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Integration and needs of Iowa high school agricultural educators regarding agricultural safety and health education

Josie M. Rudolphi
Iowa State University

Integration and needs of Iowa high school agricultural educators regarding agricultural safety and health education

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Josie Rudolphi

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Michael Retallick, Major Professor
Robert A. Martin
Charles V. Schwab

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ABSTRACT

Agricultural safety and health education has been an agenda item for various government and non-profit organizations working to reduce the number of agricultural injuries and deaths to young people. Agricultural safety and health education has been recognized as effectively helping to reduce the number of on-farm injuries and deaths, despite facing barriers and challenges. One of the largest challenges agricultural safety and health professionals face is reaching a captivated audience of the desirable age. When audience, learning theories, and teaching methods are considered, one viable route for teaching agricultural safety and health education is in the secondary agricultural education classroom.

The purpose of this study was to determine the current practices and attitudes of Iowa high school agricultural educators regarding agricultural safety and health education. The accessible population for this census study consisted of 216 Iowa agriculture teachers. Findings were based on data obtained through a web-based survey from 137 Iowa high school agricultural educators. Non-response error was controlled.

Findings from this study indicated that most Iowa high school agriculture teachers are teaching some aspect of agricultural safety and health in their classroom utilizing a variety of teaching tools from various resources. Agricultural safety and health is most commonly taught as part of a larger agricultural science unit, as opposed to being taught as its own unit of study. Iowa agriculture teachers recognized strengths, such as the quality of materials, and weaknesses, including the need for professional development, to agricultural safety and health education and identified limitations they face in teaching the topic.

Ultimately, the results of this study brought greater understanding of Iowa high school agriculture teachers' practices in agricultural safety and health education and their attitudes towards agricultural safety and health education. Agricultural safety and health professionals can benefit from addressing the findings and the recommendations of this study in the development of agricultural safety and health education materials.

CHAPTER I. INTRODUCTION

Agriculture is the oldest activity of settled man, after his days of hunting and foraging (Frank, McKnight, Kirkhorn, & Gunderson, 2004). Today less than one percent of the United States' population claims production agriculture as their primary occupation (Environmental Protection Agency, 2009). Thanks to advancements in mechanization, modern production methods, and chemicals, one percent of the American population is able to grow enough food to sustain the rest of the country and even populations outside of the United States. These advancements, however, come at a price, namely putting the well-being of agricultural workers, their families, and their children at risk (Frank et al., 2004). Worker fatality statistics from 2007 suggest that forestry, agriculture, and fishing are the nation's most hazardous work industries and have work death rates eight times higher than the all-industry average (Murphy & Lee, 2009). Of the 573 work-related deaths that occurred in forestry, agriculture, and fishing, 80% occurred in agriculture alone (Murphy & Lee, 2009).

In agriculture, and uncommon to most industries, children and young adults make up a significant portion of the workforce (Rivara, 1985). The National Committee for Childhood Agricultural Injury Prevention (NCCAIP) suggested there are more than two million youth under the age of 20 exposed to agricultural risks and hazards each year, including those who live on a farm or ranch, those who live in the household of a hired farm or ranch worker, and those who regularly or irregularly visit farms (McCallum, Conaway, Drury, Bruane, & Reynolds, 2005). On Iowa farms in 2000, there were 1,195 reported injuries and 38 reported fatalities (Schwab, 2002). The leading causes of farm related injuries in Iowa in 2000 included slips and falls, injuries caused by livestock, injuries that occurred as a result of being struck or hit, and tractor accidents. Tractors accidents alone accounted for

10% of the reported deaths in the state. Youth, age 19 and younger, made up 16% of the total number of on-farm related injuries (Schwab, 2002). The exposure of children and youth to the dangers of farm work is both routine and extensive. *Successful Farming* did a study to determine the age and extent to which youth are exposed to tractor dangers (Murphy, Kiernan, & Chapman, 1996). It was concluded that 65% of farm boys were operating tractors by the age of 12, and 95% of boys and girls between the ages of seven and nine were allowed to ride on tractors with a parent (Murphy et al., 1996). While agricultural death rates have declined for both boys and girls equally since the mid-1980s, fatality rates among males are 5.6 times higher when compared to females over all age ranges, and the fatality rate of males is 10 times higher than females among youth 15–19 years of age (Committee on Injury & Poison Prevention and Committee on Community Health Service, 2001).

