Basis For Managing Risk in the High School Technology Education Classroom

By

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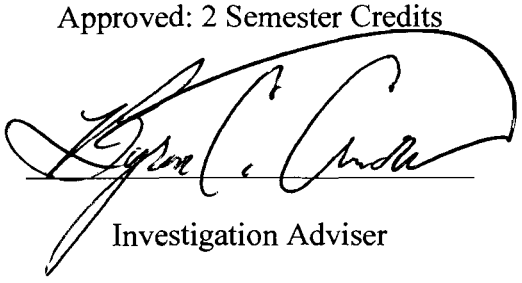

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ABSTRACT

A technology education instructor has an essential task to provide students with the proper safety policies and procedures for working with a variety of equipment and materials used in their laboratories. Currently, the Wisconsin Department of Instruction does not provide teachers with an easily accessible comprehensive safety guide. The potential lack of consistent safety policies and procedures create liability issues for both the school district and the instructor. Every day instructors deliver instruction based on a premise that he/she employs consistent safety policies that are grounded in sound judgment. The study will identify what the basis is upon which technology education teachers determine their safety practices in laboratory settings.

By better understanding the basis upon which teachers make these important decisions, teachers will be able to validate their classroom safety protocols.

The subjects in the study are technology education teachers who taught in public education for the 2004-2005 school year in the state of Wisconsin.

U.W. Stout Research Services posted the online survey. I emailed a request to participate in the survey to approximately four hundred high school technology education teachers. The survey collected data from July 26 to August 15, 2005. Data from fifty respondents was collected.

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Chapter I

Safety instruction is a critical component in any technology education curriculum. Learning to use proper safety procedures not only impacts safety in the classroom but the work place as well, since many students seek employment in industry. According to the Occupational Safety and Health Association,(The New OSHA Reinventing Workers Safety and Health, January 2000), workplace injuries cost the economy more than $110,000,000 a year. It is estimated that twenty percent of injuries to school age children occur on school premises. The estimated cost of these injuries was $115 billion in medical bills (Knight, 2000, p.16) Therefore, injuries in the school environment are a serious public health problem.

A solid foundation of safety practice and knowledge developed in secondary technology education classes has the potential to positively effect workplace injuries. It is the responsibility of the technology education instructor to provide an effective accident prevention program that includes a safe environment, machines, tools and procedures. All types of material processing can be potentially dangerous if the proper safety procedures are not followed.

The teacher, administrators, and district are legally responsible for the safety of the students in the technology education classroom. Though courts have acknowledged that schools can not guarantee the safety of all students, (Mawdsley 1993), school officials and school personnel may have legal liability when a student is injured by a deliberate action or negligence (Yell, 1997). The legal principals are part of tort law. A tort is a wrongful act causing damages that may rise to a civil suit. If a person is injured, the result may be a personal injury case. Schools become liable for injuries when there are allegations of negligence. The plaintiff, or injured party, needs to prove that damage has been done to them by the defendant due to the defendant's negligence, defined as conduct that falls below the standard established by law or the profession to protect others from harm. It is failure to do something that a reasonable person

would do (omission) or the doing of something that a reasonable person would not do (commission).

According to the Pennsylvania Department of Instruction, "Safety Guidelines for Technology Education", (Penn.S.G.), it is the teacher's responsibility to perform three basic duties to prevent negligence: Proper and complete instruction, vigilant supervision, and maintaining facilities and equipment at an optimal level. Failure to perform these duties could result in a teacher or administrator being liable for damages. The guide outlines these three duties and suggests that they are a standard that should be followed so that injury and possible litigation is limited.

Supervision is the leading discrepancy involving alleged negligence in school related injuries (Bever, 1996). Proper supervision involves being present when students are working in the lab and enforcing the safety policies and procedures. In addition to supervision the instructor needs to be responsible for delivering the appropriate instruction and guidance for consistent safe laboratory use.

Lack of proper instruction has led to serious legal difficulties for schools and technology education instructors (Bever, 1996). Proper instruction is the responsibility of the technology education instructor and varies in policy from one lab to another, depending on the processes taking place in that lab or a particular unit within the lab. This variable produces an immense responsibility on the individual instructor because they need to be familiar with the safety procedures for all the equipment that their students will use. In addition, the technology education instructor must maintain or identify maintenance problems with each piece of equipment to prevent potential hazards with equipment failures. Maintaining a safe lab environment rests on the shoulders of the instructor because they are in the best position to identify hazards in a suitable time frame.

Most technology education instructors will admit that an effective accident prevention program begins with safe machines, sharp tools, effective safety procedures and safe environments. When accidents do occur, nearly all are caused by identifiable unsafe acts or conditions that are avoidable. Major causes of accidents in the technology education labs according to the Wisconsin Occupational Safety and Health Act, (WOSHA), as Applied to Technology Education Facilities include:

- θ Unfavorable environmental conditions, such as exhaust, lighting, etc.
- θ Lack of (or improper) fire protection equipment
- θ Lack of sufficient space
- θ Inadequate electrical systems
- θ Insufficient of poor material storage
- θ Poor cleaning in shops
- θ Insufficient equipment maintenance
- θ Lack of good safety instruction
- θ Enforcement of safety rules
- θ Unwise equipment selection. (WOSHA,1998, p23)

Taking all reasonable precautions against injury is a technology education instructor's professional responsibility. It underlines the need for practical safety competencies to be part of a technology education teacher's preparation and professional development. According to OSHA, these skills include a practical foundation of knowledge and application of safety procedures, laws and regulations, legal aspects, violations within schools, and personal safety. The information validates that there is a great need for effective safety policies. There is also a great need for proficient safety policies for technology education teachers and in technology education labs.

Since providing proper safety instruction is the duty of the individual instructor, both novice and experienced technology education instructors require knowledge and skills in preparing, teaching, updating, and enforcing safety policies and procedures. The professional responsibility associated with managing these duties is no easy task. The technology education instructor is presumed to be fluent in a litany of safety policies and procedures, including federal and state safety

laws as well as local building, electrical and fire codes. In addition, these instructors are to be concerned with ventilation, exhaust and personal safety equipment. Every technology education teacher has the responsibility to reduce the potential and magnitude of accidents that occur in his or her laboratory.

Statement of the Problem

A technology education instructor has an essential task to provide students with the proper safety policies and procedures for working with a variety of equipment and materials used in their laboratories. Currently, the Wisconsin Department of Instruction does not provide teachers with an easily accessible comprehensive safety guide. The potential lack of consistent safety policies and procedures create liability issues for both the school district and the instructor. Each day instructors deliver instruction based on a premise that he/she employs consistent safety policies that are grounded in sound judgment. On what basis does a teacher determine whether these practices and policies are accurate and sufficient?

