUENCING TEACHER ATTITUDE AND INSTRUCTIONAL PRACTICES 33

Teacher Education Safety Competencies 34

Experience in Industry 36

Knowledge 37

Teaching Experience 37

In-Service Education 37

Liability 38

RESEARCH NEEDED IN SAFETY EDUCATION 40

SUMMARY 40

3. METHODOLOGY 42

RESEARCH QUESTIONS 42

POPULATION AND SAMPLE 42

DESIGN OF THE STUDY 44

Instrument Development 44

Description of the Instrument 46

Establishing Content Validity of Instrument 47

Estimating Reliability of the Instrument 49

DATA COLLECTION PROCEDURES 54

ANALYSIS AND TREATMENT OF DATA 56

SUMMARY 57

4. PRESENTATION AND ANALYSIS OF DATA 58

DESCRIPTION OF THE STUDY SAMPLE AND QUESTIONNAIRE RETURN DATA 58

DESCRIPTION OF SCORE DISTRIBUTION ON STUDY INSTRUMENT 59

Table of Contents, continued

Page

CORRELATIONS BETWEEN SAFETY ATTITUDES AND INSTRUCTIONAL PRACTICES INVENTORIES 62

CORRELATIONS BETWEEN YEARS OF TEACHING EXPERIENCE AND YEARS OF INDUSTRIAL WORK EXPERIENCE WITH CATEGORIES OF SAFETY ATTITUDES AND INSTRUCTIONAL PRACTICES 67

SUMMARY 74

5. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS 76

SUMMARY 76

Purpose 76

Research Methodology 76

Presentation and Analysis of Data 78

Findings of the Study 78

CONCLUSIONS 80

RECOMMENDATIONS 80

REFERENCES CITED 82

APPENDICES 90

VITA 142

LIST OF TABLES

Table		Page
1.	Cronbach Alpha Coefficients for Categories on the Attitude Inventory	51
2.	Cronbach Alpha Coefficients for Categories on the Instructional Practices Inventory	52
3.	Cronbach Alpha Coefficients for Total Scores on the Attitude Inventory and on the Instructional Practices Inventory	53
4.	Years of Teaching and Industrial Work Experience for the Respondents	60
5.	Score Distribution by Categories on Attitude Inventory	61
6.	Score Distribution by Categories on Instructional Practices Inventory	63
7.	Pearson Correlation Coefficients for Safety Attitude Inventory and Safety Instructional Practices Inventory by Categories	65
8.	Pearson Correlation Coefficients for Safety Attitude Inventory and Instructional Practices Inventory	66
9.	Pearson Correlation Coefficients for Years of Teaching Experience and Safety Attitudes by Categories	68
10.	Pearson Correlation Coefficients for Years of Teaching Experience and Instructional Practices by Categories	70
11.	Pearson Correlation Coefficients for Years of Industrial Work Experience and Safety Attitudes by Categories	71
12.	Pearson Correlation Coefficients for Years of Industrial Work Experience and Instructional Practices by Categories.	72
13.	Pearson Correlations for Years of Teaching Experience and Years of Work Experience with Safety Attitudes and Instructional Practices	73

CHAPTER 1

INTRODUCTION

School safety programs are influenced by the teacher's safety attitudes and instructional practices which, according to the American Council of Industrial Arts Supervisors (Bell, Bonfadini, and Good, 1975), are in need of improvement and updating in keeping with the standards set by the Occupational Safety and Health Act of 1970. The development of safe working skills and attitudes in students who will become part of the labor force is one of the most important contributions a teacher of industrial arts education can make to society. In relating the national concern about safety to the work of industrial arts education teachers, Thygerson pointed out that inasmuch as the accident rate in society has not declined there is a need to re-examine teaching techniques for accident reduction in schools (Thygerson, 1976).

Accidents have consistently ranked fourth among the leading causes of deaths in the United States. In Accident Facts it was reported that annual accident costs amounted to approximately 61.5 billion dollars in 1977. This figure includes wage losses of 18.1 billion dollars; motor vehicle property damages of 10.1 billion dollars; insurance and claims settlement costs of 12.0 billion dollars; medical costs, 7.7 billion dollars; property fire loss of about 4.5 billion dollars; and indirect cost of work accidents of about 9.1 billion dollars (National Safety Council, 1978, p. 1).

The 1977 death total for work accidents was approximately 13,000, a four percent increase over the 1976 record. Disabling injuries numbered 2,300,000 in 1977 (National Safety Council, 1978). The

increasing rise in accidents has caused industry to invest more resources for the improvement of working conditions and accident prevention programs, and to demand a higher level of safety performance by those who enter the labor force.

The seriousness of the problem may be seen in the following report presented by Haskell and Johnson (1975, p. 359) showing national statistics for 1974:

> -in addition to the death and disabling injuries, 400,000 workers sustained occupationally induced illnesses;
>
> -among the 15-24 age group, accidents claimed more lives than all other causes combined;
>
> -nearly 75,000 teachers were injured seriously enough in school accidents to require medical attention;
>
> -teachers were twice as likely to be injured while teaching in a classroom as they were if they were employed in a steel mill.

Critical in this situation is the fact that each year far too many vocational students are needlessly injured in school laboratories (Haskell and Johnson, 1975, p. 360). Responsibility for reducing accidents in industrial arts school laboratories rests primarily with industrial arts teachers. These teachers are called upon to make the learning process and the learning environment safe for students.

Industrial education and technical programs must produce graduates who know how to work in a safe manner and who are highly motivated to do so (Glazener and Comstock, 1978, p. 12). Krejcie (1972, p. 60) pointed out that approximately 80 percent of the nation's youth will not finish college, but will join the technical and industrial labor force. Secondary school industrial arts teachers, consequently, may be vital agents in

helping to form positive safety attitudes of youth entering the world of work.

The primary objective of an accident prevention program in schools is immediate and urgent--to prevent accidents which might result in injury or harm to students, teachers, or other school personnel or visitors; damage to facilities and equipment; or interruption of the educational processes (Williams, 1976, p. 1). However, the long term objective of safety instruction is even more important since safety attitudes developed during schooling form the base for safe or unsafe behavior and affect the performance of students when they join the labor force (Shashack, 1974, p. 6).

Statement of the Problem

The rise in industrial work-related accidents places great responsibility on industrial arts education teachers to produce students who know how to work in a safe manner and who are highly motivated to do so. Safety attitudes and instructional practices of teachers are considered to be major contributors to the success of school safety programs. The purpose of this investigation was to determine the relationship between teachers' safety attitudes and their instructional practices, and to determine the relationship between teachers' safety attitudes and instructional practices and the number of years of teaching and work experience they had gained. Specifically, the following questions provided focus for this study:

1. What is the relationship between safety attitudes and instructional practices of secondary school industrial arts education teachers in Virginia in terms of categories and overall attitudes and practices?

2. What is the relationship between years of teaching experience and years of industrial work experience and safety attitudes and instructional practices in terms of categories and overall attitudes and practices of secondary school industrial arts education teachers in Virginia?

Need for the Study

According to a committee of the American Council of Industrial Arts Supervisors, many administrators, supervisors, and industr al arts and vocational education teachers have expressed a need for help in interpreting safety requirements and regulations (Bell, Bonfadini and Good, 1975, p. 1). This need has grown from the increasing responsibilities placed upon educators to provide safe working conditions for students in school laboratories, and the demands of industry which hold that a prerequisite to initial and continued employment is a commitment to and knowledge about safety.

Glazener and Comstock (1978, p. 13) have identified three developments in recent years which have forced employers to make demands for workers who understand the importance of safety on the job and who follow safe practices:

1. The belief that the employer has a social obligation to safeguard the health and welfare of employees. This belief culminated in the passage of the Occupational Safety and Health Act of 1970 (OSHA).

2. The Consumer Product Safety Act of 1972 which defines a consumer product as any article manufactured or sold for use in and around a household, school, or recreational area, and requires industry to protect consumers against risks of personal injury from products.

3. The tremendous increase in awareness on the part of the American public of the ecological and environmental impact of industrial processes.

In addition to the three factors identified by Glazener and Comstock, two other forces appear to impact on the increased importance of safety instruction in secondary schools. During recent years there have been significant changes in the industrial arts curriculum and in the industrial arts student population.

Industrial arts is concerned with studying industry and technology. The swift advances of technology in recent history have caused exciting curricular changes in industrial arts. Many current teachers witnessed the introduction of the following innovative curricular programs after the completion of their teacher training programs: the Industrial Arts Curriculum Project (IACP) which developed the World of Manufacturing and the World of Construction, Technology Education developed by Paul DeVore, and the Maryland Plan conceived by Donald Maley and others. Even now there are proposals for curricular changes in industrial arts toward an open access curriculum as indicated by the 27th yearbook of the American Council of Industrial Arts Teacher Education, Industrial Arts in the Open Access Curriculum (American Council on Industrial Arts Teacher Education, 1978).

The changing student population is another force impacting on the importance of safety instruction. Industrial arts courses are now attracting more women and girls, older adults, and handicapped students. Additionally, the part-time enrollment in industrial education courses is increasing. This consistently changing and expanding student population requires more effective safety instruction.

Definition of Terms

The following operational definitions are provided to give focus and clarity pertaining to key concepts in this investigation:

Industrial Arts - Refers to those phases of general education which deal with technology--its evolution, utilization and significance, with industry--its organization, materials, occupations, processes, and products, and with the problems and benefits resulting from the technological and industrial nature of society (Maley, 1975, p. 10).

Attitude - The predisposition or tendency to react specifically toward an object, situation, or value. Usually accompanied by feelings and emotions (Good, 1973, p. 48).

Safety attitude - Refers to the person's awareness of the hazards and dangers in the handling of hand tools, power machines, equipment, and the materials of industry (Williams, 1963, p. 61).

Instructional practices - Refers to teaching techniques which are defined as specific ways of presenting instructional materials or conducting instructional activities (Good, 1973, p. 590).

Industrial education - A generic term applying to all types of education related to industry including industrial arts education, vocational industrial education (trade and industrial education) and much technical education (Law, 1971, p. 37).

Safety responsibilities - Refers to the conditions for accountability for the development, implementation, and evaluation of the program of instruction in the safe use of tools and machinery and in the maintenance of a safe and healthful working environment.

Liability - Refers to the state of being responsible by law for damages stemming from pupil injuries (Kigin, 1973, p. 9).

Directing and supervising learning - Refers to those activities of the teacher which are designed to guide the student's development of identified skills, attitudes, and knowledge.

Laboratory organization - A term used to describe the process or result of arranging all of the instructional facilities, equipment, materials and activities in the space designed and equipped specifically as an activity area for industrial arts programs.

Teaching aids - A term used to denote auxiliary instructional devices, such as a chart, drawing, picture, film, mock-up, or working model, intended to facilitate learning (Good, 1973, p. 24).

Pupil personnel system - Refers to a set of procedures and organization designed to provide for student involvement and participation in the safety program.

Assumptions

The study was based on the following assumptions which were derived from empirical evidence and logical reasoning:

1. Industrial arts teachers in Virginia include safety instruction in their industrial arts classes.

2. Safety instruction in industrial arts classes can affect the safety performance of the students after they become industrial workers.

Limitations

This study was limited to industrial arts teachers in the state of Virginia who are listed in the Virginia Industrial Arts Teachers'

Directory, 1978-79 and the results of this study are generalizable only to industrial arts teachers in Virginia.

Organization of the Study

The remainder of the study is organized as follows: Chapter 2 consists of the review of the related literature; Chapter 3 describes the research methodology; Chapter 4 presents the analysis of data; and Chapter 5 comprises the summary, conclusions, and recommendations.

CHAPTER 2

REVIEW OF RELATED LITERATURE

Presented in this chapter is a review of research and related literature on safety and safety instruction. The materials selected for presentation relate to the following topics: (1) human factors as causes of accidents with emphasis on attitudes, (2) environmental factors in accident prevention, (3) multiple cause concept in accident prevention, (4) research on instructional practices in industrial arts education laboratories, (5) liability factors influencing teacher attitudes and instructional practices, and (6) research needed in safety education.

Human Factors As Accident Causes

Heinrich's (1959) safety philosophy, first published in 1931 in the text, Industrial Accident Prevention, focused attention on the human factors in accident causation. Heinrich maintained that people cause more accidents than are caused by conditions. He suggested that unsafe acts are the cause of 85 percent of the accidents and unsafe conditions the rest (except for acts of God).

Classifying accidents into four groups, Heinrich (1959, p. 109) gave the following descriptions:

> Improper attitude: Willful disregard, reckless, lazy, disloyal, uncooperative, fearful, oversensitive, egotistical, jealous, impatient, absent-minded, excitable, obsession, phobia, inconsiderate, intolerant, mentally unsuited in general.
>
> Lack of knowledge or skill: Insufficiently informed, misunderstands, not convinced of need, indecision.

Physically unsuited: Hearing, sight, age, sex, height, ill, allergic, slow reaction, crippled, intoxication, physically handicapped in general.

Improper mechanical or physical environment: Space, light, heat, arrangement, ventilation, materials, tools, equipment, procedures, company policy, routing, etc., make it awkward, difficult, or impossible to follow safe-practice rules.

Addressing the complexity of the psychological factor in human accidents, Margolis and Kroes (1975, p. 4) identified the following elements:

1. Motivation of a worker to perform safely.
2. The day-to-day work habits a worker develops by observing his peers or supervisor.
3. Worker's attitude toward himself and the people around him.
4. The skill a worker brings to his job.
5. The state of alertness, boredom or fatigue arising from a task or the length of a work time and hours or schedule of work.

Attitudes

Personal attitude is considered the most important factor of the human causes. The percent of accident causes attributable to attitude is difficult to determine. However, popular opinion among researchers indicates that it is a high percentage.

The importance of attitudes in influencing behavior is reflected by the various definitions of attitudes found in the literature (Tarrants, 1971; Newcomb, 1953; Krech and Crutchfield, 1948). Acknowledging that attitudes may condition what an individual selects to store or use in terms of information, some educators consider attitudes more important

than either knowledge or skills in safety instruction (Stack and Elkow, 1966).

Recognition of the importance of safety attitudes by industrial educators over a period of time is evidenced by the fact that one of the nine suggested objectives of industrial arts education is the development of desirable safety attitudes and practices in each student (American Vocational Association Editorial Committee, 1953, p. 24). Pendered (1975, p. 30) suggested that industrial arts teachers must be concerned with safety attitudes because an attitude is learned by the individual's past experiences, and attitudes tend to be persistent, stable, and relatively enduring but can be changed by additional knowledge or further experience.

Krejcie suggested that attitudes are by far the most important psychological aspect of safety in an endeavor, and a study of them leads directly to the psychological factors related to human behavior. When attempting to predict students' responses to a known situation, it is clear that past experiences, whether desirable or undesirable, have an effect on the response (Krejcie, 1972, p. 60).

Hannaford (1957) reported a positive and significant relationship between the safety attitudes of male industrial workers and their actual lost-time accident experience. A five-year period was covered in the study.

A study involving the development and evaluation of a shop safety attitude scale was reported by Bettis (1972). Using the theory that accident prevention could become a reality if attitudes could be treated or measured to see if they could predict whether or not one student may

be prone to have more accidents than another student, Bettis developed a semantic differential type attitude scale to measure safety attitudes of agricultural students. The test used nineteen stimulus words or concepts and nine opposing adjectives for each stimulus word. The nine pairs of opposing adjectives represented the evaluative activity, and potency factors. An accident survey form was administered along with the attitude scale. Bettis found that stimulus words with controversial or emotional connotations were significantly correlated with accident experience. Using additional data from test results of the Edwards' Social Desirability Scale, a mechanical aptitude test, cumulative college grade-point average, high school rank, and ACT scores, Bettis concluded that there must be some relationship between a student's opinion of himself, his emotional stability, or his level of adjustment to his environment and his accident experience.

Based on the study results, Bettis reported that it appears that accident experience consisting of injuries to self or damage to property can be predicted for students in shop classes for which fifteen to twenty-three percent of the variance could be accounted. Bettis suggested that this information will be helpful to industrial arts teachers (Bettis, 1972, p. 28).

Safety Attitude Development and Change

A person's behavior will generally be governed by the attitudes he or she has formed toward that class of experiences. Goldenson (1970, p. 127) suggested that attitudes are developed through experience and people tend to resist change in their attitudes.