In an effort to create less-hazardous work environments in American agriculture, the Agricultural Safety and Health Council of America (ASHCA) was created in 2007. At its first annual meeting, ASHCA identified critical issues the organization must face that impede efforts, support, and motivation for farm and ranch safety in the United States (Murphy & Lee, 2009). These issues included:

1. Minimal mention of farm safety in the Farm Bill.
2. Raising the bar for acceptable/unacceptable safety behaviors on the farm.
3. Safety education and training for future generations and types of farmers and farm workers.
4. Lack of unity and direction for implementing farm and ranch occupation safety and health best practices.

There are various organizations that exist to educate the public on agricultural health and safety. In Iowa, one of the most prevalent organizations is Farm Safety 4 Just Kids. The mission of Farm Safety 4 Just Kids is "to promote a safe farm environment to prevent health hazards, injuries, and fatalities to children and youth" (Farm Safety 4 Just Kids, 2010). Since 1986, the organization has been working to educate children and youth, including teenagers up to age 18, about the potential dangers associated with agricultural equipment and livestock (Farm Safety 4 Just Kids, 2010). Across the United States, there are other governmental and non-profit organizations working with the same goal of creating safer working environments for children and youth in agriculture.

Researchers have begun to document the positive effect of safety education for youth. A study done by Murphy (1985) found a 20% improvement on test scores among students in vocational agriculture who received education on farm safety, and 25% of those participants had improved behavioral practices as a result of the agricultural safety and health training. A 1993 study found that youth who participated in Wisconsin's Tractor certification and Tractor and Machinery Certification program not only increased their knowledge of health, safety, and equipment operation but also improved safety practices (Murphy et al., 1996). Farm injury death rates have been on the decline the past decade (Rivara, 1997). Between 1991 and 1993, 104 people under the age of 20 died as a result of an agricultural incident. While this number is still high, it is a 39% decrease when compared to the 1979–1981 data for the same age group (Rivara, 1985). There have been multiple reasons cited for this welcoming decline including better emergency services and trauma care, and prevention efforts, such as education, which is encouraging for agricultural safety and health professionals (Rivara, 1997). While agricultural safety and health education has

seen some successes, there are, however, weaknesses within agricultural safety and health that inhibit its own ability to reduce the number of incidents involving children and youth on farms.

Challenges in agricultural safety and health education include the nature of farm work which includes environmental challenges and social, economic, and political challenges (Murphy, 2003). Another limitation to agricultural safety and health education is the lack of an effective educational outlet. Reducing farm injuries and death must be a community effort, and it is important to view agricultural safety as a public issue and not an industrial issue (Murphy, 2003). Safety and health educators should respect the people they try to help and also engage them in the intervention as much as possible.

Agricultural safety and health education has long been a point of importance for many agricultural businesses or organizations such as county Farm Bureaus and equipment dealerships as well as other groups including insurance agencies and fire departments. Educational efforts by these parties, however, are often sporadic, narrowly focused, and only reach those in the community who have a personal relationship with those hosting the program (Murphy et al., 1996). Likewise, farm safety training has often been considered a responsibility of cooperative extension, but states vary in the resources available for such activities (McCallum et al., 2005).

Given the intent to reach teen workers, one viable educational route would be high school agricultural education programs, especially when similarities in educational theory between agricultural education and agricultural safety and health education are considered. Agriculture has one of highest fatality rates of all occupations. Because the idea of agricultural education is to prepare students to enter the agricultural workforce, agricultural

health and safety is a vital part of a student's education (Hubert, Ullrich, Murphy, & Linder, 2001). Safety regulations must be self-monitored, and it's important that every worker understands the hazards of farm work and how to behave safely. In chapter 13 of their book, *Safety Education*, Florio and Strafford (1969) stated:

> Education is the only feasible means of achieving this goal, and its failure to date indicates merely that initial efforts have not been sufficiently intensive and widespread. All schools in rural areas should provide training in farm safety and should support the activities of other organizations interested in this work. (p. 341)

Additionally, safety of students is the most important job of an agricultural educator, and parents demand their children be educated to use materials, tools, and equipment properly (Dyer & Andreasen, 1999).

Statement of the Problem

Literature suggests that agricultural safety and health education should be a community effort, and educating youth, a more impressionable and adaptable portion of the population, could have great impact on attitudinal and behavioral changes in agricultural safety and health (Murphy et al., 1996). High school agricultural departments have been recognized as a possible avenue for successful agricultural safety and health education instruction. Therefore, more information about high school agricultural teachers' agricultural safety and health efforts are needed. Specifically indentifying the attitudes held by teachers of agriculture regarding agricultural health and safety and to what extent teachers of agriculture are integrating agricultural health and safety education into their curriculum will provide valuable insight into agricultural safety and health efforts with agriculturally oriented youth.