Purpose of the Study

The study will identify the basis upon which technology education teachers determine their safety practices in laboratory settings. By better understanding the basis upon which teachers make these important decisions, teachers will be able to validate their classroom safety protocols and therefore defend their practices in case of litigation.

Limitations of the Study

The survey population for the study will be limited to secondary technology education teachers in the state of Wisconsin.

Chapter II: Review of the Literature

The following review of literature will identify teacher resources in three key safety areas, supervision, instruction, and the maintenance of facilities and equipment.

Proper and Complete Instruction

A primary issue in any safety program is the competence of the instructor. OSHA defines a competent person as a person who is knowledgeable of application standards, is capable of identifying workplace hazards relating to specific operations, is designated by the employer to perform workplace operations, and has the authority to take appropriate actions to correct hazardous conditions or environments within their workplace. Any technology education teacher who does not meet the definition of "competent" as defined by OSHA raises serious liability issues for that teacher, school, and district.

There are two main universities that train technology education teachers in the state of Wisconsin, University of Wisconsin - Stout and University of Wisconsin- Platteville. A survey of graduates from Stout in technology education indicated that many felt inadequately prepared to manage safety issues based on the level of safety education training that they received in the technology education teacher's program (Kratochvill, 2000). Platteville University offers three elective courses in safety. Since they are not required courses, one cannot assume graduates have taken the classes. This would indicate that new graduates from these universities might need additional resources and training to devise a comprehensive safety program.

Safety instruction for students needs to be comprehensive and thorough. It is also important that all written and performance tests are documented and kept on file for the duration of the course

and any other courses that encompass similar safety procedures. One resource that has an excellent format for teaching safety standards is the Washington State Safety Guide for Career and Technical Education (Wash.S.G.). They suggest these guidelines for instruction.

- θ safety demonstrations, attentively watched by everyone
- θ safety videos.
- θ the proper and adequate wearing of personal protective equipment (PPE) appropriate to the industry or program area.
- θ Safety quizzes and tests, etc.
- θ Students demonstrate proficiency in facility, tool, and equipment safety to the instructor, who uses his or her professional assessment in allowing the student to utilize shop facilities.(Wash.S.G.,2002,section 1,p.13)

Effective safety awareness education leads to safer attitudes and safety consciousness, which, in turn, leads to safer working practices and accident prevention within the laboratory. The task of overcoming the "it can't happen to me" attitude is a big one and requires that safety awareness be an integral part of the every day instruction program. Safety consciousness requires that the student be educated in safety generally and specifically. The teacher, in working to develop a positive attitude toward safety, should teach the student to ask, "Is what I am about to do unsafe in any way to myself, to others, or to property?" It is essential that the instructional methods lend themselves to positive safety attitude development. This includes:

- θ a clean and orderly working environment
- θ the awareness of possible accident situations where respect replaces fear
- θ the importance of rules and regulations
- θ the necessity to teach the correct way to perform the first time
- θ the knowledge and skills in the use and the proper maintenance of tools and machines
- θ the reinforcement of safe operating procedures
- θ proper respect for hazardous wastes and hazardous waste disposal (Wash.S.G., 2002, section 1, p.6)

A court case demonstration poor instruction on the use of laboratory materials is cited below.

"A 16 year old was assigned to make gunpowder in a high school chemistry laboratory. He erroneously substituted potassium chlorate for the potassium nitrate listed in the recipe. Instead of pulverizing the ingredients on separate sheets of paper as listed in the instructions, he poured all three ingredients into an iron mortar and pulverized them simultaneously with a pestle, which produced an explosion. The explosion blew away his left hand, seriously injured his right hand, completely destroyed his right eye (he subsequently wears a glass eye), and seriously injured his left eye, so that he has difficulty reading. The teacher was not only present in the laboratory, but also stood 15 feet behind the plaintiff. The trial court granted defendant's motion for a non-suit. The appellate court and California Supreme Court, reversed, holding that there was sufficient evidence to find the teacher liable for negligence. *Mastrangelo v. West Side Union High School,* 29 P.2d 885 (Calif.App. 1934), *adopted by,* 42 P.2d 634 (Calif. 1935).

The California Supreme Court added:

It may well be doubted whether it is proper in an introductory school course in chemistry to require pupils to make and ignite an explosive. It would appear that the dangers of such an experiment, incorrectly performed by young children, might be anticipated; and that the benefits to be derived from its actual performance by each pupil are not so great as to justify the risk of serious injury to the child. But at the very least, if it is to be performed, it necessarily requires the strictest personal attention and supervision of the instructor. *Mastrangelo v. West Side Union High School,* 42 P.2d 634, 638 (Calif. 1935)."(Standler.2000,p.5)

This student had access to a dangerous material in the lab that he was not properly trained to use. He also did not follow the proper procedure. Even though the instructor was in close proximity to the student, he was found to be negligent due to the student's inability to process the materials with the correct procedures. Instructors need to exercise extreme diligence in preparing students for laboratory activities.

Vigilant Supervision

Legal scholars estimate that 80% of all court cases involving alleged negligence for school-related injuries deal with some aspect of supervision (Bever,1996). Trade and industrial education teachers are now more likely to be involved in legal action if one of their students suffers an injury

than at any other time in educational history. (Gathercoal & Stern, 1987) Supervision is a very critical component of a school safety plan.

Issues of negligence include:

- Instructions that do not clearly warn of hazards, (or were such hazards "obvious"?)
- Instructor not present in the laboratory room at the time of the injury
- Instructor preoccupied at the time of the injury (e.g., instructor was doing his/her own homework and ignoring the students; instructor was grading papers)
- Not wearing safety equipment (e.g., goggles or face shield to prevent eye injury, ground-fault interrupters in electrical circuits, fume hoods when working with toxic vapors, guards around moving parts to prevent injury to fingers, etc.)
- Assigned experiment was unnecessarily dangerous: The same educational objectives could be obtained with a less hazardous experiment, less toxic materials, etc. This is a risk/benefit analysis. θ
- Teacher might be incompetent to supervise a laboratory environment in elementary school or high school. Such a teacher might have minored in history, literature, mathematics, or physical education when he/she was a student. It might be negligent for the school to assign such a teacher to supervise pupils who are doing experiments, since the teacher would be incapable of recognizing a dangerous condition even if he/she saw it. I envision a tort along the lines of negligent entrustment by the principal of the school (Standler, 2000, p.2)

Younger students need more supervision than older students. For example, sixth-grade pupils doing lab activities should be closely supervised. On the other hand, a laboratory for engineering majors in their final year of undergraduate college might have little supervision, just a faculty member who is readily available for questions. More supervision is needed when materials or equipment are more dangerous. (Standler, 2000, p.4). For example, pouring a casting with molten aluminum is more dangerous than finish sanding a wood project.