Modifying undesirable attitudes toward safety is a very important part of accident prevention. Worick (1975, p. 35) maintained that attitudes tend to resist change because they are self preservative in nature. The stronger the attitude, the harder it will be to change. It is important to know how an attitude fits into the total personality of an individual in order to develop specific counter-measures for attitude change. Although people resist changing their attitudes, the fact that attitudes can be modified offers great hope to those working in accident prevention.

According to Stack and Elkow (1957, p. 118) it is felt with some confidence among those working with industrial safety that if attitudes could be improved substantially, much of the battle of industrial accident prevention would be won. Attitudes, however, are frequently set long before the individual begins work. Hence, the schools can help develop and foster constructive attitudes.

According to Williams (1963, p. 67), there are two methods of developing desirable attitudes. The direct method of attitude formation involves the planned efforts of a teacher. This method relies on the laws of learning in developing attitudes. In the indirect method, the attitudes are "caught" from the association of other people who possess the desirable attitudes. The indirect method places prime responsibility on the attitude of the teacher since students may catch their attitudes toward safety from the teacher.

Stack and Elkow (1966, p. 40) listed the following methods from Brody's suggestions for modifying attitudes:

1. Logic - The logical appeal in safety education puts everything on the basis of reason. In the light of our knowledge of the problem this surely is not enough.

2. Admonition and Exhortation - It has been found that lecturing or preaching or warning will have little success.

3. Proficiency - The natural desire of individuals to do things well or to be considered proficient has value up to a certain point; this is sound motivation.

4. Humor - Humor has been a historic means of influencing people. It can stimulate interest, for people are receptive to humor. They often derive satisfaction from the mistakes of others; but this type of illustration must be handled tactfully.

5. Fear - The so-called "fear approach" is still utilized to impress upon people the painful consequences of behavior. However, this is a negative method and dread of having an accident is just the frame of mind likely to cause one. The use of the fear approach should be limited.

6. Group Dynamics - Group acceptance and group recognition motivate every individual. And as an inevitable consequence he subjects himself to the regulations of the group. Personal involvement of the individual members of the group is the key to this activity. Research conducted during the past two decades strongly supports the view that group processes may be the most effective means for developing or modifying attitudes and behavior.

Strasser (1964, p. 61) emphasized the fact that since one of the principal objectives of accident prevention and safety programming is the modification of human behavior to eliminate the possibility of accidents, the education efforts of school and society must be carefully planned and developed. Use of methods which have been found to be ineffective, such as logic, admonition and exhortation, and fear should be replaced by methods which hold greater promise of success.

Blair, Jones and Simpson (1965, p. 222) suggested that the following points for an effective program for modifying attitudes through a

planned learning experience:

1. Know what the students' attitudes are.
2. Use group processes.
3. Give first hand experience rather than reading or lecturing.
4. Let students believe the attitudes are their own, original ideas.

Safety performance, like all other performance, is a function of the interaction between the person and the environmental factors. The achievement of a "safe" environment rests on certain characteristics of persons at all levels in the industrial enterprise (Schroder, 1970, p. 180). Consequently, consideration of attitude and attitude change in safety instruction is important. It can be maintained that the achievement of safety may be understood developmentally as the evolvement of more mature safety attitudes which are expressed in the search for safer environments and the reduction of unsafe behavioral acts (Schroder, 1970, p. 180).

Adding to the thinking that human factors are the most important factors in accident prevention, Wolff (1976, p. 69) listed the following reasons why compliance with the Williams-Steiger Occupational Safety and Health Act of 1970 did not in itself assure a safe and healthful workplace:

1. The OSHA standards do not and never can adequately cover every situation.
2. The unsafe act remains the most important single factor contributing to accident experience.

The responsibility for safety does not lie with the worker alone. The physical environment in which the individual works, the social environment of the workplace, the expectations of the supervisors, and the overall organizational milieu have substantial effects on the behavior of the worker (Margolis and Kroes, 1975).

Environmental Factors in Accident Prevention

A safe environment is an essential part of the school safety education program (Bonfadini, 1975, p. 164). A safe environment will exist if hazards are discovered and corrected through regular and frequent inspections by school personnel--administrators, teachers, and students. Safety inspections are to determine if everything is satisfactory in terms of established standards. According to Moon (1975, p. 31), recent safety legislation and court cases concerning teacher liability make it imperative that more emphasis be given to the safety features of the facility.

The Williams-Steiger Occupational Safety and Health Act of 1970

The Williams-Steiger Occupational Safety and Health Act of 1970 (OSHA) has been heralded as the single largest step in safety in the history of America (Petersen, 1975, p. 113). The underlying thrust of OSHA is to bring the physical conditions of American industry up to a level dictated by the standards. The Act requires safe and healthful working conditions for all workers except those employed by federal, state, and municipal governments (U.S. Department of Labor, Occupational Safety, and Health Administration, 1972). However, since state plans for the management of their own safety and health programs for state and

municipal employees must incorporate the provisions of the Act, it may be said that this Act applies to virtually the total working environment. The purpose of OSHA is:

> To assure, so far as possible, every working man and woman, in the nation safe and healthful working conditions and to preserve our human resources (U.S. Department of Labor, Occupational Safety, and Health Administration, 1975, p. 1).

Williams (1975, p. 1) and Entorf (1972, p. 51) are representative of the educators who proclaim that the passage of OSHA gave added impetus to the organized accident prevention program conducted in the school laboratories of the total educational system.

An analysis of the Williams-Steiger Occupational Safety and Health Act of 1970 made by Butcher (1975, p. 242) led to the conclusion that the terms "employer" and "commerce" in the Act may be interpreted to include employees in non-governmental education institutions. School laboratories are indirectly covered through the State plans. Students are potential employers and employees who will eventually be subject to the Act. According to Butcher, this places a burden on the teacher to make certain that the physical conditions of the laboratories comply with the occupational safety and health standards, that he/she set a proper example and that he/she indoctrinate students in all phases of maintaining safe and healthful conditions using only safe working procedures.

A National Institute for Occupational Safety and Health was established primarily for research and educational functions. Authorization was given for the following functions (Butcher, 1975, p. 242):

1. To develop and establish recommended job safety and health standards.

2. To conduct research and experimental programs for developing criteria for standards.

3. To publish an annual list of all known toxic substances and the concentrations at which toxicity is known to occur.

The focal point of OSHA is the lists of safety and health standards. A comprehensive compliance program features two parts: (1) employers are urged to comply with standards voluntarily; (2) OSHA's trained compliance officers inspect workplaces to assure employer compliance with standards. The Act focuses on training and promoting consciousness of good safety and health among all members of the work force. Publications of the OSHA standards and general and technical materials on job safety and health are made available. The Act authorizes training programs to teach employers and employees about the proper use of adequate safety and health equipment and how to recognize and avoid unsafe work practices.

According to Storm (1976, p. 135) industrial education teachers have two basic responsibilities in connection with the Act. They must (1) operate their laboratories in compliance with the federal guidelines, and (2) they must make their students aware of the Act and prepare them to function within the guidelines.

Research on Selected Environmental Factors in Safety

Research on the effects of environmental factors on safety attitudes and performance is limited. Studies on color and noise are presented here as indications of the type of research needed in industrial arts education.

An experimental study conducted for the Pittsburgh Plate Glass

Company by the Psychological Laboratory of the Johns Hopkins University Institute for Cooperative Research measured the attitudes and physical reactions of their students exposed to planned color in their school environment against reactions of pupils exposed to conventional color environments. It was found that color affects scholastic achievement to a greater degree than it does behavior traits in elementary school children. Conclusions regarding the effects of color on junior high students were hampered by numerous uncontrolled variables such as physical growth spurts of youth at that age (Strong, 1975, p. 36). Pendered (1975, p. 36) also reported that the potential of a colorful environment at the secondary level, especially in the case of school laboratories, is an unknown factor.

Noise, as an environmental hazard for workers, has received increased concern. Ramp, Johnson, and McLuckie (1975, pp. 107-112) reported that noise surveys of construction, manufacturing, farming, mining, transportation, and other operations reveal that potentially harmful exposure conditions affect millions of workers.

Noise in the work environment may: (1) degrade hearing, (2) mask reception of desired sounds, (3) heighten emotions and physiological activity, (4) disrupt concentration, and (5) otherwise hinder job efficiency on safety (U.S. Department of Health, Education,and Welfare, 1972, p. iv-16).

Hicks (1973) reported an investigation of noise pollution in industrial education laboratories which found that a potential health and safety hazard does in fact exist in industrial education facilities.

After surveying all instructors of woods and metals in Utah and testing the actual environmental noise levels in 30 randomly selected laboratories, Hicks concluded that:

1. A potential safety and health hazard exists with noise pollution within the industrial education facilities.
2. Many members of the profession are not fully informed about the new legislation on safety and health standards.
3. Most laboratories are in compliance with OSHA noise standards; however, many do exceed the maximum allowable limits.
4. Under stringent OSHA compliance, certain curriculum alterations would have to be initiated.
5. There is no apparent connection between those laboratories which were in violation to OSHA noise standards and the composition of size and construction materials.
6. The opinions of the teachers from the field do not necessarily reflect the actual measured conditions of the environmental noise exposures.
7. The din of noise produced around machinery must not be considered a problem relevant only to industry. The usage of machinery in educational settings places the same potential for occupational hearing impairment into the educational laboratory.

Safety in the School Laboratory Environment

Williams (1963, p. 37) pointed out that the physical condition of the shop combined with the attitude displayed by the teacher provides a cogent learning situation for students. The fact that the laboratory environment is managed from a safety point of view testifies in a concrete way that safety is considered to be of great importance.

The passage of the OSHA regulations stimulated considerable interest in checklists and handbooks designed to assist industrial arts education teachers in interpreting and meeting the regulations. Laboratory and

shop safety checklists have been prepared by many school systems, organizations, and individuals; however, only four such checklists will be discussed here.

The National Standard School Shop Inspection Check List is one of the very commonly used laboratory checklists. It was developed by the Joint Safety Committee and the National Safety Council in response to a recommendation of the 1949 President's Conference on Occupational Safety. The inspection check list is promoted as an objective inspection procedure for the school laboratory. There are nine categories for inspection: (A) General Physical Condition, (B) Housekeeping, (C) Equipment, (D) Electrical Installation, (E) Gas, (F) Personal Protection, (G) Instruction, (H) Accident Prevention and (I) First Aid. The checking procedure requires the checker to indicate the degree to which each standard is met by checking S - Satisfactory (needs no attention), A - Acceptable (needs some attention, U - Unsatisfactory (needs immediate attention). Space is provided for comments (National Safety Council, 1976). The National Standard School Shop Safety Inspection Check List has been criticized for the amount of subjective responses which may be given by the teacher, although it is called the most objective inspection instrument available today (Rivell, 1975, p. 175).

The Laboratory Safety Evaluation Form was developed by trade and industrial instructors, industrial arts instructors, and a safety committee for Prince William County Public Schools in Manassas, Virginia. It was published in the 24th yearbook of the American Council on Industrial Arts Teacher Education (1975). The form included human safety, materials, storage and handling, physical facilities, machines, and

tools. This form differed from the others in that the largest single emphasis area is personal protection; 53 items are included in this category as opposed to ten items in this category on the Shop Safety Check List and 16 items in this category on the National School Shop Safety Inspection Check List. Checking procedures require the checker to indicate S - Satisfactory (needs no attention) or U - Unsatisfactory (needs immediate attention). Space for recommendations is provided for each item. A Not Applicable (NA) category is also provided (Moon, 1975, pp. 164-179).

The April 1972 issue of School Shop carried a Shop Safety Check List which was composed of information from the New Jersey, Ohio, and Florida State Departments of Education, and the National Standard School Shop Safety Inspection Check List. The major categories included were: General Conditions, Housekeeping, Equipment, Electrical, Gas, Personal Protection, Accident Records, First Aid, and space for recommendations for improvements of weak safety areas in the laboratory. Checking procedures require the teacher to check "Yes" or "No" to each item. The purpose of the check list was to allow the instructor to measure the relative safety of the shop, and to remind instructors that periodic and regular inspections of the laboratory are essential to student and instructor safety (School Shop, 1972, p. 85).

The fourth check list/guide presented here was prepared as a result of the passage of the Occupational Safety and Health Act. According to Bell, Bonfadini, and Good (1975, p. 1), the voluminous publications growing out of the OSHA standards and regulatory functions have caused most teachers and supervisors to "throw up their hands" in

frustration. The guide developed by Bell and others attempted to identify and compile in a guidebook those components of OSHA materials which are needed by educators. It was organized into three major sections: I - Occupational Safety and Health Standards, II - General Safety, and III - Color Coding, Machine Safety.

Section I was organized as follows:

Subpart D - Walking-Working Surfaces

Subpart G - Occupational Health and Environmental Control

Subpart H - Hazardous Materials

Subpart I - Personal Protective Equipment

Subpart J - General Environment

Subpart L - Fire Protection

Subpart O - Machinery and Machine Guarding

Subpart P - Hand and Portable Powered Tools and Other Hand-Held Equipment

Section II of the guide included: Safety Responsibilities, Liability, Liability Insurance, Causes of Accidents and Providing for Safety. Section III of the guide includes: Machine Color Codes, Safety Rules and Laboratory Safety Evaluation Forms.

This guide/checklist was different from others in that it carried a section on providing for safety and safety responsibilities and liability. The questionnaire designed specifically for this study was based in part on this guide/checklist.

Inspection checklists are important, according to Rivell (1975, p. 157) because the safety inspection is the bedrock of the safety program. The assumptions underlying inspections are: (1) To produce

accident-free workers, the environment must be free from accident-producing conditions and, (2) the worker must perform his/her duties and responsibilities in a manner that precludes the occurrence of an accident.

The handbook was another type of aid prepared in the area of environmental safety to assist teachers. Shashack (1974) of the Department of Vocational and Technical Education at the University of Illinois, Urbana-Champaign, compiled a document entitled OSHA Handbook for Vocational and Technical Teachers. The handbook featured an inspection checklist for general shop, as well as more detailed, individualized checklists for automotive, drafting, electricity, electronics, foundry, graphic communications, machine sheet metal, small engines, welding and woodworking facilities. Sample forms for record keeping and accident reporting were included at the end of these sections, as well as a timetable for putting them into practice. An extensive list of instructional references was included.

Luke (1974) developed a handbook for the Utah State Board of Education which was entitled Safety: Recommendations and OSHA Standards. The document included an abridgment of selected OSHA standards as well as forms, posters, and other safety and labor laws which might affect school laboratories.

A third representative handbook reported by Bell (1972) was developed by the Department of Education of the state of Hawaii and entitled Industrial Education Safety Instructional Guide. It covered teacher and student safety responsibilities, instructions and examinations for facility and equipment safety, text of the safety regulations,

forms, checklists, and descriptions of additional safety tips and equipment.

Multiple Cause Concept in Accident Prevention

Safety performance is viewed by some writers as a function of the interaction between the person and the environmental factors. Accidents generally result from a combination of human agent-environmental factors acting in close interwoven fashion (Thygerson, 1976). Baltzer (1967, p. 22) wrote:

> For years it was thought that unsafe acts were responsible for about 85 percent of all disabling injuries and unsafe conditions accounted for the remaining 15 percent. Now, safety men realize there seldom is a clear-cut single cause. Actually, both unsafe conditions and unsafe acts are involved in at least four out of five accidents.

Petersen (1971) has put forth the idea that the domino theory of Heinrich has been too narrowly interpreted. The questions are raised, "When we identify an act and/or condition that 'caused' the accident in the investigation procedures of today, how many other causes are we leaving unmentioned?" and "When we remove the unsafe condition that we identify in our inspection, have we really dealt with the cause of the potential accident?" (Petersen, 1971, p. 13).

According to Petersen, it is known today that behind every accident there lie many contributing factors, causes, and subcauses. The theory of multiple causation is that these factors combine together in random fashion, causing accidents. Investigation of accidents should identify as many causes as possible--certainly more than one act or condition.