Purpose and Objectives

The purpose of this study was to identify the attitudes and practices of Iowa agricultural educators regarding agricultural health and safety education in the secondary school curriculum. The objectives of this study were to:

1. Identify the attitudes of Iowa agricultural educators towards agricultural safety and health education.
2. Determine the extent to which Iowa high school agricultural educators were teaching agricultural safety and health in their classrooms.
3. Identify the need for additional education and materials within agricultural safety and health.
4. Identify selected demographic information of the respondents.
5. Identify the role of demographics in Iowa agriculture teachers' attitude towards agricultural safety and health education.

Need for the Study

Agriculture ranks among one of the most dangerous industries. Culturally, children and young adults have been called upon to assist in family farming operations, putting them at risk of injury or death. Older children, specifically teenagers, are trusted with more responsibilities and larger equipment, increasing the need for age-appropriate agricultural health and safety education. While many organizations exist with the specific purpose to provide agricultural safety and health educational materials, the use of these materials in formal school based agricultural education is in question.

Implications and Educational Significance

This study will seek to better understand what, if anything, high school agricultural education teachers are doing to prepare students in their classrooms to work safely with agricultural equipment and machinery. Furthermore, it will identify teachers' attitudes of agricultural health and safety education as well as their attitudes of the materials and resources currently available to them.

This research can be used to help develop effective agricultural health and safety materials and curricula for agricultural educators. Understanding the wants and needs of educators will help ensure that materials are used and integrated into curricula and will ultimately better prepare educators on the topics of agricultural safety and health. This effort could result in more safety-conscious young adults and potentially fewer agricultural related injuries and deaths.

Definition of Terms

The following is a list of terms and their definitions from the literature used to best frame this study:

Agricultural safety and health: For the purpose of this research, agricultural health and safety refers to the proper handling and operating of agricultural equipment, livestock, tools, chemicals, etc, so as to ensure maximum safety of the operating individual and minimized risk of injury or death.

Practices: The actions or processes of performing or doing something; repeated performance or systematic exercise for the purpose of acquiring skill or proficiency (Agnes et al., 2003).

Attitude: An individual's tendency to respond favorably or unfavorably to an object (including person or group of people, institutions, or events). Social psychologists recognize three components to the conception of an attitude: (a) cognitive component, that which is known about an object; (b) affective component, that which is felt towards an object; and (c) behavioral component, action taken towards the object. Attitudes determine what an individual will see, hear, think, and do, and are rooted in experience (Souza Barros & Elia, n.d.).

Organization of Thesis

This thesis is organized into six chapters: introduction, literature review, comprehensive methods, two research papers that address the objectives of the study, and conclusions. The introduction outlines the need for agricultural safety and health education and recognized current educational efforts. In the literature review, the connection between agricultural safety and health education and secondary agricultural education is made, and the need for this specific study is raised. Chapter three discusses the methodology of the study in-depth and addresses issues of reliability and validity. Research findings are dispersed throughout two chapters and addressed in two separate papers. Chapter four identifies the current agricultural safety and health education practices and attitudes of Iowa agriculture teachers as well as limitations and issues they face in teaching the subject. Chapter five examines the effect of teacher demographics on attitudes towards agricultural safety and health. Finally, conclusions of the study are drawn, implications of the findings discussed, and the need for additional research is identified in chapter six.

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CHAPTER II. LITERATURE REVIEW

This chapter discusses the literature related to agricultural health and safety education and offers a conceptual framework for the study. The chapter is divided into the following sections: educational organizations for agricultural safety and health and their impact, and internal and external challenges to agricultural safety and health education. Learning theory and teaching methods in agricultural safety and health and agricultural education are presented, and then similarities between the two entities are established. Finally, teacher variables including practices and attitudes are evaluated to determine their effect on education.

Agricultural Safety and Health Education Organizations

In an effort to help educate the public on the importance of agricultural safety and health and bring awareness to the hazards of agriculture, agricultural health and safety organizations, non-profit groups, and interest groups have been established. Today, there are governmental and non-profit organizations working to promote agricultural safety and health and educate the public, work for safety legislation, and conduct public educational efforts, some of which have roots in Iowa.