> " One of the best reviews of a teacher's duty to supervise pupils is in a dissenting opinion of an Arizona Supreme Court case. The relationship of a public school teacher to his pupil is in some respects *in loco parentis.* Having the right to control and supervise the pupil, there is a correlative duty to act as a reasonable and prudent parent would in like circumstances.

> Proehl, Liability of Teachers, 12 Vanderbilt L.Rev. 723, 740 (1959). The rationale of in loco parentis does not however apply in determining liability for a negligent tort against the pupil. In most jurisdictions the parent is not liable for negligent tort against his child, but the public school teacher may be. " The problem lies in determining what criteria should be used to meet the standard of care necessary to be exercised by the public school teacher. If the probability of harm can be foreseen, the public school teacher should take such measures as are reasonable and prudent to prevent an injury to the student. As the gravity of the possible harm increases due to conditions or circumstances to which the student is subjected, the apparent likelihood of its occurrence need be correspondingly less. No one can deny that few sectors of public and private existence are safe from risks to life and limb; the schoolyard, the classroom, the shop class, the chemistry laboratory certainly have their dangers and their risks. Teachers presumptively endowed with superior skill, judgment, intelligence and foresight, must fulfill the strong duties arising from their public position by exercising care commensurate with the immaturity of their charges and the importance of their trust. The characteristics of children are proper matters for consideration in determining what is ordinary care with respect to them, and there may be a duty to take precautions with respect to those of tender years that would not be necessary in the case of adults.
> *Shannon v. Butler Homes, Inc.,* 428 P.2d 990, 995 (Ariz. 1967). (Stantler, 2000, p.4)

The following is an example of a court case in which the teacher was found liable on the basis of lack of supervision.

> In another case, a fourteen year old boy poured alcohol from a can into an experiment to determine the boiling point of solutions of either sugar or salt in water. The addition of the alcohol to the aqueous solution was *not* part of the assigned experiment, but was a spontaneous idea of the victim. The teacher was in an adjoining room at the time of the accident. The trial court granted the school's motion for summary judgment. The Wyoming Supreme Court reversed, holding that the alleged negligence of the teacher was a question of fact that needed to be determined by a jury. The Wyoming Supreme Court's opinion says:
>
> Absent special dangerous circumstances, a school district does not have the duty of providing constant supervision of all movements of all pupils at all times.
> *Connett v. Fremont County Sch. Dist.*, 581 P.2d 1097, 1103 (Wyo., 1978).
>
> We would observe that the school owes the student the duty to supervise his activities. This duty becomes more imperative in the classroom when risks of danger are foreseeable, and thus the degree of care higher, where young, inexperienced students are handling substances that for them are potentially dangerous. *Id.* at 1104. (Standler, 2000, p.6)

The amount of supervision required in any laboratory is dependent on the age of the student and the degree of danger that the laboratory activity involves. It is important that technology education teachers provide learning activities that achieve their learning outcomes with the minimal

exposure to hazardous materials and processes. For example, students can learn how to mold materials using plastic, which has a lower melting temperature, rather than using aluminum alloys with a much higher melting temperature. The key issue is "diligent supervision". The instructor needs to present at all times during laboratory activities and his/her entire focus needs to be on observing and monitoring all student activities.

The Pennsylvania State Guide, (Penn. S.G.), recommended that every school district should have a district safety coordinator. Their duties should include:

- θ Coordinate school safety functions
- θ Establish a school safety committee
- θ Provide for and participate in school safety inspections
- θ Establish a communication system to keep teachers and administrators abreast of new standards and procedures
- θ Provide for and assist in establishing teacher in-service training programs
- θ Provide for and assist in the implementation of safety instruction programs for students
- θ Provide for and assist in the investigation and recording of accidents and injuries
- θ Research special safety problems
- θ Obtain and disseminate regulatory material (policies, guidelines, inspections checklists, posters, etc.)
- θ Maintain a liaison with the local government and industrial agencies
- θ Analyze and report all accidents (Penn.S.G., 1999, p.13-14.)

A school safety inspector would be an important factor in a school safety program because the position would provide an umbrella of external supervision of the classroom teacher, which should ensure that safety policies are correctly and adequately addressed in the various classrooms.

Maintaining Equipment and Facilities at an Optimal Level

According to the Pennsylvania Department of Education, an effective safety program assures that all aspects of the technology education facility and its contents are safe for all student activities. Equipment maintenance is of primary importance and the best source of specific safety information on equipment, materials, and products is the original manufacturer. According to OSHA, areas of operation in which school districts can and should voluntarily attempt to comply include:

- θ hand-tool and equipment safety
- θ safety in working with hazardous materials
- θ training in safety and health requirements
- θ fire protection
- θ physical plant design
- θ physical plant condition
- θ air environment
- θ visual environment
- θ auditory environment
- θ utility service systems
- θ housekeeping
- θ sanitary facilities
- θ first aid and emergency procedures
- θ class discipline

It is a daunting task to supervise all the environmental factors and facility and machine maintenance so that a safe laboratory environment is maintained. The following is a court case involving a lapse in equipment maintenance.

> A Louisiana case in 1974 involved a group of eighth-grade pupils who were preparing a science fair project. A boy poured alcohol from a jug and a girl lit a match near the mouth of the jug, which exploded, severely burning a 14 year-old girl who was standing nearby. The trial court found the teacher was negligent and awarded the plaintiff $ 7890, which was affirmed by an appellate court. The appellate court declared:
> Pleas of contributory negligence and assumption of the risk by the defendant were overruled, the [trial] court finding that Miss Station [the plaintiff] did not appreciate the danger or take part in the abortive attempt to relight the burner. We affirm the judgment of that court. The jurisprudence of this state is firmly established that where one creates, deals in, handles or

> distributes an inherently dangerous object or substance, that an extraordinary degree of care is required of those responsible. This duty is particularly heavy where children are exposed to a dangerous condition, which they may not appreciate. Here, a dangerous instrument was placed in the hands of children without any special degree of care, supervision, or direction. Alcohol, a highly flammable substance, was left in their control to be used in connection with a faulty alcohol burner that had continually given trouble. That the situation was fraught with danger is proven by the results. *Station v. Travelers Insurance Co.*, 292 So.2d 289, 291-292 (La.App. 1974)[citations omitted]. (Standler, 2000, p.5)

This case demonstrates the consequences of poor maintenance. A student was seriously injured who was not involved in the laboratory experiment because a faulty burner was used. As a result the instructor was found negligent.