Research on Instructional Practices in Industrial Arts Education Laboratories

Safety instruction in industrial arts education is considered an integral part of the total program. The opinion expressed by Pendered (1975, p. 39) is typical of that of many educators:

> The development of positive safety attitudes can take place only in a safe one [environment] where safety instruction receives endless emphasis in both theory and practice. The keystones of a sound safety education program are knowledge, skill, and attitudes, all of which must be developed in a safe environment. Of course, the development of knowledge, skills, and attitudes cannot be considered as separate or isolated entities; each is an integral part of safety education. Safety attitudes must be developed concurrently and simultaneously with the development of all other factors.

The responsibility for the program of safety instruction rests squarely upon the shoulders of the instructor. Little research, however, is available which is designed to assist industrial arts education teachers in making decisions about best instructional practices, materials, and procedures to use in efforts to change safety attitudes of students and/or to promote safety awareness and skills.

Research on Safety Instructional Strategies

Studies in school laboratory safety have produced inconclusive results on relating attitudes, knowledge, personality, and safety knowledge to safe behavior of students. Linhardt (1971) reported a study which compared three methods of teaching safety in the shop: intensive instructional shop safety unit, series of safety films, and enforced shop safety. The findings of the study led Linhardt to conclude that although the conventional lecture demonstration method of teaching shop safety has been used for a number of years, this method did not

change safety attitudes significantly and should be supplemented with actual accident films.

Linhardt also found no significant correlation between mechanical comprehension and safety attitude, intelligence and safety attitude, or mechanical comprehension and intelligence. Additionally, it was found that students working under strict supervision did not maintain their attitudes toward safety after strict supervision was removed. Students' participation in an intensive instructional shop safety unit did not result in lasting safety attitude change (Linhardt, 1971, p. 58).

Attempts to change students' attitudes toward safety in a school laboratory by forcing the wearing of protective clothing produced negative results in a study conducted by Prust (1964). Similar results were reported by Schaefer (1965) who found that neither using an instructional film nor forcing students to wear safety glasses made a significant difference in students' attitude toward wearing safety glasses.

Hess (1969) found no significant difference in student attitude or achievement for classes taught with the closed loop, single concept safety films and that of classes taught with the lecture-demonstration method. The study evaluated four industrial arts classes on: (1) safety attitudes and development, (2) total initial safety achievement and retention concerning six machine safety units, (3) initial safety achievement and retention for each individual safety unit, (4) teacher rated student developed safety attitudes, and (5) independent student film viewing frequencies. One hundred fifty male students were given a safety attitude scale and a comprehensive safety achievement test before

and after the experimental procedures.

In comparing the self-instructional approach with the traditional approach to teaching safety in use of woodworking machines and tools, Beckham (1969) found the self-instructional approach to be equal to the traditional method in terms of safety behavior and in terms of knowledge of the woodworking machine or tools. This finding was supported by a study by Kassay (1970).

Concern about the value of positive instruction as opposed to negative instruction in safety is found throughout the literature. Although the use of fear is generally discouraged, comparison of positive and negative instruction in laboratory demonstrations conducted by LaRue (1968) did show that the dramatically negative teaching approach may be as effective in promoting initial learning and retention as the traditionally positive methods of demonstration.

Nichols (1971) conducted a complex study of correlation among selected psychological factors and the unsafe behavior of students in metalworking. The factors studied were: spatial perception, mechanical comprehension, attitude toward safety, knowledge of metalworking, and achievement in metalworking. These factors were correlated with safe performance of students.

The following findings were reported:

1. There was no significant correlation between the number of accidents incurred by students in metalworking and the psychological factors measured.

2. A low positive correlation was obtained between the number of minor injuries experienced by students and their knowledge of metalworking.

3. The number of unsafe acts committed by students was found to be negatively related to students' achievement in metalworking. No significant correlation was found between unsafe acts and the other psychological factors examined.

4. The ability to perceive hazards was determined to be positively correlated with their experience in metalworking. This ability did not seem to be related to the other psychological factors that were measured.

5. Students' aspiration to behave safety was found to be positively related with their measured achievement in metalworking and their ability to perceive spatial relationships.

Nichols (1971, p. 102) found no significant correlation between safety aspiration and intelligence, attitudes, or ability to perceive hazards.

Expert Opinion on Safety Instructional Strategies

Suggestions on instructional practices based on experience are more abundant in the literature than are suggestions based on research. Williams (1975, p. 51) listed the following objectives for teachers who have the primary role for accident prevention in the laboratory:

1. Develop a permanent safety consciousness in students through teacher example - always doing things the safe way.

2. Teach accident prevention from a positive approach stressing the right way to perform an operation.

3. Develop in each student a sense of responsibility for his own safety and that of others.

4. Help students understand that the effective ways of doing things are the safe ways of doing things.

5. Help students recognize situations involving hazards.

6. Help students learn safety practices for use in meeting their own day to day activities.

Developing an understanding of the real problems involved, the characteristics of the students, and the need for relevance was a

continuing theme in articles designed for teachers. Kerr (1969) maintained that attitude motivation should be the most important direction in safety instruction for the industrial arts teacher. Addressing shop and laboratory safety in the inner-city school, Kerr suggested that concepts of safety and safe practices emerge from patterns of attitude motivation, relevance, and an understanding of the factors that might contribute to accidents. Teachers should be especially concerned about safety instruction or accident prevention programs for the nonreader. Techniques must be adapted to the needs of the student.

Jones (1969, p. 168) listed a different set of problems relating to accident prevention in the shops and laboratories of inner-city schools which complicates the instructional program. Jones' list included the following points:

1. Lack of interest or misunderstanding between the counselors and the industrial arts teachers resulting in the enrollment of disinterested and poorly qualified students in laboratory and shop classes.
2. Overcrowding in the laboratories.
3. Having to work with machinery and tools that are poorly maintained by the repair department.

Reports on effective techniques, strategies, and procedures generally refer to the secondary school level. Noticeably missing are descriptions of successful instructional materials and strategies for post-secondary schools and for teacher training programs in colleges and universities. Typical of the suggestions offered by teachers are the ones described in the following paragraphs.

Williams (1972) presented a comprehensive article on teaching practices for accident prevention. Of major note in the article was the

importance of safety instruction units on the course of study. Two purposes identified for such units were: (1) They served as a blueprint for the programs of safety. (2) They provided one form of evidence to support the instructor in the event of a lawsuit resulting from classroom injury to a student. Specific teaching activities were: (Williams, 1972, pp. 50-58):

1. Study the hazards in the shop or laboratory areas.
2. Develop a detailed written plan of safety education.
3. Provide periodic safety shop talks and safety demonstrations.
4. Provide safety rules and regulations.
5. Prepare instruction sheets for each hazardous machine in the laboratory and for each hand tool used.
6. Plan field trips to study occupational safety practices.
7. Use safety posters, safety literature, and a safety suggestion box.
8. Use safety films and visuals.

Wilkins (1971) presented a convincing firsthand testimony on the effectiveness of film presentations. In addition to improving the teaching of safety, Wilkins maintained that the use of films created evidence of a teacher's safety-demonstration efforts.

Harshman (1974) reported a shop safety demerit system which has proven effective in creating safety awareness in laboratory courses. The system was based on those found in many industries since the passage of the Occupational Safety and Health Act of 1970. The Shop Safety Demerit System included the following categories: Any Unsafe Practice, Good Housekeeping, Eye Protection, Head Protection, Respiratory

Protection, Moving Heavy Objects, Fire Safety, Electrical Safety, Air Vender Pressure Safety-Compressor Use, Reporting Accidents, Tractors and Equipment.

Another type of technique for promoting safety consciousness is the use of special clubs and citations. The Wise Owl Club described by O'Neil (1972) was an example of such techniques. Wise Owl Club membership was awarded only to those students and employees whose eyesight was saved by wearing eye and face protection at the time of a potentially-blinding accident. The Wise Owl Club was a national organization which had an advisory committee composed of national recognized authorities in management, labor, safety, medicine, nursing and education.

Accident reporting is a major component in a safety education program. According to Williams (1975, p. 76), an organized plan of accident reporting can contribute materially to the success of an accident prevention program in school shops and laboratories through a discovery of facts, a contemplation of the reasons for the accident, and a consideration of possible corrective actions.

Typical of the forms suggested for accident reporting was one presented in School Shop (April, 1972). Information which should be given on the form includes: exact nature of the injury; the part of the body injured; a complete description of the accident; any action taken on behalf of the accident; and the nature of the student's activity at the time of the accident.

Evaluation of safety instruction is another major component of an accident prevention program. An example of a safety evaluation system which has been effectively used with junior high, senior high, and college

students was presented by Lutz (1972). The plan focused on a testing technique because, according to Lutz, maintaining a constant awareness of what each student is doing is an important part of accountability. The following steps were involved in the evaluation system: (1) Define the goals of instruction. (2) Identify specific factors involved in learning a machine, demonstration of operating skills, and exhibiting a respectful attitude toward others. (3) Identify a method for measuring students' awareness of the best step-by-step procedure and of the operational features of a given machine.

A simple test was the suggested method for measurement. The test may be administered at different times in the teaching process depending upon the needs of students. Tests should be developed for each tool which may be used. An operator's license or authorization card may be incorporated into the program.

Factors Influencing Teacher Attitudes and Instructional Practices

A review of the literature reveals a clear agreement on the primary role of the teacher in the development of safety conscious and skilled young people to join the manpower force. Not obvious, however, is the identification of competencies, experiences, knowledge and attitudes which industrial arts education teachers need in order to effectively assume the responsibilities which fall upon them.

Further, little in the way of research can be found on factors, other than teaching competencies, which influence teacher safety attitudes and instructional practices. Questions relating the role of experience in the work force, teaching experience, educational level,

in-service training, prior accident experience, and knowledge of liability laws to teacher's safety attitudes and instructional practices are yet to be answered.

Little is published or required by state departments of education with regard to maximum class size, square footage per student requirements, safety education training for prospective teachers, or other specific criteria associated with accident reduction (Pfister, 1972).

Teacher Education Safety Competencies

Concern for the teacher educator's role in safety programs was expressed by Suess (1968, p. 138) as follows:

> ...industrial arts teacher educators face important decisions regarding implementation of appropriate safety measures in the schools and concomitant preparation of prospective teachers in the realm of safety.

The role of the teacher educator in the reduction of the accident rate among industrial arts students is at least two-fold according to Suess. First, improved safety instruction and practice during the teacher education program is imperative. The second function of the teacher educator in accident reduction is to assume leadership by taking a long hard look at the activities occurring in contemporary industrial arts classes.

A study of desirable teacher competencies in trade and industrial education underlines the necessity for professionalism in safety. An analysis of the study made by Ruley (1970, p. 506) showed that of 107 competencies the ones which respondents rated most important were:

1. The ability to develop student attitudes toward safe practices and safety consciousness in job performance.

2. The ability to stimulate and maintain interest throughout the instructional process.

3. A knowledge or understanding of safe practices in teaching the operation of industrial equipment.

4. The ability to develop appreciation of good workmanship.

Two of the most desirable competencies include safety explicitly; all four contribute to the prevention of accidents. These conclusions clearly indicate the great concern for safety among trade and industrial educators.

In recognition of the increasing concern resulting from the enactment by the U.S. Congress of the Highway Safety and Health Act of 1970, the American Association for Health, Physical Education, and Recreation appointed a five-member Task Force to prepare a preliminary report on basic curricular requirements for undergraduate preparation in safety education. Indicating that the two Acts accentuated a long existing need of individuals who have extensive training in safety education and accident prevention, the Task Force identified competencies, curricula design and other pertinent factors relating to preparation in safety and accident prevention (American Association for Health, Physical Education, and Recreation, 1974). Analysis of the competencies listed by the Task Force revealed many competencies which relate to industrial arts teachers. (See Appendix A for complete listing.)

In addition to the instructor's skill as an expert or master artisan in his teaching area, Davis (1978, p. 17) maintained that the selection of instructional staff should be based on the following qualifications:

1. The amount of appropriate formal training that the individual has obtained in his or her area of expertise.

2. The amount of experience in the area of business or industry he or she will be teaching (a minimum of eight years experience is suggested).

3. The presence of a strong desire to teach, as well as personality that will allow a good rapport with students.

Experience in Industry

Reynolds (1977) maintained that nearly all safety professionals are instinctively aware that the motivation which most effectively instills a positive behavioral attitude toward safety is an employee's actual involvement in a serious injury, disaster, or obvious near-miss. Inasmuch as staging an accident is not an acceptable means of safety training, other motivational means must be found.

In every laboratory environment, according to Reynolds, the key to the recognition of potential safety and health hazards lies within the spectrum of creating an overall awareness of possible hazardous situations, whether or not the danger is real, probable, or imaginary. To establish this general awareness, employees must continually be reminded of the hazards they may encounter by means of training, promotional activities, mass circulation of pertinent safety and health information, and hard-nosed individual contact. Relating this idea to industrial arts education teachers raises the question of the importance of teachers' work experience and accident experience in safety attitude formation and in instructional practices.

McMahon (1975, p. 20) advocated that just as industry stresses the importance of a foreman's familiarity with every process of the jobs he supervises, schools should stress the importance of actual work experience for the shop or laboratory teacher. Built into every job is its own set

of safety requirements, and only the instructor who has firsthand knowledge of the hazards involved can adequately integrate awareness of those hazards into his teaching.

Davis (1978) further indicated that experience has determined that the most successful educators possess certain common qualities. One of the qualities is extensive field experience.

Knowledge

Knowledge, according to McMahon (1975, p. 20) is only the first step for the industrial arts educator. The instructor must be able to organize his subject into a manageable sequence, fitting into that sequence all that he knows of the safety and health factors involved.

Teaching Experience

Pfister (1972) reported that shop accident research and teaching experience in school and college level of instruction led to the conclusion that additional years of teaching experience will not necessarily lead to greater success in the prevention of student accidents. According to Pfister, in-service safety education must be obtained to improve the safety instruction of all laboratory teachers (Pfister, 1972, p. 58).

In-Service Education

In-service training in safety education can be significantly improved through the cooperative Safety Workshop according to Nee (1972, p. 62). The model for such a workshop includes experiences in analyzing various industrial and educational safety practices and the opportunity for teachers to design and plan a complete safety program for industrial or educational environment. Activities included study of safety

requirements for production processes, manufacturing equipment and machinery, industrial plans, and organization and administration of safety programs in industry and vocational-technical programs. Staff for this workshop included course coordinator, vocational educators, insurance safety specialist, corporate safety director, corporate medical specialist, and legal specialist. Additional industrial input was given through industry-supplied instructional materials and through an Industry Safety Risk Analysis Game which consisted of a 16-hour experience with a hypothetical set of problems for a large industrial plant.

Liability

Liability is a legal responsibility which binds an individual in law and justice to do something which may be enforced by action (Kigin and Sherick, 1975, p. 300). The possibility of an industrial arts education teacher becoming involved in litigation resulting from injury of a student is greater today than in any other period of history (Kigin and Sherick, 1975).

The degree to which industrial arts education teachers are aware of the potential liability inherent in their jobs may be a factor which influences their safety attitudes and instructional practices. No literature was found which studied such a relationship.

Kigin (1959) studied liability affecting shop teachers and provisions for avoiding accidents and litigation. He reported that negligence was the most common reason for which a shop teacher can be held liable.

The change in the rate of litigation in liability suits was pin-

pointed in the following statement by Flanigan (1976, p. 382): "In 1975, over one million of this type of suit were filed in state and federal courts. Ten years ago, less than 200,000 suits a year were filed."

Worick (1975, p. 213) summarized the situation regarding teacher liability in the following way:

> The doctrine of sovereign immunity also affects the teacher. Under this doctrine school districts are not responsible for the acts of their employees. Industry, by way of contrast, is responsible for the act of its employees under the doctrine of "respondent superior." Some states that have abrogated the doctrine of sovereign immunity for schools have accepted liability for the negligence of their employees, in which case the school districts purchase insurance protection. In all states, however, the teachers themselves are subject to negligence suits, and in those states where the philosophy of respondent superior does not apply, they stand alone in their defense.

Negligence is defined as ". . . the omission to do something which a reasonable man, guided by those considerations which ordinarily regulate human affairs, would do or the doing of something which a reasonable and prudent man would not do" (Nolte and Linn, 1963, p. 245).

1. Failure to act so as to protect others from unnecessary risk (removing safety guards).

2. Failure to act as a prudent man would (allowing use of defective equipment, leaving the classroom, etc.).

3. Lack of care or due diligence (failure to inspect and/or maintain machines).

4. Allowing third parties to use or engage in an activity which can result in jeopardy on their part.

In the final analysis Worick points out (1975, p. 218), "The best defense against liability for negligence is prevention."