Conclusion

This section of the paper reviewed published safety protocol in three key areas; supervision, instruction, and equipment and facility maintenance. The following guidelines are a summary of risk management ideas for technology education. They define the most critical areas that need to be addressed when evaluating a school safety program.

- θ The school, as the employer, needs to provide the teacher with the basic requirements for equipment, training, and time for that training.
- θ Teachers are responsible for seeing that equipment in the lab or shop is kept in safe operating condition, according to applicable State and Federal laws (Labor and Industries / WISHA—OSHA—ANSI).
- θ Teachers are responsible for providing instruction and demonstrating the safe and proper operation procedures for each piece of power equipment, portable power hand tools, hand tools, cleaning, and/or finishing procedures.
- θ Teachers must plan ahead and be aware of potential dangers and problems.
- θ Teachers must have and maintain order and control in the classroom and/or lab (shop).
- θ Teachers must teach a proper degree of respect for the dangers that are inherent in the lab or shop.
- θ Teachers should never leave students unattended.
- θ Teachers cannot delegate the responsibility of a class to a student (TA).
- θ Students must have received and demonstrate or show they have read and understand a copy of the safety rules for each piece of equipment that they may use.
- θ Students must pass a general shop safety test with a score of 100 percent.
- θ The teacher should keep safety test scores until the student is 21 years old. (A sample of the safety test shall be available upon request.)

- θ Students need to sign a document that they will not use any equipment until they have passed a safety test, have observed a demonstration on that piece of equipment, and have the instructor's permission.
- θ Parents should sign a parent awareness document before the student uses any equipment.
- θ Do not underestimate the seriousness of an accident. Call 911—and provide emergency care until medical responders arrive.
- θ After the pressure of an event has subsided, complete an incident report stating the facts of what occurred and submit to district risk manager (or appropriate district official). Go over the report with the student for a learning experience.
- θ Keep your own copy of records and affidavits.
- θ CTE directors, administrators, principals, counselors, and teachers must be reasonable and prudent in seeing that classes are not overloaded. (Wash. S.G., 2002, section 1, p.15).

Chapter III: Methods of Study

Teachers have an enormous responsibility in making "risk –management" decisions. They need to evaluate the risk factors and balance these factors against the learning value of the laboratory experience. They then need to design a safety program that minimizes the risk of injury in the lab. The three critical lenses for practice that were present in the research regarding safety programs in technology education were instruction, supervision and maintenance. The SGFTE stated that these three key components should be a standard to be followed so injury and possible litigation is limited. These components of practice were also considered of critical importance in the Wash. S.G. and "Safety Program and Management Guide", Utah State Office for Applied Technology Education, 2002. (Utah S.G., 2002).

This study will attempt to determine what guidelines teachers use to determine what is "proper and safe" when they design and execute safety policies for their classroom and laboratories. The question will fall within four major constructs.

Construct #1

"The teacher has a practice of staying current and informed as to safe practice."

It is critical that a technology education teacher has a strong knowledge base on the issue of safety before he can execute an effective safety program. In the states that have developed safety guides that I have reviewed, (Pennsylvania, Washington, and Utah), training for the teacher is a key component. The school, as the employer, needs to provide the teacher with the basic requirements for equipment, training, and time for that training (Mass. S.G., 2004, p.19). In a document prepared by the Department of Education, Employment, and Training regarding the "Use of Machines in Technology – Policies and Guidelines," it stated, "Principals must ensure that students in technology classes are taught and supervised by teachers who have the necessary training and/or experience". (Dept. of Education, Employment and training, 2000, p. 1) Wash. S.G. stated that teacher training is an essential part of a successful safety program, which has a direct bearing on the development of safe work habits and attitudes by all individuals within the school environment. It cannot be assumed that safety preparation at the undergraduate level is complete and comprehensive enough to develop a classroom safety plan.

	Supervision	Instruction	Maintenance
The teacher has a practice of staying current and informed of recommended safety practice.	Does your district, school or department hold regularly schedule in-service training that address the issues of safety in T.E labs? _____ If yes how often? (Is there an internal (source for establishing a basis for practice)	Have you participated in formal safety related training in the past five years? (Finding out if teachers are staying informed with current practice) I have a strong knowledge of lab equipment use and maintenance. (Is teacher informed of the basis for their practice)	Labs and equipment has been reviewed for safety compliance in the past two years. Who conducted this review? (used to establish a basis) (Is there an external source of practice)

Construct # 2

"The teacher will have evidence of established rules"

Teachers are expected to explain and demonstrate to students the safe performance of various skills and procedures in the classroom (Bever, 1996). According to Massachusetts Safety Guide, 2004, the teacher has the following responsibilities:

- θ Teachers are responsible for providing instruction and demonstrating the safe and proper operating procedures for each piece of power equipment, portable power hand tools, and hand tools.
- θ Students should have received and be able to demonstrate or show they have read and understand a copy of the safety rules for each piece of equipment that they may use.
- θ Students should pass a general shop safety and performance test with a score of 100 percent.
- θ Teachers are responsible for providing instruction and demonstration of the proper procedures for handling, use and disposal of all chemicals including cleaning and finishing materials. (Mass. S.G., 2004, p.19).

- θ Teachers are responsible for seeing that equipment in the lab is kept in safe operating condition, according to applicable State and Federal laws (Labor and Industries/OHEA, ANSI, and manufacturer's recommendations). This includes required machine guards.
- θ Teachers must have and maintain order and control in the classroom and lab.
- θ Teachers should never leave students unsupervised.

According to WSSCH, 1998, a major cause of accidents is a lack of good safety instruction.

Washington State Guide recommends that safety instruction include:

- θ Safety demonstrations
- θ Safety videos
- θ Proper and adequate wearing of PPE
- θ Safety quizzes and tests
- θ Students demonstrate proficiency in facility, tool and equipment safety to the instructor, who uses his or her professional assessment in allowing the student to utilize shop facilities. (Wash. S.G., 2000, section 1, p.13)

	Supervision	Instruction	Maintenance
The teacher has evidence of established rules	The layout of my lab with equipment has blind spots from the teacher. (Finding practice) Class size for my lab classes makes supervision of students difficult. (Finding practice)	Identify the following activities that are incorporated in your safety training. ____Demonstrations ____Safety test ____performance test ____Personal protection use ____Student /teacher safety contract ____ Students demonstrate proficiency in all lab activities ____ Parent notification of safety concerns (Finding out the practice used)	I have a written maintenance schedule for the machines in my lab. (Finding practice)

Construct #3

"The teacher is very responsive and attentive to potential safety issues"

A great many accidents are the result of someone doing something which he is not supposed to do, knowing very well that he is not supposed to do it (Firenze & Walters, 1981). According to Massachusetts State Guide, the following issues need to be addressed by the technology education teacher.

- θ Teachers are responsible for seeing that equipment in the lab is kept in safe operating condition, according to applicable State and Federal laws (Labor and Industries/OHEA, ANSI, and manufacturer's recommendations). This includes required machine guards.
- θ Teachers must have and maintain order and control in the classroom and lab.
- θ Teachers should never leave students unsupervised. (Mass. S.G., 2004, p.19).

According to Washington State Guide, major causes of accidents in labs are a result of poor enforcement of safety rules. The very best safety plan will fail if the teacher is not attentively enforcing the rules.

	Supervision	Instruction	Maintenance
The teacher is very responsive and attentive to potential safety issues	I have specific consequences when students violate safety rules. (Finding Practice) My equipment has visual safety zones on the floor. (Finding Practice) I have a high level of supervision in my lab. (Finding Practice) My safety practices would be legally defendable if an accident would occur. (Finding Basis)	What is the basis for your safety resources? ___ I create my own safety materials. ___ I use safety resources from experts in the field ___ I use safety resources created before my arrival. (Finding Basis)	I conduct machine maintenance on an as needed basis. (Finding basis)

Construct #4

"The teacher has organizational systems for record keeping in reference to safety"

Record keeping of equipment maintenance and safety instruction is a key factor in preventing injury and providing documentation so a teacher can defend an allegation of negligence if an accident should occur. The following safety record protocols are a combination of recommended written documentation that were included in the state guides of Massachusetts, Idaho, Washington, and Pennsylvania.

- θ The teacher utilizes an equipment inspection checklist when making formal inspections and maintains file copies.
- θ The teacher has a "Student Safety Performance Record" that documents teacher demonstration, written and performance tests.
- θ The teacher has a parent permission form signed so child can engage in laboratory activities.
- θ The teacher has a student medical information sheet on file.
- θ The teacher records all accidents on an "Accident Report Form" and keeps an "Accident Report Summary" that records all accidents that happen in the laboratory.
- θ The teacher has a copy of a teacher/student contract that addresses the rules of laboratory activity.

	Supervision	Instruction	Maintenance
The teacher has organizational systems for record keeping in reference to safety	I have records of student performance in regards to lab safety. (Finding Practice) I have records of all accidents and have an accident report summery. (Finding the practice)	I have a file of safety records for all my students. (Finding the basis) I have a copy of the lesson plan in use when teaching about specific shop equipment. (Finding the practice)	I have a written maintenance schedule for the machines in my lab. (Finding the basis) My current level of machine maintenance is very through. (Finding the practice)

The following demographic questions were included in the survey to determine the level of risk in the classrooms of the survey participants. The greater the level of risk, the more comprehensive their safety plans need to be.

Demographic Questions	Value of purpose related to the study
Which of the course title best describes the course you teach? Check all that apply. ____ General Tech Ed ____ Drafting /CAD ____ Wood technology ____ Metal technology ____ Construction ____ Electricity/electronics ____ Manufacturing ____ Communications ____ Automotive ____ Energy/Power ____ Graphic Communications	Determine the level of risk.

Check all Equipment used in your lab facility.		Determine the level of risk.
____ Lathe	____ Milling Machine	
____ Pedestal Grinder	____ Shear	
____ Brake	____ Metal Forming	
____ Forge	____ CNC equipment	
____ Arc Welder	____Oxy-Acetylene	
____ MIG Welder	____ TIG Welder	
____ Horizontal Band Saw	____ Portable power tools	
____ Drill press	____ Table Saw	
____Radial Arm Saw	____ Surfacer/Planner	
____ Jointer	____ Miter Box Saw	
____ Band Saw	____ Jig Saw	
____ Shaper	____ Injection Molder	
____ Vacuum Molder	____ Rotational Molder	
____ Floor Jack	____ Automotive Hoist	
____ Overhead Chain Hoist	____ Parts Cleaner	
____ Offset Press	____ Robotics	
____ Lasers	____ Hydraulic Sheer	
____ Electricity labs	____ Hydraulic labs	
____ Semi conductor labs	____ Computer labs	

Subjects

The subjects in the study will be technology education teachers who taught in public education for the 2004-2005 school year in the state of Wisconsin. The survey was sent to approximately four hundred teachers who taught in large central cities, small towns, urban fringe districts of large and midsize districts, and districts in rural areas.

Instrumentation

A pilot survey was initiated to identify any potential interpretive problems with the survey questions. Technology education teachers at several different schools were interviewed to identify any potential problems with the questions.

Once the survey questions were validated I developed the survey instrument, which was posted as an online survey by U.W. Stout Research Services Fifty responses were received in the seventeen days that the survey was posted online. . The University tabulated results in an Excel format spreadsheet.

Data Analysis

Two questions are designed to identify the level of risk in the classes the teacher's teach. It identifies the courses they teach and the equipment they use in the laboratory setting. The selection of "high risk" courses and "high risk" equipment will result in a classification of a "high risk" laboratory setting.

The survey includes twelve questions that address the teacher's current safety practices. The responses will be evaluated according to "recommended practice" that was identified in the literature review. The responses will be evaluated in the following way:

- θ Agree – high correlation to recommended practice
- θ Somewhat agree – some correlation to recommended practice
- θ Somewhat disagree – little correlation to recommended practice
- θ Disagree – no correlation to recommended practice

Eight questions identify the basis for their decision making in determining practice. Two questions identify current safety training internally, (inside the school), and externally, (outside the

school). Both types of training would be a high correlation to recommended practice. One type of training or no training would be a low correlation to recommended practice.

Question number seven asked teachers to check activities incorporated in their safety training. Checking all questions would be a high correlation to recommended practice. If less than three items are checked, there would be a low correlation to recommended practice.

Question number thirteen asked participants to identify the basis of their safety resources. A response of "experts in the field" would identify a high correlation to recommended practice. Any other response would indicate a low correlation to recommended practice.

The balance of the questions will use the above evaluative scale to determine their relationship to recommended practice.

Projected Results of Data Collection

- θ Identify what training and resources teachers use in developing their safety programs.
- θ Find out if there is any correlation between the level of training and resources teachers used and the alignment of their safety program with "recommended practice".
- θ Find out if the research suggests that technology education teachers in the state of Wisconsin would benefit from additional safety practice training and resources.
- θ Identify how closely their safety protocol aligns with "recommended practice".

Chapter IV: Results

Based on the results of the survey, this chapter answered each research question that was developed around the four major constructs of recommended practice that was developed in chapter three. The primary purpose of the questions, and therefore the survey, was to find out what basis Wisconsin high school technology education teachers use when they develop their classroom safety instruction.