Research Needed in Safety Education

It seems clear that current knowledge of accident prevention techniques and methods is inadequate to safeguard the citizenry of tomorrow. The National Commission on Safety Education (1964) published a list of recommended studies in safety for driver education. The following three items from that list appear to be relevant to industrial arts education:

1. Determination of extent to which current text and instructional materials incorporate existing research findings on accident occurrence, psychomotor skills, tracking, perception, and problem solving.
2. Updating of test materials to reflect current research.
3. Development and dissemination of guidelines to teachers for program evaluation.

More recently, in a report for the Ford Foundation, Ashford (1976, p. 98) identified the following needs:

1. Research to clarify the role of stress.
2. Research into the causes of accidents.
3. Identification of allegedly "accident-prone" persons.
4. Motivational studies in occupational safety and in general safety.

Summary

In this chapter research and literature related to safety and safety instruction have been presented. Major topics discussed were: (1) human factors as causes of accidents with emphasis on attitudes; (2) environmental factors in accident prevention; (3) multiple-cause concept in accident prevention; (4) research on instructional practices in industrial arts education laboratories; (5) liability factors

influencing teacher attitudes and instructional practices; and (6) research needed in safety education.

Research and expert opinion indicated that human factors account for a large percent of the accidents which occur, and that attitudes are the most important forces in the human factors.

The passage of the Occupational Safety and Health Act of 1970 stimulated voluminous materials on standards for environmental safety. In response to this Act (OSHA), basic responsibilities were identified for industrial arts education teachers.

It was found that little research was available to assist teachers in making decisions about the most effective instructional practices, materials, and evaluation procedures to use in teaching good safety attitudes and skills; however, expert opinion on these matters was abundant.

General agreement was found on the key role of the teacher in the development of the safety attitudes and skills of students. Missing in the literature, however, was significant research on factors which influence the safety attitudes and instructional practices of teachers or on the identification of specific competencies needed by teachers in the area of safety instruction.

Chapters dealing with the study, methodology, results, presentation and analysis of data will follow. The final chapter will present the summary, conclusions and recommendations.

CHAPTER 3

METHODOLOGY

This chapter describes the research procedure and design. Included here are a restatement of the research questions, and descriptions of (1) the population and sample, (2) the design of the study, (3) the methods used to develop and check the reliability of the instrument, (4) the procedures for collecting data, and (5) the statistical analysis and treatment of data. The chapter concludes with a summary.

Research Questions

The following questions served as guides for this study:

1. What is the relationship between safety attitudes and instructional practices of secondary school industrial arts education teachers in Virginia in terms of categories and overall attitudes and practices?

2. What is the relationship between years of teaching experience and years of industrial work experience and safety attitudes and instructional practices in terms of categories and overall attitudes and practices of secondary school industrial arts education teachers in Virginia?

Population and Sample

The population for this study was industrial arts teachers employed in secondary schools in the state of Virginia during the 1978-79 school year. During this period, 1068 teachers were listed in the Virginia Industrial Arts Teachers' Directory, 1978-79. Included in this number were teachers of the following courses: A World of Choice: Careers and You; Exploring Technology; Modern Industry and Technology; American

Industry; World of Construction; World of Manufacturing; Industrial Career Exploration; General Industrial Arts; Conservation of Natural Resources; Research and Development; Industrial Crafts; Jewelry Making; Power and Transportation; Electricity/Electronics; Graphic Arts; Photography; Mechanical Drawing; Metalworking; Woodworking; Communications; and Manufacturing and Construction.

From the total population of 1068 industrial arts teachers, a random sample of 285 was selected. The numbers for the random sample were identified by use of a computer generated table of random numbers. Random selection was used for the following reasons as suggested by Borg and Gall (1971, p. 119):

1. To select a sample that will yield research data that can be generalized to a larger population.

2. To be able to apply inferential statistics to the research data.

3. Inferential statistics enables the researcher to make certain inferences about population values (e.g., mean, standard deviation, correlation ratio, differences between population means) on the basis of obtained sample values.

Kerlinger (1973, p. 127) recommends that as large a sample as possible should be used in order to effectively utilize the principle of randomization. Specifically, according to Borg and Gall (1971, p. 123), the larger the sample, the greater the likelihood that the mean and the standard deviation will be representative of the population mean and the standard deviation. Additionally, the larger the sample, the less likely will the researcher obtain negative results or accept a null hypothesis when it is actually false.

The sample size was calculated through a formula and table

recommended by Krejcie and Morgan (1970, p. 607):

$S = X^2NP(1-P)-d^2(N-1)+X^2P(1-P)$

S = required sample

X^2 = the table value of chi square for one degree of freedom at the desired confidence level (3.841)

N = the population size

P = the population proportion (assumed to be 0.50 since this would provide the maximum sample size)

d = the degree of accuracy expressed as a proportion (0.05).

Design of the Study

This study may be described as survey research (Borg and Gall, 1979, p. 283). Respondents were contacted by mail and asked to complete a survey questionnaire. A panel of experts was utilized for the validation of the questionnaire developed by the researcher for this study. Practitioners in the field and a literature search were utilized to identify items to be included on the questionnaire. The questionnaire was mailed to a random selection of industrial arts teachers in the state of Virginia.

Instrument Development

Data for this study were collected through a questionnaire developed specifically for this study. The following procedures were used in developing the questionnaire:

1. A search of the literature on safety and accident prevention was made and a list of safety instructional practices was developed based on the literature search.

2. The guide entitled Safety, by Bell, Bonfadini, and Good (1975), and the article, "A Checklist of Preferred Practices for School Shops"

by Williams (1975) were selected for use as major resources for identifying content and shaping the questionnaire items.

3. A pool of eighty favorable and unfavorable statements about safety attitudes and practices was generated.

4. A group of fourteen industrial arts teachers selected from the Norfolk Public Schools was asked to list the ten most important safety instructional practices they follow. Responses were received from eleven of the teachers. (See Appendix B for letter to teachers and list of practices submitted by teachers.)

5. The compiled list of practices suggested by the teachers was used to substantiate, refine, or delete statements of practices and attitudes developed from the literature search.

6. From the revised list of statements of safety attitudes and practices, fifty statements were selected to be used on the questionnaire.

7. The total pool of statements was administered to a pilot group of preservice industrial arts teachers and teacher educators for purposes of checking for clarity and relevance. After the analysis of the results, thirty-one items were identified to be included on the questionnaire.

8. Using the thirty-one statements, parallel questionnaire items were drafted for the Attitude Inventory and the Instructional Practices Inventory.

9. The questionnaire was submitted to a panel of experts for analysis and review of content and proper grouping of items into categories.

Description of the Instrument

The questionnaire developed for this study was composed of three subparts: Attitude Inventory, Instructional Practices Inventory, and Teaching and Industrial Work Experience Data. The Attitude Inventory and the Instructional Practices Inventory were composed of thirty-one parallel statements organized into the following six categories: (1) Safety Responsibilities, (2) Liability, (3) Directing and Supervising Learning, (4) Laboratory Organization, (5) Teaching Aids, and (6) Pupil Personnel System.

Part I. The Attitude Inventory was composed of thirty-one statements about safety and safety instruction. Fourteen of the statements were written in a positive direction and seventeen of the statements were written in a negative direction. A four-choice scale was used. For each of the thirty-one statements, teachers were asked to check one of the following responses: Strongly Agree, Agree, Disagree, Strongly Disagree.

The positive statements were scored by the following key: Strongly Agree = 4, Agree = 3, Disagree = 2, Strongly Disagree = 1. The negative statements were scored by the following key: Strongly Agree = 1, Agree = 2, Disagree = 3, Strongly Disagree = 4.

The reason for reversing the scoring of negative items was to provide a total score that reflected positiveness toward safety. The four-choice scale was used which did not provide for a neutral response of undecided or uncertain in order to encourage teachers to indicate a position on each statement.

Part II. The Instructional Practices Inventory contained thirty-one

statements with a "YES" or "NO" scale. Teachers were asked to circle "YES" or "NO" to each of the statements to indicate whether or not they used the practice described by the statement in their industrial arts instruction. The scoring key for this inventory was as follows: "YES" = 4, and "NO" = 1.

Part III. This part of the questionnaire consisted of demographic data on years of teaching and years of industrial work experience. Teachers were asked to write in the blanks the number of years of teaching experience they had completed and the number of years of industrial work experience they had gained.

Establishing Content Validity of Instrument

Content validity of the instrument was established through the use of a panel of experts. The panel was composed of persons from the following positions: (See Appendix C for list of names).

2 Industrial Arts Teachers

4 Teacher Educators

1 State Department of Education Industrial Arts Supervisor

2 State Department of Education Assistant Industrial Arts Supervisors

1 Occupational Safety and Health Administration District Supervisor

1 State Commissioner of Safety (Virginia)

1 Teacher Educator/Specialist in Safety

4 School System Industrial Arts Supervisors

The panel of experts was chosen on the basis of exemplified leadership and knowledge of safety through laboratory experience and through professional experience. Classroom teachers chosen were officers for

the Virginia Industrial Arts Association for 1977-78. These teachers had considerable teaching and leadership experience in industrial arts. Four teacher educators were chosen to participate on the panel. They consisted of one from each four-year institution with industrial arts programs in Virginia, namely, Old Dominion University, Norfolk State University, Virginia Polytechnic Institute and State University, and Virginia State University. Years of teaching experience, professional involvement, and wealth of knowledge were the basic criteria for choosing these educators. One state supervisor and two assistant state supervisors were chosen. These persons had ten years or more of experience each in working and providing leadership in industrial arts.

The writer interviewed a district representative of the Occupational Safety and Health Administration office and selected him to serve on the panel of experts based on the knowledge and interest which he displayed in the interview. His view represented the OSHA perspective on the instrument.

The State Commissioner of Safety for the state of Virginia was chosen. The researcher selected this person based on the nature of publications which have come through the Commissioner's office.

One teacher educator, a specialist in safety education from outside the state of Virginia, was chosen. The author has had graduate classes in safety under this safety specialist and knew that he could give valuable assistance.

Four school system industrial arts supervisors who had leadership experience in industrial arts were chosen. These supervisors were chosen because of the writer's knowledge of their interest and work in

industrial arts.

The panel members were asked to study the draft instrument and indicate their reactions and suggestions by completing an Instrument Content Validation Sheet for the Attitude Inventory and for the Instructional Practices Inventory. (See Appendix D for letters to panel of experts and Content Validation Sheet.)

Revisions were made on the instrument as indicated by the responses from the panel members. The panel of experts was then asked to respond a second time on a revised validation form for each inventory of the instrument. The purposes for the second response were: (1) to check the questionnaire for further ambiguous statements, (2) to check to see if each item was categorized correctly, (3) to further check for directionality, positive or negative, of each item. The instrument was revised again as needed as a result of the second input from the panel of experts. (See Appendix E for a copy of the final instrument.)

Estimating Reliability of the Instrument

Reliability of the questionnaire was estimated through computation of the Cronbach Alpha coefficient on the responses of the total sample of teachers included in the study. The Cronbach Alpha tells how well scores obtained by testing under one condition represent universe scores (Cronbach, 1970, p. 160). Further, the alpha coefficient estimates the proportion of the test variance due to all common factors among the items (Cronbach, 1951, p. 320). The investigation of internal consistency helps the researcher determine the proportion of the test variance attributable to the principal factor running through the categories.

It is an index of common factor concentration. This index serves the purposes claimed for indices of homogeneity (Cronbach, 1951, p. 331).

Guidelines suggested by Mehrens and Lehmann (1975) were used in determining the usefulness of the categories and total questionnaire as relates to reliability. Mehrens and Lehmann (1975, p. 107) suggest that for group decisions, a reliability coefficient of about 0.65 may suffice.

Table 1 presents the Cronbach Alpha coefficients for categories on the Attitude Inventory. The results indicate that the categories on Liability and Teaching Aids had the highest measure of internal consistency. Although they were not equal to 0.65, they do indicate a substantial degree of homogeneity and were used for making comparisons.

Of the four remaining categories, three had low reliability coefficients, and one had a low negative coefficient. Therefore, the use of the scores for these categories alone as a measure of safety attitude is not meaningful.

Table 2 presents the Alpha coefficients for categories on the Instructional Practices Inventory. The coefficients show a moderate to low degree of internal consistency, and the use of the categories alone as a measure of safety practices should be done with caution. As may be seen by comparing Table 1 with Table 2, the degree of internal consistency is higher for the Instructional Practices Inventory than for the Safety Attitudes Inventory.

The Cronbach Alpha coefficients for the total scores for the Attitude Inventory and for the Instructional Practices Inventory are shown in Table 3. The measure of internal consistency found for the Attitude Inventory and the Instructional Practices Inventory revealed that the

Table 1

Cronbach Alpha Coefficients for Categories on the Attitudes Inventory

Categories	No. of Items	Alpha
Safety Responsibilities	4	-0.11
Liability	5	.60
Directing Learning	9	.08
Laboratory Organization	5	.13
Teaching Aids	4	.59
Pupil Personnel System	4	.10

Table 2

Cronbach Alpha Coefficients for Categories on Instructional Practices Inventory

Categories	No. of Items	Alpha
Safety Responsibilities	4	0.26
Liability	5	.30
Directing Learning	9	.45
Laboratory Organization	5	.30
Teaching Aids	4	.50
Pupil Personnel System	4	.42

Table 3

Cronbach Alpha Coefficients for Total Scores on Attitude Inventory and on Instructional Practices Inventory

Inventory	Alpha
Safety Attitudes	0.62
Safety Instructional Practices	0.72

degree of homogeneity is greater for each total inventory than for the categories. The coefficient for the Safety Instructional Practices Inventory is greater than the 0.65 suggested by Mehrens and Lehmann (1975) and the coefficient for the Safety Attitude Inventory is about as large. The findings on the total inventories, therefore, may be considered meaningful.

Data Collection Procedures

A letter explaining the study and requesting permission to survey teachers was sent to division superintendents of teachers selected for the random sample. Copies of the research proposal and instruments were sent to those superintendents who requested them. (See Appendix F for a copy of the letter.)

A cover letter explaining the study was mailed with each questionnaire to the teachers. The letter assured the teachers that responses would remain confidential and that only the overall response of the group was important to the researcher. Individual teachers would not be singled out in the written report. The questionnaire was coded in such a way that only the researcher knew the name of the respondents. A stamped, self-addressed envelope was sent with each instrument. (Copies of the cover letter and follow up letters are included in Appendix G.)

The following time-line was followed in the data collection process:

Mailed letters to superintendents requesting permission to conduct study	March 23, 1979
Mailed copies of research proposal and instruments to six superintendents as requested	April 4, 1979
Initial mailing of instrument to teachers	June 27, 1979

Mailed post-card reminder to non-respondents	July 16, 1979
Mailed follow-up letter and second set of instruments	July 28, 1979
Mailed second follow-up letter	August 17, 1979
Terminated acceptance of instruments	September 21, 1979
Conducted telephone poll to determine reason for non-response and characteristics of non-respondents	September 22, 1979 to October 10, 1979

In order to establish that those teachers who responded were not systematically different from those who did not, efforts were made to determine characteristics of the non-respondents and reasons for lack of response. The following procedure was used:

1. Non-respondents were identified through the code numbers assigned to each questionnaire. Ninety-two non-respondents were listed.

2. A Non-Response Investigation Guide was developed. (See Appendix H for a copy of the Guide.)

3. Telephone calls were made to non-respondents using the Non-Response Investigation Guide. The following purposes were served by this procedure: (1) to ascertain reasons for lack of response, and (2) to ascertain characteristics of non-respondents.

4. Thirty-four, or 37 percent, of the non-respondents were telephoned. Of this number, the author was able to interview twelve, or 11 percent of the non-respondents. For those non-respondents telephoned but not interviewed, one had retired, six had changed jobs and fifteen were not reached.

Demographic data secured in the interviews revealed the following characteristics of non-respondents: (1) The average number of years of

teaching experience was 8.4 years. The average number of years of industrial work experience was 6.7 years. These data indicate that the non-respondents were similar to the respondents in terms of teaching and work experience.