Limitations

The survey was limited to a small number of participants. Only twelve percent of the teachers to whom a survey request was sent responded.

Summary of Results

Construct number one stated that teachers should have a practice of staying current and informed as to safe practice. It addresses the issue of teachers having the background knowledge to develop a legally defendable safety program.

Question number one asked if the district, school, or department held regularly scheduled in-service training that addressed the issues of safety in the technology education lab. The purpose of the question was to ascertain whether there was an external source for establishing a basis of practice. Thirty-two percent of the respondents indicated that they were not involved in regularly scheduled in-service training. This would indicate a low level of correlation to recommended practice. Question number two asked how often the training occurred. Only seven out of fifty responded that it occurred once per semester or more. This would also be a low correlation to recommended practice.

Question number three asked if the teacher had participated in formal safety related training in the past five years. Thirty-two percent did not participate in any in any formal safety training in the past five years. This would be a low correlation to accepted practice.

Question number four was designed to assess the teacher's level of confidence on their knowledge of lab equipment and the maintenance of that equipment. Seventy percent stated that they had a strong knowledge of equipment use and maintenance. When asked question number five, "Has the lab and equipment had been reviewed for safety compliance in the past two years?", seventy-four percent indicated that reviews had taken place. When asked who conducted the review, twenty-one out of fifty responded that the review was done by an external source. The results indicated that there was a low level of external supervision in the majority of schools.

Based on the responses to construct number one, the teachers who responded to this survey had a low correlation to accepted practice.

Construct number two stated that the teacher should have evidence of established rules. In the area of instruction, question number fourteen indicated the type of activities that took place to prepare students to participate in a lab activity. Only one of the respondents who taught in a high-risk lab environment failed to have five recommended preparation activities for lab participation. This is high correlation to accepted practice for forty-nine of the fifty respondents. Question number nine asked if the respondents had written maintenance schedules for the machines in the lab. Sixteen percent of the respondents agreed, thirty percent somewhat agreed, eighteen percent somewhat disagreed, and thirty-six percent disagreed. This is a low correlation to recommended practice.

Question number eight asked the teacher if class size was a factor in the supervision of their students. Twenty-two percent indicated that class size was not a factor in supervision, but seventy-eight percent did indicated that class size affected their ability to supervise their students.

Question number seven asked if the layout of the lab created blind spots that made supervision difficult. Twenty-eight percent agreed that there were no blind spots, thirty-six percent somewhat agreed, sixteen percent somewhat disagreed, and twenty percent disagreed. Seventy-two percent of the respondents had some concerns regarding blind spots in their lab environment.

Construct number three stated that the teacher is very responsive and attentive to potential safety issues. In the area of supervision, question number ten asked if there were specific consequences when safety rules were violated. Eighty-eight percent of the respondents indicated that consequences were in place. This is a high correlation to accepted practice.

Question number eleven asked if the equipment in the lab had visual safety zones on the floor. Forty-four percent of the respondents agreed, twenty-six percent somewhat agreed, twelve percent somewhat disagreed, and eighteen percent disagreed. This would indicate that the majority of the respondents did not meet recommended practice of visual safety zones on the floor.

Question number twelve asked if the teacher felt that they had a high level of supervision in their lab. Seventy percent indicated a high level of supervision, twenty-eight percent indicated they somewhat agreed, and two percent, or one respondent, disagreed. This would be a high correlation to accepted practice.

Question number thirteen asked if the participant's safety practices would be legally defendable if an accident would occur. Sixty-four percent stated that their safety practices would be legally defendable if an accident would occur. Thirty-four percent of the respondents somewhat agreed, and two percent somewhat disagreed. One would expect that all the participants would feel that their practices were legally defendable.

In the area of instruction, question fifteen asked what the basis for their safety resources was. Forty-eight percent indicated that they created their own materials, forty-two percent used safety resources from experts in the field, and ten percent used resources that were created before they

started teaching at that school. Recommended practice indicates that safety resources should be developed from experts in the field. Fifty-eight percent of the respondents did not follow recommended practice.

In the area of maintenance, question number sixteen asked if they conducted maintenance before it became an as needed basis. Forty percent agreed, forty-six percent somewhat agreed, ten percent somewhat disagreed, and four percent disagreed. Since sixty percent did not do regularly scheduled maintenance, this indicates a low correlation to recommended practice.

Construct four stated the teacher has an organizational system for record keeping in reference to safety. Question number seventeen asked if they had records of student performance in regards to lab safety. Seventy-four percent of the respondents indicated that they did have records of student performance in regards to lab safety. This would indicate a high correlation to recommended practice.

Question number eighteen asked if they had records of all accidents and if they had an accident report summery. Fifty-eight percent agreed, twenty-six percent somewhat agreed, six percent somewhat disagreed, and ten percent disagreed. The majority of the respondents had a a high correlation to recommended practice.

Question number nineteen asked if they had a file of safety records for all of their students. Sixty-four percent agreed, twenty-two percent somewhat agreed, six percent somewhat disagreed, and eight percent disagreed. Again, the majority of the respondents followed recommended practice.

Question number twenty asked if they had a copy of the lesson plan in use when they taught about specific shop equipment. Fifty-two percent agreed, thirty-four percent somewhat agreed, and twelve percent disagreed. This would indicate that more than half of the respondents had a high correlation to recommended practice.

Question number twenty-two asked if their current level of machine maintenance was very thorough. Thirty percent agreed, fifty-six percent somewhat agreed, ten percent somewhat disagreed, and four percent disagreed. Seventy percent of the respondents need to improve their machine maintenance. This would indicate a low correlation to recommended practice.

Demographics

Question number twenty-three determined the level of risk the respondents had in their labs, defined by course name. Only two respondents taught classes in a low-risk lab environment. Ninety-two percent indicated a high-risk lab environment.

Question number twenty-four determined the level of risk by identifying the equipment used in their lab facilities. Again, two respondents indicated a low-risk lab environment. Ninety-six percent indicated a high-risk lab environment.

Chapter V: Results

Conclusions

The results of the survey indicated that ninety-six percent of the respondents taught in a high-risk laboratory setting. This would indicate that they should have a high level of safety protocol incorporated within the curriculum. The majority of the teachers' safety programs had a low correlation to recommended practice. This would indicate that if an injury occurred in their classroom their safety protocols may not be legally defendable.

Therefore, high school technology education teachers in Wisconsin would benefit from additional safety practice training and resources.

Recommendations

I would recommend that the Wisconsin Department of Instruction, (DPI), develop a safety curriculum that would be integrated in to the technology education teacher certification. The DPI could also develop an online course that prospective teachers would take. Along with that course, they could develop an on-line test that teachers would have to pass before being certified to teach technology education in the state of Wisconsin.