Analysis and Treatment of Data

Data obtained in this study consisted of the scores for the categories on the Attitude Inventory and on the Instructional Practices Inventory and for the overall inventories, the number of years of teaching experience, and the number of years of industrial work experience. The categories on the inventories were determined to be independent by a panel of experts who validated the questionnaire.

Pearson correlation coefficients were computed to study the relationships. The Statistical Package for the Social Sciences (Nie and others, 1975) was used in computing the correlations.

The first step of data analysis was to correlate the responses on the Attitude Inventory for the Liability category and the Teaching Aids category with the responses to the same categories on the Instructional Practices Inventory. The second step was to correlate the total scores on the Attitude Inventory with the total scores on the Instructional Practices Inventory.

The third step of data analysis consisted of computing a correlation coefficient for the following variables: (1) Safety Attitude Inventory scores with number of years of teaching experience, (2) Instructional Practices Inventory Scores with number of years of teaching experience, (3) Safety Attitude Inventory scores with number

of years of industrial work experience, and (4) Instructional Practices Inventory scores with number of years of industrial work experience.

Summary

This chapter has presented the procedure used for collecting and analyzing the data. A description of how the sample was obtained and the methods used to check the validity and reliability of the instrument was also discussed. The next chapter will present the analysis of data.

CHAPTER 4

PRESENTATION AND ANALYSIS OF DATA

In this chapter the data obtained from the survey instrument are presented and analyzed. The analysis is divided into three parts. The first part of the chapter presents a description of the sample, the instrument return data, and the score distribution by categories on the Safety Attitude Inventory and the Instructional Practices Inventory. The second part of the chapter presents the analysis of the data directed toward the research questions stated for this study.

Description of the Study Sample and Questionnaire Return Data

The sample of 285 teachers was drawn from the Virginia Industrial Arts Teachers' Directory, 1978-79 which listed 1068 teachers. One hundred eighty-three, or 64 percent, of the teachers returned usable survey instruments. Six survey instruments were returned after the September 21, 1979 cut-off date and were not used. Four survey instruments were not usable because too many of the items were left unanswered by the respondents. One of these instruments had fifty percent of the items unanswered while three of the instruments had more than ten percent of the items unanswered.

In the total of 183 usable returns, thirty-three returns contained missing data. Two procedures were used to fill in missing data. For the twelve survey instruments which contained only one missing response on the Attitude Inventory, each missing item was assigned the value of the mean score for that individual on the particular category (Nie and others, 1975) For cases where two or more responses were missing,

telephone calls were made to respondents to secure missing data. For the Instructional Practices Inventory, telephone calls were made to fill in all missing data, even in cases where only one item was left unanswered. Twenty-one respondents were called. No pattern could be discerned in the analysis of items missed.

A return rate of 64 percent usable response was received and deemed adequate by this researcher. In discussing an acceptable rate, Babbie (1973, p. 164) suggested that a response rate of at least 50 percent is adequate for analysis and reporting and a response rate of 60 percent is good.

As shown in Table 4, the average number of years of teaching experience for the 183 respondents was 9.9 years. The standard deviation was 7.3. The average number of years of work experience of teachers in the sample was 7.1 years. The standard deviation was 8.1 years.

The respondent's teaching experience ranged from one year of experience to forty years of experience. Their work experience ranged from no work experience to thirty-one years of work experience.

Description of Score Distribution on Study Instrument

The survey instrument designed for this study consisted of the Safety Attitude Inventory, the Instructional Practices Inventory, and a section on number of years of teaching and industrial work experience. (See Appendix I for frequency distribution of responses to the instrument.) Table 5 presents the score distribution by categories on the Safety Attitude Inventory. The minimum possible score was one point for each item while the maximum possible score was four points for each item.

Table 4

Years of Teaching and Industrial Work Experience for the Respondents

Variable	N	Mean	Standard Deviation
Years of Teaching Experience	183	9.9	7.3
Years of Work Experience	183	7.1	8.1

Table 5

Score Distribution by Categories
on Attitude Inventory

Category	No. of Items	Mean	Standard Deviation	Lowest Score Made	Highest Score Made	Highest Possible Score
Safety Responsibility*	4	12.7	1.4	8.0	16.0	16.0
Liability	5	16.8	1.9	12.0	20.0	20.0
Directing Learning*	9	27.6	2.0	21.0	34.0	36.0
Laboratory Organization*	5	13.1	1.7	8.0	18.0	20.0
Teaching Aids	4	12.7	1.5	9.0	16.0	16.0
Pupil Personnel System*	4	11.7	1.3	9.0	16.0	16.0

*Used only in comparisons of total inventory scores and not as separate categories.

Table 5 shows the lowest score made and the highest score made for each category. The higher scores are indicative of more favorable attitudes toward safety while lower scores suggest less favorable attitudes toward safety. The data suggest that respondents expressed a tendency for favorable attitudes toward safety, though the scores were not overwhelmingly high.

Table 6 shows the score distribution by categories on the Instructional Practices Inventory. The minimum possible score was one point for each "NO" response and four points for each "YES" response. Data in Table 6 show the lowest score made for each category and the highest score made for each category. The higher scores are indicative of greater use of safety instructional practices while the lower scores are indicative of lesser use of safety instructional practices. The data suggest that respondents indicated a tendency toward a moderately high use of safety instructional practices in industrial arts laboratories and classrooms.

In comparing the responses to the Attitude Inventory with the Instructional Practices Inventory, the data show that the mean score for the Liability category is closest to the highest possible score on both the Attitude Inventory and on the Instructional Practices Inventory.

Correlations Between Safety Attitudes and Instructional Practices Inventories

The results are reported here in relation to the first research question posed for this study, "What is the relationship between safety attitudes and instructional practices of secondary school industrial arts education teachers in Virginia in terms of categories and overall

Table 6

Score Distribution by Categories on Instructional Practices Inventory

Category	No. of Items	Mean	Standard Deviation	Lowest Score Made	Highest Score Made	Highest Possible Score
Safety Responsibility*	4	10.5	2.7	4.0	16.0	16.0
Liability	5	17.4	2.8	8.0	20.0	20.0
Directing Learning*	9	30.5	4.2	12.0	36.0	36.0
Laboratory Organization*	5	15.9	3.3	5.0	20.0	20.0
Teaching Aids	4	12.3	3.2	4.0	16.0	16.0
Pupil Personnel System*	4	11.3	3.0	4.0	16.0	16.0

*Used only in comparisons of total inventory scores and not as separate categories.

attitudes and practices?" Table 7 presents the correlation coefficients for the categories on the Safety Attitude Inventory which had meaningful reliability coefficients and the corresponding categories on the Instructional Practices Inventory.

As shown in Table 7, a correlation coefficient of 0.17, significant at the 0.05 level, was found between safety attitudes in the Liability category and instructional practices in the Liability category. A correlation coefficient of 0.12, significant at the 0.05 level, was found between safety attitudes in the Teaching Aids category and instructional practices in the Teaching Aids category.

In deciding what magnitude of correlation coefficient indicates a noteworthy relationship, Hinkle, Wiersma, and Jurs (1979, p. 85) suggest the following rule of thumb:

0.90 to 1.00 (-0.90 to -1.00) Very high positive (negative) correlation
0.70 to 0.90 (-0.70 to -0.90) High positive (negative) correlation
0.50 to 0.70 (-0.50 to -0.70) Moderate positive (negative) correlation
0.30 to 0.50 (-0.30 to -0.50) Low positive (negative) correlation
0.00 to 0.30 (0.00 to -0.30) Little if any correlation

Using the Hinkle, Wiersma, and Jurs' rule of thumb as a guide, these data indicate that there is little if any correlation between respondents' attitudes toward liability or teaching aids and respondents' use of instructional practices related to liability or teaching aids.

The second part of the analysis of the relationship between safety attitudes and instructional practices was to compare the responses for the total Safety Attitude Inventory to the responses for the total Instructional Practices Inventory. Table 8 shows a correlation

Table 7

Pearson Correlation Coefficients for Safety Attitude Inventory and Safety Instructional Practices Inventory by Categories

Categories	N	r	s
Attitudes Toward Liability with Instructional Practices in Liability	183	0.17	0.011
Attitudes Toward Teaching Aids with Instructional Practices in Teaching Aids	183	0.12	0.048

Table 8

Pearson Correlation Coefficients for Safety Attitude Inventory and Instructional Practices Inventory

Variables	N	r	s
Total Scores on Safety Attitudes Inventory with Total Scores on Instructional Practices Inventory	183	0.20	0.004

coefficient of 0.20, significant at the 0.05 level, between overall responses on the Safety Attitude Inventory and the overall responses on the Instructional Inventory.

These results indicate that little if any correlation exists between safety attitudes held by teachers and instructional practices used by teachers. The fact that little if any correlation exists between attitudes and practices may suggest that attitudes related to safety may influence instructional practices related to safety, but that there may be other factors in the laboratory/learning environment which influence instructional practices and may not be under the control of the teachers.

Correlations Between Years of Teaching Experience and Years of Industrial Work Experience with Categories of Safety Attitudes and Instructional Practices

The second research question stated for this study was, "Are there differences in the relationship between safety attitudes and instructional practices in terms of categories and overall attitudes and practices of secondary school industrial arts education teachers in Virginia as they relate to years of teaching experience and years of industrial work experience?" Correlation for the categories which yielded meaningful reliability coefficients are presented in this section.

Table 9 shows the Pearson correlation coefficients between years of teaching experience and safety attitudes in the Liability category and in the Teaching Aids category. No significant correlation at the 0.05 level was found between number of years of teaching experience and attitudes toward liability of attitudes toward use of teaching aids.

Table 9

Pearson Correlation Coefficients for Years of Teaching Experience and Safety Attitudes by Categories

Categories	r	s
Liability	0.01	0.434
Teaching Aids	0.00	0.443

Table 10 shows the Pearson correlation coefficients between years of teaching experience and use of instructional practices for the Liability category and for the Teaching Aids category. No significant correlation at the 0.05 level was found between the number of years of teaching experience and the use of safety instructional practices as relates to liability, while a correlation coefficient of 0.15, significant at the 0.05 level, was found between the number of years of teaching experience and use of instructional practices in the Teaching Aids category.

Table 11 presents the correlation coefficients for years of work experience and safety attitudes for the Liability category and for the Teaching Aids category. A correlation coefficient of 0.19, significant at the 0.05 level, was found between number of years of industrial work experience and safety attitudes in the Liability category. No significant relationship was found between number of years of industrial work experience and safety attitudes in the Teaching Aids category.

Correlation coefficients between number of years of industrial work experience and instructional practices are shown in Table 12. A coefficient of 0.17, significant at the 0.05 level, was found between number of years of industrial work experience and use of instructional practices in the Liability category. A coefficient of 0.15, significant at the 0.05 level was found between the number of years of industrial work experience and use of instructional practices in the Teaching Aids category.

Table 13 shows a correlation coefficient of 0.05 between number of years of teaching experience and overall safety attitudes, and a correlation coefficient of 0.10 between number of years of industrial work

Table 10

Pearson Correlation Coefficients for Years of Teaching Experience and Instructional Practices by Categories

Categories	r	s
Liability	0.10	0.091
Teaching Aids	0.15	0.020

Table 11

Pearson Correlation Coefficients for Years of Industrial Work Experience and Safety Attitudes by Categories

Categories	r	s
Liability	0.19	0.005
Teaching Aids	-0.01	0.444

Table 12

Pearson Correlation Coefficients for Years of Industrial Work Experience and Instructional Practices by Categories

Categories	r	s
Liability	0.17	0.011
Teaching Aids	0.15	0.018

Table 13

Pearson Correlations for Years of Teaching Experience and Years of Work Experience with Safety Attitudes and Instructional Practices

Safety Scale	Years of Teaching Experience		Years of Work Experience	
	r	s	r	s
1. Safety Attitudes	0.05	0.250	0.10	0.099
2. Safety Instructional Practices	0.09	0.105	0.10	0.085

experience and overall safety attitudes. Neither of the coefficients were significant at the 0.05 level.

In terms of instructional practices, the data show a correlation coefficient of 0.09 between number of years of teaching experience and overall safety instructional practices, and a correlation coefficient of 0.10 between number of years of industrial work experience and overall safety instructional practices. Neither of the coefficients were significant at the 0.05 level.

From the standpoint of the rule of thumb by Hinkle, Wiersma and Jurs, there is little if any correlation between years of teaching experience and safety attitudes or instructional practices in the Teaching Aids and the Liability categories. There is also little if any correlation between the years of work experience and the Liability or Teaching Aids categories. No relationship was found between years of teaching experience and overall safety attitudes or years of teaching experience and overall instructional practices. There was no relationship found between years of industrial work experience and overall safety attitudes or years of industrial work experience and overall instructional practices.

Summary

The presentation and analysis of data were reported in this chapter. Correlations between safety attitudes and instructional practices were analyzed according to two categories: Liability and Teaching Aids. Further, correlations between overall safety attitudes and instructional practices were presented.

The following data were also presented: (1) relationship between number of years of teaching experience and safety attitudes, (2) relationship between number of years of teaching experience and instructional practices in safety, (3) relationship between number of years of industrial work experience and safety attitudes, and (4) relationship between number of years of industrial work experience and instructional practices.

CHAPTER 5

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

This chapter presents a brief summary of the study and conclusions arrived at on the basis of the analysis of data. The chapter concludes with recommendations.

Summary

Purpose

The purpose of this study was to determine the relationship between teachers' safety attitudes and instructional practices, and to determine the relationship between years of teaching and work experience and teachers' safety attitudes and instructional practices. Specifically, the following questions provided focus for this study:

1. What is the relationship between safety attitudes and instructional practices of secondary school industrial arts education teachers in Virginia in terms of categories and overall attitudes and practices?

2. What is the relationship between years of teaching experience and years of industrial work experience and safety attitudes and instructional practices in terms of categories and overall attitudes and practices of secondary school industrial arts education teachers in Virginia?

Research Methodology

Chapter 3 described the research design and the research procedures utilized in this study. A survey instrument was mailed to 285 randomly selected industrial arts teachers drawn from the Virginia Industrial Arts Teachers' Directory, 1978-79. A return rate of 64 percent was achieved.

The survey instrument was composed of three parts: Attitude Inventory, Instructional Practices Inventory, and Teaching and Industrial Work Experience Data. The Attitude Inventory was designed to ascertain the general perception of teachers toward safety instruction. The Instructional Practices Inventory was designed to ascertain whether teachers included safety components in their instructional program.

Questions on the inventories were grouped according to the following six categories: (1) Safety Responsibility, (2) Liability, (3) Directing and Supervising Learning, (4) Laboratory Organization, (5) Teaching Aids, and (6) Pupil Personnel System. The inventories contained thirty-one parallel statements grouped in the six categories.

The Safety Attitudes Inventory had a four-choice response format where teachers were asked to check one of the following responses: Strongly Agree, Agree, Disagree, or Strongly Disagree for each of the thirty-one statements. The Instructional Practices Inventory had a "YES/NO" format where teachers were asked to indicate whether or not they included the thirty-one safety practices in their laboratory or classroom instruction.

The third section of the survey instrument was the Teaching and Industrial Work Experience section. Teachers were asked to write, in the space provided, the number of years of teaching experience and the number of years of industrial work experience they had gained.

The survey instrument was validated by a panel of experts. The reliability of the survey instrument was established by computing the Cronbach Alpha coefficients for the overall scores and for each category. While only two of the categories yielded meaningful reliability

coefficients, each of the overall inventories were found to have reliability coefficients which were meaningful.

Presentation and Analysis of Data

Pearson correlation coefficients were computed on responses to the Attitude Inventory with those on the Instructional Practices Inventory, category by category, and overall. Further, correlations were computed for years of teaching experience and years of industrial work experience with scores on the Safety Attitude Inventory and with scores on the Instructional Practices Inventory.

Findings of the Study

The analysis of the responses to the Safety Attitude Inventory, the Instructional Practices Inventory, and the Teaching Experience and Industrial Work Experience Data indicated that:

1. In correlating the responses for the Liability category on the Safety Attitude Inventory with the Liability category on the Instructional Practices Inventory, a coefficient of 0.17 was found. In correlating the responses for the Teaching Aids category on the Safety Attitude Inventory with the Teaching Aids category on the Instructional Practices Inventory, a coefficient of 0.12 was found. Both were significant at the 0.05 level.

2. A significant correlation coefficient of 0.20 was found between overall responses on the Safety Attitude Inventory and the overall responses on the Instructional Practices Inventory.

3. No significant correlation was found between number of years of teaching experience and responses on the Liability category or the Teaching Aids category on the Safety Attitude Inventory.

4. No significant correlation was found between number of years of teaching experience and responses on the Liability category of the Instructional Practices Inventory, while a significant correlation coefficient of 0.15 was found for years of teaching experience and the Teaching Aids category of the Instructional Practices Inventory.

5. A significant correlation coefficient of 0.19 was found between number of years of industrial work experience and responses on the Liability category of the Safety Attitude Inventory. No significant correlation was found between industrial work experience and responses on the Teaching Aids category of the Safety Attitude Inventory.

6. A significant coefficient of 0.17 was found between number of years of industrial work experience and responses on the Liability category of the Instructional Practices Inventory, while a significant correlation coefficient of 0.15 was found between the number of years of industrial work experience and the Teaching Aids category of the Instructional Practices Inventory.

7. No significant correlation was found between number of years of teaching experience and overall responses on the Safety Attitude Inventory or on the Instructional Practices Inventory.

8. No significant correlation was found between number of years of industrial work experience and overall responses on the Safety Attitude Inventory or on the Instructional Practices Inventory.

9. Although several of the correlation coefficients were statistically significant, they were all less than 0.30, indicating according to the Hinkle, Wiersma and Jurs' (1979, p. 85) rule of thumb, that little if any relationship existed.

Conclusions

The following conclusions were drawn from the data presented and analyzed for this study:

1. Safety attitudes expressed by industrial arts education teachers may not be considered as predictors of their instructional practices relating to safety.

2. Industrial work experience is not an important variable in predicting the safety attitudes or instructional practices of industrial arts education teachers.

3. The number of years of teaching experience gained by industrial arts education teachers has little relationship to the safety attitudes or instructional practices of industrial arts education teachers.

Recommendations

Based on the experience of the researcher and findings of the study, it is recommended that:

1. The result of the frequency distribution on the instructional practices and safety attitude inventories be carefully studied and used in developing content for in-service programs for industrial arts education teachers.

2. A study be conducted to determine the frequency and causes of types of accidents in industrial arts laboratories and classrooms in Virginia.

3. A follow-up study of industrial arts graduates be conducted to determine on-the-job effectiveness of safety instruction given in

industrial arts undergraduate programs.

4. The effect of the teaching environment and the impact of the Occupational Safety and Health Act (OSHA) on safety attitudes and instructional practices be studied.

5. The multiple cause concept in accident prevention be studied by industrial arts teachers and teacher educators.

6. A study be conducted to determine the role that "fear of liability" plays in shaping the instructional practices of industrial arts education teachers.

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APPENDIX A

UNDERGRADUATE PREPARATION IN SAFETY EDUCATION: SUGGESTED COMPETENCIES

Undergraduate Preparation in Safety Education*

Suggested Competencies

A. Cognitive Domain (Knowledge)

1. Demonstrates familiarity with a variety of methods and techniques for determining safety needs and problems.

2. Identifies the significant present and emerging safety related problems and issues in the school, the community, and society at large.

3. Exhibits a knowledge of the influences of political, social, and economic factors on the safety of individuals.

4. Exhibits a knowledge of the problems facing people in living safely and demonstrates ability to aid in the solution of these problems.

5. Interprets legislation relating to safety programs.

6. Identifies information, services and other resources for safety programs.

7. Describes the relationship of the biological, social and behavioral sciences to the causes, prevention and/or solution of problems of safe living.

8. Exhibits a knowledge of the various components of the school safety program as set forth by particular state governing agencies.

9. Exhibits knowledge of the impact of the emotional and physical climate of the school on the safety of students.

10. Identifies symptomatic changes in student appearance and behavior which may indicate the presence of problems that could affect safe living.

11. Demonstrates ability to use a variety of media and methods in planning and implementing safety of students.

12. Identifies a variety of safety teaching-learning opportunities.

13. Demonstrates application of measurement and evaluation techniques to safety problems and program.

14. Displays an understanding of both traditional and contemporary subject matter content of the safety education discipline.

Suggested Competencies, continued

15. Identifies and expands on the different areas of a total safety program.

16. Demonstrates ability to make specific application of competencies existing in the cognitive domain to the student in all aspects of school and community life.

B. Affective Domain (Emotions, feelings, attitudes)

1. Displays regard for personal and environmental safety as a state of being rather than as a subject to be taught.

2. Exhibits a sustained interest in rapidly changing scientific knowledge concerning safety.

3. Declares a commitment to continued and constant study in safety education and related fields.

4. Promotes value of the total community, in particular the home and school, having unique responsibility in matters affecting the safety of individuals.

5. Defends the value of articulating safety education at various levels among and between program offering agencies.

6. Conveys beliefs that safety is a positive force in everyday living.

7. Exhibits responsiveness to the changing patterns of behavior and their effect on safe living.

8. Subscribes to the belief that example and precept contribute to the teaching-learning process of safety.

9. Defends belief that a positive self-image contributes to safe behavior.

10. Displays a genuine interest in and enthusiasm for assignments in accident prevention and injury control.

11. Encourages others to consider career commitments in accident prevention.

12. Develops safety awareness programs through a positive rather than a negative approach.

Suggested Competencies, continued

C. Psychomotor Domain (Action)

1. Communicates effectively with the public's concern with safety.

2. Participates actively as a member of professional organizations promoting safety.

3. Works cooperatively with other personnel in safety.

4. Demonstrates leadership in safety planning and evaluation.

5. Displays initiative in encouraging expansion of safety activities.

6. Encourages individuals to accept responsibility for their safety and the safety of others.

7. Keeps accurate records of accidents and follow-up actions.

8. Develops instructional guides, unit plans and lessons suitable for use in safety education.

9. Structures teaching-learning environments and experiences conducive to effective safety instruction.

10. Masters utilization of technological delivery systems relative to safety communication.

11. Assigns individuals to activities, particularly those with hazard potential, on the basis of health records, accident experience and other available information.

*American Association for Health, Physical Education, and Recreation. Safety Recreation. Washington, D.C.: American Association for Health, Physical Education, and Recreation, 1974. pp. 95-96.

APPENDIX B

SAFETY PRACTICES LISTED BY TEACHER REPRESENTATIVES

NORFOLK STATE COLLEGE
2401 CORPREW AVENUE
NORFOLK, VIRGINIA 23504

March 14, 1979

I am in the process of developing a study on instructional practices in safety in industrial arts. You have been identified as a person who could provide valuable assistance in developing the questionnaire which will be used for data collection.

Please jot down on the attached page ten (10) instructional practices or techniques in safety which you use in your classes. This information will be used with that received from others to validate questions for the questionnaire. Your responses will be greatly appreciated.

If you have questions in regard to this request, please contact me or in your school. He has agreed to collect the responses for me and to serve as a contact person.

Thank you very much in advance for your help in this endeavor.

Yours truly,

Jack P. Witty
Industrial Arts Instructor
623-8658 Office
464-5118 Home

Safety Practices Listed by Teacher Representatives

(Identified by Classroom Teachers in the Instrument Development Process)

Safety quizzes, tests

Safety posters, pamphlets, bulletin boards, charts

Lectures on safety

Safety demonstrations

Enforcing the wearing of safety glasses

Incorporating safety in every demonstration

Explanation and enforcing of safety rules

Using student safety engineer and safety foreman

Using parental permission sign-off cards

Films and filmstrips on safety in general and on specific machine operations

Disciplining students who refuse to observe safety rules

Bolting down all equipment to floor

Showing films and holding discussions on the consequences on not observing safety procedures

Requiring students to make and file written records of safety violations immediately following violation

Teaching safe use of hand tools, machines, and equipment

Restricting operation of power equipment to one student at a time

Use of safety guards on machines

Requiring students to wear protective clothing

Not permitting horseplaying

Checking all tools and machines for safety

Requiring students to report all accidents

Restricting weak students from dangerous areas

Keeping floors clean of all debris

Requiring students to copy and keep in their notebooks safety rules for each unit covered

Sharing newspaper articles on industrial accidents

Conducting individual conferences with problem students

Students are not permitted to use any machines until after they pass a safety test on each machine.

APPENDIX C

NAMES OF PANEL OF EXPERTS

Mr. Farris Anderson
United States Department of Labor
Occupational Safety and Health Administration
District Supervisor
Norfolk, Virginia 23502

Mr. Edmond M. Boggs
Commissioner of Safety
Department of Labor and Industry
Post Office Box 1814
Richmond, Virginia 23214

Dr. John Bonfadini
Supervisor of Industrial Arts
Prince William County Schools
Post Office Box 389
Manassas, Virginia 22110

Mr. Robert Beauter
Supervisor of Industrial Arts
Norfolk Public Schools
800 East City Hall Avenue
Post Office Box 1357
Norfolk, Virginia 23501

Dr. Marc Caron
Assistant Professor of Industrial Arts
Norfolk State University
2401 Corprew Avenue
Norfolk, Virginia 23504

Dr. Arvid Van Dyke
Curriculum Specialist
Industrial Arts Education
Virginia State University
Post Office Box 261
Petersburg, Virginia 23803

Mr. A. E. Harrington
Associate Professor of Industrial Arts
Specialist in Safety
North East Missouri State University
Kirksville, Missouri 63501

Mr. Rayford Harris
Associate Professor of Industrial Arts Education
Virginia State University
Petersburg, Virginia 23803

Mr. Thomas A. Hughes, Jr.
Supervisor of Industrial Arts Education
State Department of Education
Post Office Box 6Q
Richmond, Virginia 23216

Dr. David Joyner
Professor and Chairman of Industrial Arts Education
Old Dominion University
Post Office Box 6173
Norfolk, Virginia 23508

Mr. William Kern
Blair Junior High School
730 Spotswood Avenue
Norfolk, Virginia 23417

Mr. Chester R. Lane
Director of Vocational Education
Martinsville High School
Northside High School
Martinsville, Virginia 24112

Mr. Russell G. Louis
Associate Professor of Industrial Arts Education
Virginia Polytechnic Institute and State University
Blacksburg, Virginia 24061

Mr. George Litman
Curriculum Specialist in Industrial Arts
6131 Willston Drive
Falls Church, Virginia 22044

Mr. Marshall O. Tetterton
Assistant State Supervisor of Industrial Arts Education
State Department of Education
Post Office Box 6Q
Richmond, Virginia 23211

Mr. Henry L. Wyatt
Industrial Arts Instructor
Hermitage High School
Lynchburg, Virginia 24502

APPENDIX D

LETTERS TO PANEL OF EXPERTS AND INSTRUMENT CONTENT VALIDATION SHEET USED BY PANEL OF EXPERTS

NORFOLK STATE COLLEGE
2401 CORPREW AVENUE
NORFOLK, VIRGINIA 23504

March 8, 1979

I am in the process of developing a study of the relationship between safety attitudes and instructional practices of secondary school industrial arts teachers in Virginia.

A two-part questionnaire has been developed for use as a survey instrument. In order to make the questionnaire the best possible, I am asking selected experts in industrial arts and in safety to examine it and give me feedback on suggested improvements. You have been identified as a person whose input would be most valuable to this study, and I solicit your assistance.

Enclosed is the questionnaire. Please check each item for clarity and freedom from ambiguities. Also, please check the total questionnaire for coverage of the topic.

Please place a ( ) by each item if you feel it is a good one. For items which need additional work, please make the notations and/or corrections.

Your assistance in this endeavor will be greatly appreciated.

A stamped self-addressed envelope is enclosed for the return mailing.

Thank you very much for your attention to this study.

Yours truly,

Jack P. Witty
Associate Professor of
Industrial Arts
Norfolk State College
Graduate Student, VPI

JPW/cw

Enclosure

NORFOLK STATE COLLEGE
2401 CORPREW AVENUE
NORFOLK, VIRGINIA 23504

Dear

A few weeks ago I requested your assistance in validating an instrument which I am developing to study safety attitudes and instructional practices of industrial arts teachers. The response which I received was very helpful.

In keeping with the feedback which I received from the panel, I have revised the instrument. I need to call upon you again for your reaction to the revised instrument.

Enclosed is the two-part inventory and an Instrument Content Validation Sheet. Please check each item of the inventory for clarity and freedom from ambiguities. Also, please check the total inventory for coverage of the topic.

Six questions are asked on the Instrument Content Validation Sheet. Please respond to each question and return the Instrument Content Validation Sheet along with the inventory to me in the enclosed self-addressed stamped envelope. Notice that question number six requests your reaction to the attitude inventory in terms of negative (-) or positive (+) direction of each of the statements.

It is not necessary for you to complete the four part scale on the inventory.

I certainly want to thank you for taking time to participate in this research project. I will send to you copies of the results of the study when it is completed.

Thank you very much.

Very truly yours,

Jack P. Witty
Graduate Student, VPI & SU

SAFETY ATTITUDES AND INSTRUCTIONAL PRACTICES STUDY

Instrument Content Validation Sheet

Part I: Safety Attitudes Inventory

A. Directions: After reading the Safety Attitude Inventory, please answer the questions below by circling yes or no.

Yes No 1. Are the items properly categorized?
If no, please indicate suggested changes.

Yes No 2. Are the items in each category representative of the category?
If no, please indicate changes by writing on the inventory.

Yes No 3. Are there items which should be added?
If yes, please write items on back of inventory.

Yes No 4. Are the statements understandable to teachers?
If no, please indicate suggested changes by writing on the inventory.

Yes No. 5. Does each statement represent only one concept?
If no, please indicate suggested changes by writing on the inventory.

B. Directions: Your opinion on the positive or negative direction of each statement is needed to help validate the scoring procedure and key which I have established for each inventory.

Please give your opinion as to whether each statement reflects a positive attitude or a negative attitude. Use the symbols preceeding each statement on the inventory to give your opinion. Draw a circle around "+" if you think the statement is favorable toward safety. Draw a circle around "-" if you think the statement is unfavorable toward safety. Any additional comments you give me will be greatly appreciated.

SAFETY ATTITUDES AND INSTRUCTIONAL
PRACTICES STUDY

Instrument Content Validation Sheet

Part II: Instructional Practices Inventory

A. Directions: Please read the statements on the inventory. Give your opinion of the inventory by checking yes or no for the questions listed below.

Yes No 1. Are the items properly categorized?
If no, please indicate suggested changes.

Yes No 2. Are the items in each category representative of the category?
If no, please indicate changes by writing on the inventory.

Yes No 3. Are there items which should be added?
If yes, please write items on back of inventory.

Yes No 4. Are the statements understandable to teachers?
If no, please indicate suggested changes by writing on the inventory.

Yes No 5. Does each statement represent only one concept?
If no, please indicate suggested changes by writing on the inventory.

B. Directions: Please give your opinion as to whether each statement reflects a positive (desirable) instructional practice or a negative (undesirable) instructional practice. Use the symbols preceeding each statement on the inventory to indicate your opinion. Draw a circle around "+" if you think the statement reflects a positive practice. Draw a circle around "-" if you think the statement reflects a negative practice. Please use the symbols (+ or -) preceeding each statement on the inventory.