I would also recommend that the DPI develop a state safety guide that would be available on-line. The site could also contain safety resources and provide updates and ongoing information on safety instruction.

At the district level, I would recommend that an administrator or a head of the department be appointed to insure that all technology education teachers are appropriately trained and that they

follow the DPI guidelines. This would diminish the possibility of injury to students and protect against lawsuits that may be brought against the teacher, school, or district if an accident would occur in the classroom.

References

Bever, David L. (1996) *Safety: A personal Focus*. St. Louis, Missouri: Mosby-Year Book, Inc.

Firenze, R. & Walters, J. (1981). *Safety and Health for Industrial/Vocational Education: For Supervisors and Instructors.* Washington D.C: Occupational Safety and Health Administration. (OHEA)

Gathercoal, F., Stern, S. (1987). *Legal Issues for Industrial Educators.* Ann Arbor, Mi: Prakken.

Knight, S. (July 2000). Injuries Sustained by Students in Shop Class. *Pediatrics*. 106(1)

Mawdsley, R.D. (1993). Supervisory Standard of Care for Students With Disabilities. *Education Law Reporter, 80,* 779-791.

Kratochvill, Francis. (2000). *An Investigation Of The Safety Education Curriculum In The Technology Education Teachers' Program At The University of Wisconsin in Menomonie, Wi.* (U.W. Stout Research Paper). Retrieved July 2004 from http//uwstout.edu/lib/thesis/2000/2000kratochvillf.pdf

Massachusetts Career and Technical Education Curriculum Resource Center. (2004*). Safety Guide.* Retrieved April 2005, from Massachusetts Department of Instruction. http://www.mcte.org/.

United States Department of Labor. (1990a). *OSHA compliance manual: What is OSHA?* Washington, DC: U.S. Government Printing Office. Retrieved May 2004, from U.S. Government Printing Office http://www.osha.gov/

Pennsylvania Dept. of Instruction. (not listed) *Safety Guides for Technology Education.* Retrieved July 2004, from Pennsylvania Department of Instruction http://www.teap-online.org/safety.htm

Sanders, M. (Spring 2001). New Paradigm or Old Wine? The Status of Technology Education Practice in the United States. *Journal of Technology Education.* 12(2).

Standler, R. (1999-2000). *Injuries in School/College Laboratories in the U.S.A*. Retrieved April 2005 from http://www.rbs2.com/labinj.htm

Utah State Office for Applied Technology Education. (2002*). Safety Program and Management Guide.* (Utah S.G.) Retrieved May 2004 from the Utah Department of Public Instruction http://www.usoe.k12.ut.us/ate/Teched/Safety.htm

Washington Department of Public Instruction. (2002). *State Safety Guide for Career and Technical Education.* (Wash S.G.) Retrieved June 2004 from the Washington Department of Public Instruction http://www.k12.wa.us/CareerTechEd/pubdocs/safetyguide0203/Section%201.pdf

Wisconsin Department of Public Instruction. (1993). *A Guide To Facility Planning and Safety.* Retrieved June 2003, from Wisconsin Department of Public Instruction http://www.dpi.state.wi.us/dpi/

Wisconsin School Safety Coordinators Association. (1998*). Wisconsin School Safety Coordinators Handbook.* (WSSCH) Retrieved June 2003, from Wisconsin School Safety Association http://www.wssca.org/index.html

Yell, Dr. M., (1997) Teacher Liability for Student Injury and Misconduct. *Beyond Behavior.*7(4).

Appendix A

Survey Results

Basis for Managing Risk in Technology Education

This is a survey for current Technology Education Teachers teaching in high school grades 9-12. This survey is designed to provide useful information concerning general safety issues. Directions: Please complete the information by checking the appropriate response and filling in any comments.

1. Does your district, school or department hold regularly scheduled in-service training that address the issues of safety in T.E labs?

Yes	32.0%	(16)
No	68.0%	(34)
TOTAL	**100.0%**	**50**

2. If your answer was yes in question one, how often does this training occur?

once a week	2.0%	(1)
once a month	6.0%	(3)
once per semester	6.0%	(3)
once a year	14.0%	(7)
once per two years	2.0%	(1)
Never	20.0%	(10)
TOTAL	**50.0%**	**50**

3. Have you participated in formal safety related training in the past five years?

Yes	68.0%	(34)
No	32.0%	(16)
TOTAL	**100.0%**	**50**

4. I have a strong knowledge of lab equipment use and maintenance.

Agree	70.0%	(35)
Somewhat Agree	28.0%	(14)
Somewhat Disagree	2.0%	(1)
Disagree		(0)
TOTAL	**100.0%**	**50**

5. Labs and equipment has been reviewed for safety compliance in the past two years.

Yes	74.0%	(37)
No	26.0%	(13)
TOTAL	**100.0%**	**50**

6. Who conducted this review?

#	Response
2	?
1	consulting fim and school insurance
1	Consulting firm
1	Department members and Principal
1	dept chair and myself
1	DLHR OSHA INSURANCE CO.
1	entire department
1	Fire Department Annual Walk Through
1	Fire safety inspector
1	Independent consultant group
1	independent insurance inspector- Wauaau Insurance
1	instructor
1	Insurance Co. & Fire Dept.
3	Insurance Company
1	Insurance person
1	insurance provider
1	internal review
1	maintenance staff / myself
1	McNeil Environmental
1	myself
1	Myself, student team, district insurance company
1	OSHA
1	our staff
1	outside consultand hired by insurance or some such thing
1	Private Firm
1	safety abd clean air
1	safety coordinator
1	school insurance company
1	School Insurance Company Inspection team
1	Staff
1	state
1	Tech Ed Safety Coordinator
1	TRICOR Safety Consulting

7. The layout of my lab equipment has no blind spots from the teacher.

Agree	28.0%	(14)
Somewhat Agree	36.0%	(18)
Somewhat Disagree	16.0%	(8)

Disagree	20.0%	(10)
TOTAL	**100.0%**	**50**

8. Class size for my lab classes makes supervision of students not difficult.

Agree	22.0%	(11)
Somewhat Agree	26.0%	(13)
Somewhat Disagree	22.0%	(11)
Disagree	30.0%	(15)
TOTAL	**100.0%**	**50**

9. I have a written maintenance schedule for the machines in my lab.

Agree	16.0%	(8)
Somewhat Agree	30.0%	(15)
Somewhat Disagree	18.0%	(9)
Disagree	36.0%	(18)
TOTAL	**100.0%**	**50**