APPENDIX E

FINAL INSTRUMENT: SAFETY ATTITUDES AND INSTRUCTIONAL PRACTICES OF INDUSTRIAL ARTS TEACHERS INVENTORY

Safety Attitudes and Instructional
Practices of Industrial Arts Teachers
Inventory

PART I - Directions: The following statements represent different positions on safety and safety instruction in industrial arts classes. Please indicate the extent of your agreement with the statements by circling the number which most closely represents your feelings. Please use the following guide:

1 = Strongly Agree
2 = Agree
3 = Disagree
4 = Strongly Disagree

	Strongly Agree	Agree	Disagree	Strongly Disagree
Safety Responsibilities				
1. Each teacher needs a written safety program.	1	2	3	4
2. Teachers should not expect help from parents in developing the safety program.	1	2	3	4
3. If the administration values a safety program, then it should be properly funded.	1	2	3	4
4. Industrial arts teachers are not placing enough emphasis on safety.	1	2	3	4
Liability				
1. OSHA regulations should be applied to school industrial arts laboratories.	1	2	3	4
2. Negligence may be indicated by teachers who provide poor safety instruction.	1	2	3	4
3. If teachers let students use unsafe machines they may expect trouble.	1	2	3	4
4. Filing reports for all accidents is a good procedure.	1	2	3	4

	Strongly Agree	Agree	Disagree	Strongly Disagree
Liability, continued				
5. Liability insurance is a vital part of a safety program.	1	2	3	4
Directing and Supervising Learning				
1. Safety objectives are just as important as skill objectives.	1	2	3	4
2. Talking with students is the best way to evaluate safety learning.	1	2	3	4
3. Even though a student works safely, safety tests are important.	1	2	3	4
4. Safety instruction is best taught as a separate instructional unit.	1	2	3	4
5. The example that the teacher sets is more important than safety instruction.	1	2	3	4
6. Accident repeaters should be removed from the laboratory.	1	2	3	4
7. The more students know about hazards, the safer they will perform.	1	2	3	4
8. Laboratory classes are better off without safety regulations and restrictions.	1	2	3	4
9. Routine safety inspections are a waste of time.	1	2	3	4
Laboratory Organization				
1. Teachers cannot be held responsible for the orderly arrangement of equipment.	1	2	3	4
2. The use of safety lanes around machines is a sign of a good safety program.	1	2	3	4

	Strongly Agree	Agree	Disagree	Strongly Disagree
Laboratory Organization, continued				
3. Students should be allowed to work in all areas of the laboratory.	1	2	3	4
4. Any type of system for distribution of materials is better than no system at all.	1	2	3	4
5. Centralized storage is safer than decentralized storage for accessories and materials.	1	2	3	4
Teaching Aids				
1. Using AV aids in safety instruction wastes valuable time.	1	2	3	4
2. Safety precautions on project sheets make students too cautious.	1	2	3	4
3. Safety posters and bulletin boards should emphasize the positive approach.	1	2	3	4
4. Suggestion boxes for student input on safety are useless.	1	2	3	4
Pupil Personnel System				
1. A student safety management system is indispensable in the safety program.	1	2	3	4
2. Housekeeping duties are overemphasized in safety.	1	2	3	4
3. A pupil personnel system is no good without checklists or a reporting system.	1	2	3	4
4. No program should operate without student pledge cards.	1	2	3	4

PART II - Directions: Please indicate whether or not the following items are included in your industrial arts instructions by drawing a circle around YES or NO.

Directing and Supervising Learning

Yes No 1. The teacher models good safety behavior.

Yes No 2. Students must pass safety performance tests before using equipment.

Yes No 3. Specific objectives in safety skills are identified on instructional units.

Yes No 4. Safety skills of each student are recorded and studied.

Yes No 5. Written safety tests are required.

Yes No 6. Students are required to make a careful analysis of laboratory hazards.

Yes No 7. Safety instruction is integrated into all instructional units.

Yes No 8. Routine safety inspections are conducted.

Yes No 9. Safety regulations and restrictions are strictly enforced.

Liability

Yes No 1. Faulty machines and equipment are clearly tagged and removed from service.

Yes No 2. The teacher is knowledgeable about OSHA safety standards related to liability.

Yes No 3. Written reports are filed for each accident which occurs in the laboratory.

Yes No 4. Written evidence of safety instruction is available.

Yes No 5. The teacher is covered with liability insurance.

Safety Responsibilities

Yes No 1. A written safety program is followed.

Yes No 2. Parents participated in developing safety program.

Yes No 3. The teacher accepts personal responsibility for the safety of all students.

Safety Responsibilities, continued

Yes No 4. Funds are allocated for correcting or eliminating unsafe conditions.

Teaching Aids

Yes No 1. Safety posters, bulletin board displays, and safety exhibits are used.

Yes No 2. A procedure for soliciting student suggestions related to safety is used.

Yes No 3. Films, filmstrips, photographs, and recordings on safety are readily available.

Yes No 4. Instruction and project sheets are used which include safety precautions.

Pupil Personnel System

Yes No 1. Duties relating to housekeeping and safety are clearly assigned to students.

Yes No 2. A safety management system is used which includes safety engineer and foreman.

Yes No 3. A safety pledge card is required.

Yes No 4. A reporting system for evaluating students' performance of duties is used.

Laboratory Organization

Yes No 1. There is a materials flow system for distribution of materials.

Yes No 2. Work stations are identified and assigned in terms of safety.

Yes No 3. Equipment is arranged to facilitate safe traffic flow and equipment usage.

Yes No 4. Safety lanes are used around machines in the laboratory.

Yes No 5. Decentralized storage is provided for accessories and materials.

PART III - Background Data
Directions: Please fill in the blanks.

1. How many years of teaching experience have you had? _____

2. How many years of industrial work experience have you had? _____

THANK YOU!

Please return this form within 24 hours after you receive it in the enclosed stamped self-addressed envelope to: Jack P. Witty, 1436 Sir Richard Road, Virginia Beach, Virginia 23455 - Telephone Numbers: (804) 623-8658 Office, (804) 464-5118 Home.

APPENDIX F

LETTER TO SUPERINTENDENTS

NORFOLK STATE COLLEGE
2401 CORPREW AVENUE
NORFOLK, VIRGINIA 23504

March 23, 1979

I would like to request your support and approval for a survey of Industrial Arts teachers in the state of Virginia in conjunction with a doctoral dissertation being written at Virginia Polytechnic Institute and State University.

The purposes of the questionnaire are to:

(1) Ascertain Safety Attitudes of Industrial Arts teachers in the State of Virginia.

(2) Ascertain Instructional Practices pertaining to safety in the Industrial Arts laboratory.

Your cooperation in this research project will be greatly appreciated. If you have any objections to this survey, please notify me within seven days. If I do not hear from you, I will proceed with the survey with the understanding that you do not object.

Thank you in advance.

Yours truly,

Jack P. Witty
Graduate Student VPI

APPENDIX G

COVER LETTER ACCOMPANYING QUESTIONNAIRE

TO TEACHERS AND FOLLOW-UP LETTERS

NORFOLK STATE COLLEGE
2401 CORPREW AVENUE
NORFOLK, VIRGINIA 23504

June 27, 1979

Dear Industrial Arts Educator,

You have been selected to participate in a doctoral study on safety. Your time, effort, and cooperation will contribute to a study that hopefully will help to strengthen the teaching of safety in industrial arts laboratories in the Commonwealth of Virginia.

The enclosed inventory has two purposes:

(1) To ascertain safety attitudes of industrial arts teachers in Virginia.

(2) To ascertain instructional practices pertaining to safety which are used by teachers in the industrial arts laboratories in Virginia.

The inventory is being sent to a randomly selected group of industrial arts teachers taken from the Virginia Industrial Arts Directory, 1979. Please rest assured that your responses will be confidential. The number in the lower right hand corner of the inventory will be used to identify respondents so follow-up procedure may be employed, and will not be used for purposes of data analysis.

Your division superintendent has generously approved your participation in this study. Hopefully your efforts will have a long term payoff by helping to prepare safer and more knowledgeable workers in industrial arts.

Please given us your prompt assistance. Please return the inventory within twenty-four hours after you receive it in the enclosed stamped self-addressed envelope to Jack P. Witty, 1436 Sir Richard Road, Virginia Beach, Virginia 23455. It will be greatly appreciated.

Very truly yours,

William E. Dugger, Jr.
Advisor, VPI & SU

Very truly yours,

Jack P. Witty
Graduate Student, VPI & SU

NORFOLK STATE COLLEGE
2401 CORPREW AVENUE
NORFOLK, VIRGINIA 23504

July 18, 1979

Dear Industrial Arts Educator:

About two weeks ago you were asked to participate in a doctoral study on safety. Just in case the instrument got lost in the mail or misplaced, I am enclosing a duplicate copy for your response. Please take a few minutes to complete it and return it in the enclosed stamped self-addressed envelope. Your assistance is vitally important to the success of this study since efforts were made to include data from a statewide random sample. If your inventory is already in the mail please disregard this one and accept my thanks.

The purposes of the instrument are:

(1) To ascertain safety attitudes of industrial arts teachers in Virginia.

(2) To ascertain instructional practices pertaining to safety which are used by teachers in the industrial arts laboratories in Virginia.

The inventory is being sent to a randomly selected group of industrial arts teachers taken from the Virginia Industrial Arts Directory, 1979. Please rest assured that your responses will be confidential. The number in the lower right hand corner of the inventory will be used to identify respondents so follow-up procedures may be employed, and will not be used for purposes of data analysis.

Your division superintendent has generously approved your participation in this study. Hopefully your efforts will have a long term pay-off by helping to prepare safer and more knowledgeable workers in industrial arts.

Please return the inventory within twenty-four hours after you receive it to Jack P. Witty, 1436 Sir Richard Road, Virginia Beach, Virginia 23455. A stamped self-addressed envelope is enclosed. Your assistance will be greatly appreciated.

Very truly yours,

Jack P. Witty
Graduate Student
VPI & SU

Postal Card Follow-Up

Dear Industrial Arts Educator,

This time of the year always finds us very busy with a number of projects on our agenda. I am grateful to you for taking time to respond to the questionnaire which I sent to you recently. If you have not gotten a chance to return the questionnaire to me, I hope you will take a few minutes to do so today. Your help is very much needed in this study.

Please disregard this reminder and accept my thanks if your response is already in the mail.

Sincerely yours,

Jack P. Witty

August 30, 1979

Dear Industrial Arts Educator:

I hope you had an enjoyable summer, and that the opening of the school year is satisfying and challenging. As you return to school, you will probably find two copies of a questionnaire from me on safety. Please take a few minutes to complete the instrument and return it to me right away. I still need your response. Your assistance in this study will be greatly appreciated.

If you have already mailed your questionnaire to me, please accept my thanks. If not, please do so because your response is a valuable part of this study.

Very truly yours,

Jack P. Witty
Graduate Student
VPI and SU

APPENDIX H

NON-RESPONSE INVESTIGATION GUIDE

Non-Response Investigation Guide

Hello, Mr. , my name is Jack P. Witty. I am conducting a study of safety attitudes and instructional practices of industrial arts teachers in Virginia. As a part of the study, questionnaires were mailed to randomly selected teachers during the later part of June and the first of July. I am calling you now because your name was one of those selected and I have not yet received your response.

1. Did you receive a questionnaire on safety from me during the summer.

   _____YES _____NO

   (If YES is checked, go to number 2. If NO is checked, go to number 3.)

2. If you have already mailed the questionnaire to me, please accept my thanks. If you have not returned it, please permit me to ask you some questions.

3. I am sorry that you did not receive the questionnaire because your participation is valuable to the study. Please permit me to ask you some questions.

4. How many years of teaching experience have you had? _____

5. How many years of industrial work experience have you had? _____

APPENDIX I

FREQUENCY DISTRIBUTION

Frequency Distribution for Teaching Experience

No. of Years Teaching	Absolute Freq	Relative Freq (PCT)	Adjusted Freq (PCT)	Cum Freq (PCT)
1	11	6.0	6.0	6.0
2	9	4.9	4.9	10.9
3	15	8.2	8.2	19.1
4	6	3.3	3.3	22.4
5	17	9.3	9.3	31.7
6	12	6.6	6.6	38.3
7	11	6.0	6.0	44.3
8	12	6.6	6.6	50.8
9	12	6.6	6.6	57.4
10	13	7.1	7.1	64.5
11	10	5.5	5.5	69.9
12	4	2.2	2.2	72.1
13	6	3.3	3.3	75.4
14	4	2.2	2.2	77.6
15	11	6.0	6.0	83.6
17	3	1.6	1.6	85.2
18	2	1.1	1.1	86.3
19	3	1.6	1.6	88.0
20	4	2.2	2.2	90.2
21	2	1.1	1.1	91.3
22	3	1.6	1.6	92.9
23	3	1.6	1.6	94.5
24	1	0.5	0.5	95.1
27	1	0.5	0.5	95.6
28	3	1.6	1.6	97.3
29	2	1.1	1.1	98.4
30	2	1.1	1.1	99.5
40	1	0.5	0.5	100.0
TOTAL	183	100.0	100.0	

Frequency Distribution for Work Experience

No. of Years Worked	Absolute Freq	Relative Freq (PCT)	Adjusted Freq (PCT)	Cum Freq (PCT)
0	39	21.3	21.3	21.3
1	14	7.7	7.7	29.0
2	16	8.7	8.7	37.7
3	18	9.8	9.8	47.5
4	12	6.6	6.6	54.1
5	10	5.5	5.5	59.6
6	7	3.8	3.8	63.4
7	7	3.8	3.8	67.2
8	5	2.7	2.7	69.9
9	4	2.2	2.2	72.1
10	7	3.8	3.8	76.0
12	7	3.8	3.8	79.8
13	1	0.5	0.5	80.3
14	4	2.2	2.2	82.5
15	4	2.2	2.2	84.7
16	1	0.5	0.5	85.2
17	2	1.1	1.1	86.3
20	7	3.8	3.8	90.2
21	2	1.1	1.1	91.3
22	1	0.5	0.5	91.8
23	3	1.6	1.6	93.4
24	2	1.1	1.1	94.5
25	1	0.5	0.5	95.1
26	2	1.1	1.1	96.2
28	1	0.5	0.5	96.7
30	5	2.7	2.7	99.5
31	1	0.5	0.5	100.0
TOTAL	183	100.0	100.0	

Frequency Distribution

Safety Attitudes and Instructional
Practices of Industrial Arts Teachers
Inventory

PART I - Directions: The following statements represent different positions on safety and safety instruction in industrial arts classes. Please indicate the extent of your agreement with the statements by circling the number which most closely represents your feelings. Please use the following guide:

1 = Strongly Agree
2 = Agree
3 = Disagree
4 = Strongly Disagree

	Strongly Agree	Agree	Disagree	Strongly Disagree
Safety Responsibilities				
1. Each teacher needs a written safety program.	105(57.4)	67(36.6)	11(6.0)	0(0)
2. Teachers should not expect help from parents in developing the safety program.	10(5.5)	47(25.7)	88(48.1)	38(20.8)
3. If the administration values a safety program, then it should be properly funded.	111(60.7)	64(35.0)	3(1.6)	5(2.7)
4. Industrial arts teachers are not placing enough emphasis on safety.	10(5.5)	54(29.5)	84(45.9)	35(19.1)
Liability				
1. OSHA regulations should be applied to school industrial arts laboratories.	49(26.8)	82(44.8)	39(21.3)	13(7.1)
2. Negligence may be indicated by teachers who provide poor safety instruction.	50(27.3)	121(66.1)	12(6.6)	0(0)
3. If teachers let students use unsafe machines they may expect trouble.	120(65.6)	61(33.3)	1(0.5)	1(0.5)
4. Filing reports for all accidents is a good procedure.	108(59.0)	71(38.8)	4(2.2)	0(0)
5. Liability insurance is a vital part of a safety program.	106(57.9)	68(37.2)	7(3.8)	2(1.1)

	Strongly Agree	Agree	Disagree	Strongly Disagree
Directing and Supervising Learning				
1. Safety objectives are just as important as skill objectives.	112(61.2)	68(37.2)	3(1.6)	0(0)
2. Talking with students is the best way to evaluate safety learning.	14(7.7)	53(29.0)	108(59.0)	8(4.4)
3. Even though a student works safety, safety tests are important.	61(33.3)	110(60.1)	11(6.0)	1(0.5)
4. Safety instruction is best taught as a separate instructional unit.	18(9.8)	39(21.3)	104(56.8)	22(12.0)
5. The example that the teacher sets is more important than safety instruction.	43(23.5)	89(48.6)	46(25.1)	5(2.7)
6. Accident repeaters should be removed from the laboratory.	70(38.3)	74(40.4)	36(19.7)	3(1.6)
7. The more students know about hazards, the safer they will perform.	45(24.6)	117(63.9)	21(11.5)	0(0)
8. Laboratory classes are better off without safety regulations and restrictions.	0(0)	1(0.5)	28(15.3)	154(84.2)
9. Routine safety inspections are a waste of time.	2(1.1)	2(1.1)	52(28.4)	127(69.4)
Laboratory Organization				
1. Teachers cannot be held responsible for the orderly arrangement of equipment.	5(2.7)	25(13.7)	100(54.6)	53(29.0)
2. The use of safety lanes around machines is a sign of a good safety program.	34(18.6)	113(61.7)	32(17.5)	4(2.2)
3. Students should be allowed to work in all areas of the laboratory.	14(7.7)	64(35.0)	81(44.3)	24(13.1)
4. Any type of system for distribution of materials is better than no system at all.	17(9.3)	106(57.9)	52(28.4)	8(4.4)
5. Centralized storage is safer than decentralized storage for accessories and materials.	29(15.8)	106(57.9)	43(23.5)	5(2.7)

	Strongly Agree	Agree	Disagree	Strongly Disagree
Teaching Aids				
1. Using AV aids in safety instruction wastes valuable time.	3(1.6)	4(2.2)	105(57.4)	71(28.8)
2. Safety precautions on project sheets make students too cautious.	2(1.1)	6(3.3)	129(70.5)	46(25.1)
3. Safety posters and bulletin boards should emphasize the positive approach.	55(30.1)	114(2.3)	14(7.7)	0(0)
4. Suggestion boxes for student input on safety are useless.	3(1.6)	27(14.8)	127(69.4)	26(14.2)
Pupil Personnel System				
1. A student safety management system is indispensable in the safety program.	31(16.9)	112(61.2)	39(21.3)	1(0.5)
2. Housekeeping duties are overemphasized in safety.	2(1.1)	9(4.9)	119(65.0)	53(29.0)
3. A pupil personnel system is no good without checklists or a reporting system.	18(9.8)	113(61.7)	51(27.9)	1(0.5)
4. No program should operate without student pledge cards.	8(4.4)	39(21.3)	126(68.9)	10(5.5)

PART II - Directions: Please indicate whether or not the following items are included in your industrial arts instructions by drawing a circle around YES or NO.