10. I have specific consequences when students violate safety rules.

Agree	88.0%	(44)
Somewhat Agree	10.0%	(5)
Somewhat Disagree	2.0%	(1)
Disagree		(0)
TOTAL	**100.0%**	**50**

11. My equipment has visual safety zones on the floor.

Agree	44.0%	(22)
Somewhat Agree	26.0%	(13)
Somewhat Disagree	12.0%	(6)
Disagree	18.0%	(9)
TOTAL	**100.0%**	**50**

12. I have a high level of supervision in my lab.

Agree	70.0%	(35)
Somewhat Agree	28.0%	(14)
Somewhat Disagree		(0)
Disagree	2.0%	(1)
TOTAL	**100.0%**	**50**

13. My safety practices would be legally defendable if an accident would occur.

Agree	64.0%	(32)
Somewhat Agree	34.0%	(17)
Somewhat Disagree	2.0%	(1)
Disagree		(0)
TOTAL	**100.0%**	**50**

14. Identify the following activities that are incorporated in your safety training.

Demonstrations	100.0%	(50)
Safety test	100.0%	(50)
Performance test	76.0%	(38)
Personal protection use	90.0%	(45)
Student / Teacher safety contract	74.0%	(37)
Parent notification of safety concerns	52.0%	(26)
Students demonstrate proficiency in all lab activities	80.0%	(40)

15. What is the basis for your safety resources?

I create my own safety materials.	48.0%	(24)
I use safety resources from experts in the field.	42.0%	(21)
I use safety resources created before my arrival.	10.0%	(5)
TOTAL	**100.0%**	**50**

16. I conduct machine maintenance before it becomes an as needed basis.

Agree	40.0%	(20)
Somewhat Agree	46.0%	(23)
Somewhat Disagree	10.0%	(5)
Disagree	4.0%	(2)
TOTAL	**100.0%**	**50**

17. I have records of student performance in regards to lab safety.

Agree	74.0%	(37)
Somewhat Agree	16.0%	(8)
Somewhat Disagree	2.0%	(1)
Disagree	8.0%	(4)
TOTAL	**100.0%**	**50**

18. I have records of all accidents and have an accident report summery.

Agree	58.0%	(29)
Somewhat Agree	26.0%	(13)
Somewhat Disagree	6.0%	(3)
Disagree	10.0%	(5)
TOTAL	**100.0%**	**50**

19. I have a file of safety records for all my students.

Agree	64.0%	(32)
Somewhat Agree	22.0%	(11)
Somewhat Disagree	6.0%	(3)
Disagree	8.0%	(4)
TOTAL	**100.0%**	**50**

20. I have a copy of the lesson plan in use when teaching about specific shop equipment.

Agree	52.0%	(26)
Somewhat Agree	34.0%	(17)
Somewhat Disagree	2.0%	(1)
Disagree	12.0%	(6)
TOTAL	**100.0%**	**50**

21. I have a written maintenance schedule for the machines in my lab.

Agree	14.0%	(7)
Somewhat Agree	34.0%	(17)
Somewhat Disagree	20.0%	(10)
Disagree	32.0%	(16)
TOTAL	**100.0%**	**50**

23. Which of the course titles best describes the course you teach? Check all that apply.

General Tech Ed	32.0%	(16)
Drafting /CAD	30.0%	(15)
Wood technology	34.0%	(17)
Metal technology	38.0%	(19)
Construction	18.0%	(9)
Electricity/electronics	18.0%	(9)
Manufacturing	36.0%	(18)
Communications	14.0%	(7)
Automotive	40.0%	(20)
Graphic Communications	22.0%	(11)
Energy/Power	28.0%	(14)

24. Check all Equipment used in your lab facility.

Lathe	68.0%	(34)
Milling Machine	48.0%	(24)
Pedestal Grinder	60.0%	(30)
Shear	52.0%	(26)
Brake	40.0%	(20)
Metal Forming	42.0%	(21)
Forge	24.0%	(12)
CNC Equipment	50.0%	(25)
Arc Welder	50.0%	(25)
Oxy-Acetylene	58.0%	(29)
MIG Welder	58.0%	(29)
TIG Welder	44.0%	(22)
Horizontal Band Saw	44.0%	(22)
Portable power tools	76.0%	(38)

Drill press	80.0%	(40)
Table Saw	54.0%	(27)
Radial Arm Saw	40.0%	(20)
Surfacer/Planner	46.0%	(23)
Jointer	46.0%	(23)
Miter Box Saw	52.0%	(26)
Band Saw	60.0%	(30)
Jig Saw	54.0%	(27)
Shaper	20.0%	(10)
Injection Molder	28.0%	(14)
Vacuum Molder	16.0%	(8)
Rotational Molder	12.0%	(6)
Floor Jack	44.0%	(22)
Automotive Hoist	42.0%	(21)
Overhead Chain Hoist	26.0%	(13)
Parts Cleaner	54.0%	(27)
Offset Press	18.0%	(9)
Robotics	30.0%	(15)
Lasers	16.0%	(8)
Hydraulic Sheer	16.0%	(8)
Electricity labs	36.0%	(18)
Hydraulic labs	18.0%	(9)
Semi conductor labs	14.0%	(7)
Computer labs	64.0%	(32)

Appendix B

Survey Cover Letter

Consent to Participate In UW-Stout Approved Research

Title: Establishing a Basis for Managing Risk in Technology Education

Investigator: My name is Michael Moran and I am a tech ed teacher at Baraboo High School. I have a survey on this link. http://www.uwstout.edu/survey/moranm.html
If you could take three minutes to take this quick survey I would greatly appreciate it.

Description: The research is an investigation of the safety curriculums that are taught in high school technology classes in the State of Wisconsin. The research will attempt to determine upon what basis teachers decide their safety protocols.

Risks and Benefits: The research will indicate if technology education teachers in Wisconsin would benefit from additional training and resources in the area of safety instruction. I cannot identify any possible risks from this research.

Confidentiality:
Your name will not be included on any documents. We do not believe that you can be identified from any of this information.

Right to Withdraw:
Your participation in this study is entirely voluntary. You may choose not to participate without any adverse consequences to you. However, should you choose to participate and later wish to withdraw from the study, there is no way to identify your anonymous document after it has been turned into the investigator."

IRB Approval:
This study has been reviewed and approved by The University of Wisconsin-Stout's Institutional Review Board (IRB). The IRB has determined that this study meets the ethical obligations required by federal law and University policies. If you have questions or concerns regarding this study please contact the Investigator or Advisor. If you have any questions, concerns, or reports regarding your rights as a research subject, please contact the IRB Administrator.

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Statement of Consent:
By completing the following survey you agree to participate in the project entitled "Establishing a Basis for Managing Risk in Technology Education"