YES	NO		Directing and Supervising Learning
181(98.9)	2(1.1)	1.	The teacher models good safety behavior.
153(83.6)	30(16.4)	2.	Students must pass safety performance tests before using equipment.
154(84.2)	29(15.8)	3.	Specific objectives in safety skills are identified on instructional units.
82(44.8)	101(55.2)	4.	Safety skills of each student are recorded and studied.
147(80.3)	36(19.7)	5.	Written safety tests are required.
89(48.6)	94(51.4)	6.	Students are required to make a careful analysis of laboratory hazards.
176(96.2)	7(3.8)	7.	Safety instruction is integrated into all instructional units.
156(85.2)	27(14.8)	8.	Routine safety inspections are conducted.
175(95.6)	8(4.4)	9.	Safety regulations and restrictions are strictly enforced.
			Liability
154(84.2)	29(15.8)	1.	Faulty machines and equipment are clearly tagged and removed from service.
119(65.0)	64(35.0)	2.	The teacher is knowledgeable about OSHA safety standards related to liability.
145(79.2)	38(20.8)	3.	Written reports are filed for each accident which occurs in the laboratory.
165(90.2)	18(9.8)	4.	Written evidence of safety instruction is available.
172(94.0)	11(6.0)	5.	The teacher is covered with liability insurance.
			Safety Responsibilities
139(76.0)	44(24.0)	1.	A written safety program is followed.
12(6.6)	171(93.4)	2.	Parents participated in developing safety program.
148(80.9)	35(19.1)	3.	The teacher accepts personal responsibility for the safety of all students.
100(54.6)	83(45.4)	4.	Funds are allocated for correcting or eliminating unsafe conditions.

YES	NO		
			Teaching Aids
170(92.9)	13(7.1)	1.	Safety posters, bulletin board displays, and safety exhibits are used.
82(44.8)	101(55.2)	2.	A procedure for soliciting student suggestions related to safety is used.
129(70.5)	54(29.5)	3.	Films, filmstrips, photographs, and recordings on safety are readily available.
128(69.9)	55(30.1)	4.	Instruction and project sheets are used which include safety precautions.
			Pupil Personnel System
169(92.3)	14(7.7)	1.	Duties relating to housekeeping and safety are clearly assigned to students.
108(59.0)	75(41.0)	2.	A safety management system is used which includes safety engineer and foreman.
46(25.1)	137(74.9)	3.	A safety pledge card is required.
124(67.8)	59(32.2)	4.	A reporting system for evaluating students' performance of duties is used.
			Laboratory Organization
104(56.8)	79(43.1)	1.	There is a materials flow system for distribution of materials.
125(68.3)	58(31.6)	2.	Work stations are identified and assigned in terms of safety.
171(93.4)	12(6.6)	3.	Equipment is arranged to facilitate safe traffic flow and equipment usage.
146(79.8)	37(20.2)	4.	Safety lanes are used around machines in the laboratory.
122(66.7)	61(33.3)	5.	Decentralized storage is provided for accessories and materials.

PART III - Background Data
Directions: Please fill in the blanks.

1. How many years of teaching experience have you had? _____

2. How many years of industrial work experience have you had? _____

THANK YOU!

Please return this form within 24 hours after you receive it in the enclosed stamped self-addressed envelope to: Jack P. Witty, 1436 Sir Richard Road, Virginia Beach, Virginia 23455 - Telephone Numbers: (804) 623-8658 Office, (804) 464-5118 Home.

Frequency Distribution for Safety Responsibility:

Attitude Inventory

Score	Absolute Freq	Relative Freq (PCT)	Adjusted Freq (PCT)	Cum Freq (PCT)
8	1	0.5	0.5	0.5
9	1	0.5	0.5	1.1
10	10	5.5	5.5	6.6
11	21	11.5	11.5	18.0
12	47	25.7	25.7	43.7
13	55	30.1	30.1	73.8
14	30	16.4	16.4	90.2
15	15	8.2	8.2	98.4
16	3	1.6	11.6	100.0
TOTAL	183	100.0	100.0	

Frequency Distribution for Liability:

Attitude Inventory

Score	Absolute Freq	Relative Freq (PCT)	Adjusted Freq (PCT)	Cum Freq (PCT)
12	3	1.6	1.6	1.6
13	6	3.3	3.3	4.9
14	17	9.3	9.3	14.2
15	20	10.9	10.9	25.1
16	27	14.8	14.8	39.9
17	39	21.3	21.3	61.2
18	31	16.9	16.9	78.1
19	22	12.0	12.0	98.2
20	18	9.8	9.8	100.0
TOTAL	183	100.0	100.0	

Frequency Distribution for Directing Learning:

Attitude Inventory

Score	Absolute Freq	Relative Freq (PCT)	Adjusted Freq (PCT)	Cum Freq (PCT)
21	1	0.5	0.5	0.5
22	1	0.5	0.5	1.1
23	1	0.5	0.5	1.6
24	10	5.5	5.5	7.1
25	10	5.5	5.5	12.6
26	28	15.3	15.3	27.9
27	38	20.8	20.8	48.6
28	39	21.3	21.3	69.9
29	25	13.7	13.7	83.6
30	16	8.7	8.7	92.3
31	11	6.0	6.0	98.4
32	2	1.1	1.1	99.5
34	1	0.5	0.5	100.0
TOTAL	183	100.0	100.0	

Frequency Distribution for Laboratory Organization:

Attitude Inventory

Score	Absolute Freq	Relative Freq (PCT)	Adjusted Freq (PCT)	Cum Freq (PCT)
8	1	0.5	0.5	0.5
9	1	0.5	0.5	1.1
10	5	2.7	2.7	3.8
11	22	12.0	12.0	15.8
12	37	20.2	20.2	36.1
13	48	26.2	26.2	62.3
14	37	20.2	20.2	82.5
15	20	10.9	10.9	93.4
16	4	2.2	2.2	95.6
17	5	2.7	2.7	98.4
18	3	1.6	1.6	100.0
TOTAL	183	100.0	100.0	

Frequency Distribution for Teaching Aids:

Attitude Inventory

Score	Absolute Freq	Relative Freq (PCT)	Adjusted Freq (PCT)	Cum Freq (PCT)
9	1	0.5	0.5	0.5
10	9	4.9	4.9	5.5
11	23	12.6	12.6	18.0
12	67	36.6	36.6	54.6
13	32	17.5	17.5	72.1
14	21	11.5	11.5	83.6
15	19	10.4	10.4	94.0
16	11	6.0	6.0	100.0
TOTAL	183	100.0	100.0	

Frequency Distribution for Pupil Personnel System:

Attitude Inventory

Score	Absolute Freq	Relative Freq (PCT)	Adjusted Freq (PCT)	Cum Freq (PCT)
9	7	3.8	3.8	3.8
10	17	9.3	9.3	13.1
11	57	31.1	31.1	44.3
12	62	33.9	33.9	78.1
13	23	12.6	12.6	90.7
14	13	7.1	7.1	97.8
15	3	1.6	1.6	99.5
16	1	0.5	0.5	100.0
TOTAL	183	100.0	100.0	

Frequency Distribution for Directing Learning:

Instructional Practice Inventory

Score	Absolute Freq	Relative Freq (PCT)	Adjusted Freq (PCT)	Cum Freq (PCT)
12	1	0.5	0.5	0.5
18	1	0.5	0.5	1.1
21	1	0.5	0.5	1.6
24	22	12.0	12.0	13.7
27	26	14.2	14.2	27.9
30	49	26.8	26.8	54.6
33	51	27.9	27.9	82.5
36	32	17.5	17.5	100.0
TOTAL	183	100.0	100.0	

Frequency Distribution for Liability:

Instructional Practice Inventory

Score	Absolute Freq	Relative Freq (PCT)	Adjusted Freq (PCT)	Cum Freq (PCT)
8	3	1.6	1.6	1.6
11	9	4.9	4.9	6.6
14	26	14.2	14.2	20.8
17	69	37.7	37.7	58.5
20	76	41.5	41.5	100.0
TOTAL	183	100.0	100.0	

Frequency Distribution for Safety Responsibility:

Instructional Practice Inventory

Score	Absolute Freq	Relative Freq (PCT)	Adjusted Freq (PCT)	Cum Freq (PCT)
4	4	2.2	2.2	2.2
7	38	20.8	20.8	23.0
10	72	39.3	39.3	62.3
13	59	32.2	32.2	94.5
16	10	5.5	5.5	100.0
TOTAL	183	100.0	100.0	

Frequency Distribution for Teaching Aids:

Instructional Practice Inventory

Score	Absolute Freq	Relative Freq (PCT)	Adjusted Freq (PCT)	Cum Freq (PCT)
4	7	3.8	3.8	3.8
7	12	6.6	6.6	10.4
10	53	29.0	29.0	39.3
13	53	29.0	29.0	68.3
16	58	31.7	31.7	100.0
TOTAL	183	100.0	100.0	

Frequency Distribution for Pupil Personnel System:

Instructional Practice Inventory

Score	Absolute Freq	Relative Freq (PCT)	Adjusted Freq (PCT)	Cum Freq (PCT)
4	8	4.4	4.4	4.4
7	23	12.6	12.6	16.9
10	57	31.1	31.1	48.1
13	70	38.3	38.3	86.3
16	25	13.7	13.7	100.0
TOTAL	183	100.0	100.0	

Frequency Distribution for Laboratory Organization:

Instructional Practice Inventory

Score	Absolute Freq	Relative Freq (PCT)	Adjusted Freq (PCT)	Cum Freq (PCT)
5	1	0.5	0.5	0.5
4	7	3.8	3.8	4.4
10	1	0.5	0.5	4.9
11	15	8.2	8.2	13.1
13	2	1.1	1.1	14.2
14	50	27.3	27.3	41.5
17	62	33.9	33.9	75.4
20	45	24.6	24.6	100.0
TOTAL	183	100.0	100.0	

VITA

The author, Jack P. Witty, was born April 3, 1933 in Greenwood, Mississippi to Mr. and Mrs. Jack P. Witty, Sr. He is currently Associate Professor in the School of Technology at Norfolk State University, Norfolk, Virginia.

His academic preparation includes the high school diploma from Greenwood High School in 1952, the Bachelor of Science degree in Industrial Arts from Jackson State University in 1956, the Master of Science degree in Industrial Education from Bradley University in 1963, and the Specialist in Education degree in Industrial Education from Ball State University in 1972. The author completed requirements for the Doctor of Education degree from Virginia Polytechnic Institute and State University in Vocational and Technical Education during the winter of 1981.

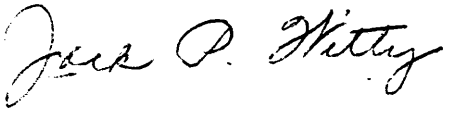
At present, he holds life membership in the American Council on Industrial Arts Teacher Education and the American Vocational Association. He also has active membership in the American Industrial Arts Association, the Association for Supervision and Curriculum Development, Phi Delta Kappa, the National Association of Industrial and Technical Teacher Educators, the Virginia Industrial Arts Association and the Virginia Vocational Association.

In the community, he has served as a member of the Advisory Council for the Gifted and Talented, Norfolk Public Schools; a member of the Reading Task Force, Norfolk Public Schools; past Chairman of Deacon Board, Covenant Presbyterian Church; member of Task Force on Re-Organization of the Mission of the Norfolk Presbytery; and president of the

Aeolian Club. At Norfolk State University, he has served as Chairman of the Sub-Committee on Physical Plant of the Long Range Planning Committee, Co-Chairman of the Homecoming Committee and Coordinator of the Trade and Industrial Education area.

Currently, he serves as Elder of Covenant Presbyterian Church. He was selected as an advisory participant for the Norfolk Presbytery to the 1980 General Assembly of the Presbyterian Church, United States.

The author's teaching experiences include serving as head football and basketball coach at Linwood High School, Vaughan, Mississippi in 1958. From 1959 to 1965 he worked as Building Trades instructor and coach at Lanier High School in Jackson, Mississippi. From 1965 to 1969 he worked as instructor of Industrial Arts at Jackson State University in Jackson, Mississippi. In the fall of 1969, the author accepted a position at Norfolk State University where he still holds employment.



A STUDY OF SAFETY ATTITUDES AND INSTRUCTIONAL PRACTICES OF INDUSTRIAL ARTS TEACHERS IN THE STATE OF VIRGINIA

by

Jack P. Witty

(ABSTRACT)

The purpose of this study was to determine the relationship between teachers' safety attitudes and their instructional practices and to determine the relationship between teachers' safety attitudes and instructional practices and the number of years of teaching and work experience they had gained.

A survey instrument composed of an Attitude Inventory, an Instructional Practices Inventory, and a section on number of years of teaching and work experience was constructed and tested for this study. A panel of experts assisted in validating the content of the survey instrument and the grouping of items into the six categories: Safety Responsibility, Liability, Directing Learning, Laboratory Organization, Teaching Aids, and Pupil Personnel Services. Reliability was established through computation of the Cronbach Alpha coefficients. The survey instrument was mailed to a random selection of 285 of the 1068 industrial arts teachers listed in the Virginia Industrial Arts Teachers' Directory, 1978-79.

Pearson correlation coefficients were computed for responses on the Attitude Inventory with those on the Instructional Practices Inventory for the Liability Category, the Teaching Aids Category and for the overall scores on each inventory. Additionally, correlations were computed

for years of teaching experience and years of industrial work experience with responses on the Safety Attitude Inventory and the Instructional Practices Inventory overall and for two categories. The categories used in those comparisons were those which were found to have a meaningful reliability coefficient, Liability and Teaching Aids. Each of the total inventories had meaningful reliability coefficients.

The analysis of data revealed little if any correlation (0.20) between overall responses to the Safety Attitude Inventory and overall responses to the Instructional Practices Inventory and little if any correlation between attitudes and instructional practices in the categories--Liability (0.17) and Teaching Aids (0.12). No significant relationship was found between number of years of teaching experience and overall responses to the Safety Attitude Inventory or to the Instructional Practices Inventory.

No significant relationship was found between number of years of industrial work experience and overall responses to the Safety Attitude Inventory or to the Instructional Practices Inventory. Little if any correlation (0.19) was found between the Liability category of the Safety Attitude Inventory and work experience, and little if any correlation was found between the Liability category (0.17) and the Teaching Aids category (0.15) of the Instructional Practices Inventory and work experience.

From the analysis of data it was concluded that:

1. Safety attitudes expressed by industrial arts education teachers may not be considered as predictors of their instructional practices relating to safety.

2. Industrial work experience is not an important variable in determining the safety attitudes or instructional practices of industrial arts education teachers.

3. The number of years of teaching experience gained by industrial arts education teachers has no effect on safety attitudes or instructional practices of industrial arts education teachers.