Non-profit organizations are one type of educational outlet used to educate the public on safe agricultural practices. As an example, Farm Safety 4 Just Kids was founded in 1986 with the mission "to promote a safe farm environment to prevent health hazards, injuries, and fatalities to children and youth" (Farm Safety 4 Just Kids, 2009). Since its inception, the organization has been working to educate children and youth, including teenagers up to age 18, about the potential dangers associated with agricultural equipment and livestock. The organization, which has been recognized nationally for its efforts, works through a system of

outreach coordinators and chapter members to educate youth and their communities on the importance of agricultural safety (Farm Safety 4 Just Kids, 2009).

In addition to non-profit organizations, governmental organizations have also been established to battle agricultural incidents and deaths. The National Institute for Occupational Safety and Health (NIOSH) within the Center for Disease Control (CDC) has started several organizations and initiatives to combat agricultural injury and death, some specific to youth (NIOSH, n.d.). NIOSH and the CDC created The National Agricultural Safety Database, an online consortium of agricultural safety and health publications. This website houses safety topics and information on safety behavior available for download in such forms as PowerPoint presentations, factsheets, and brochures for parents and/or teachers to use in classrooms or for personal use (National Ag Safety Database, n.d.).

Across the United States, the National Institute for Occupational Safety and Health (NIOSH) has also established NIOSH Agricultural Centers. The Centers for Agricultural Disease and Injury Research, Education, and Prevention represent a major effort by NIOSH to provide safety services to agricultural workers and their families (NIOSH, n.d.). One of these centers is The National Children's Center for Rural and Agricultural Health and Safety, an organization that works to enhance the health and safety of children exposed to the hazards of agriculture and rural environments. In 2008, NIOSH committed $4.6 million to the center to fund research, education, intervention, and outreach to youth involved in agriculture (Marshfield Clinic Research Foundation, n.d.).

The Iowa Center for Agricultural Safety and Health (I-CASH) is an organization located within the University of Iowa with the goal of creating a healthy, safe agricultural environment in Iowa through prevention and education programs (The University of Iowa,

2010). I-CASH works with many entities around Iowa to conduct research regarding agricultural safety and health and also to provide expertise to individuals with questions about safety (The University of Iowa, 2010).

Current Agricultural Safety and Health Organizations' Impact

The agricultural safety and health organizations working to help prevent agricultural injuries and deaths should find encouragement in the fact that the rate of childhood agricultural injuries has decreased nearly 60% since 1998. The director of the National Children's Center for Rural and Agricultural Health and Safety, Barbara Lee, stated, "This marked decline is a testament to the dedicated efforts of many individuals, organizations and agribusiness sponsors, along with federal agency leadership" (National Children's Center for Rural and Agricultural Health and Safety, 2010).

Farm Safety Day Camps are common across North America as a way to educate children and youth on the risks and hazards of American farms. The Progressive Agriculture Foundation sponsored 270 camps in 2003 alone, reaching over 50,000 children. Other organizations including FFA Chapters, 4-H Clubs, and Farm Safety 4 Just Kids sponsor similar camps, however, the effectiveness of these camps have not been systematically demonstrated (McCallum et al., 2005). In 2001, a three year study of the Progressive Farmer program was evaluated to determine the effect of these camps on the youth who attended. Twenty camps were selected and, from there, individuals were selected to participate in the study. Participants took a pre-test before the safety camp, and there was a follow up interview of both the participants and their parents three to four months following the safety camp (McCallum et al., 2005). Results showed that the safety day camps were effective at increasing safety knowledge and improving safety practices among those who participated in

the study based on pre-test and post-test scores and follow-up conversations with participants and their parents (McCallum et al., 2005).

Challenges to Agricultural Safety and Health Education

While there have been organizations working for agricultural safety and health education, there are internal challenges to agricultural safety and health, or challenges to the educational effort within the structure of agricultural safety and health. There are also external challenges presented by independent variables outside of agricultural safety and health, standing in the way of agricultural safety and health education success.

External Challenges to Agricultural Safety and Health Education

There are many aspects of agriculture that contribute to its hazardness and the difficulty of reducing hazards and risks through education. The University of Iowa's Institute of Agricultural Medicine compiled a list of factors that contribute to farming's hazardous nature. Collectively, the factors create great challenges for agricultural safety and health professionals working to change the status quo of safety and health attitudes and actions on farms. These four categories include: (a) environmental factors, (b) people, (c) work activity, and (d) social, economic, and political factors (Murphy, 2003)

Environmental factors contribute to agriculture being a dangerous industry. Extreme hot and cold temperatures, rain, sleet, and intense sun exposure rarely merit a farmer to stop working. Additionally, on many farms there are no supervisors to intervene and stop a farmer from working when conditions are threatening (Murphy, 2003).

The second challenge to agricultural safety and health education as identified by the University of Iowa and Dr. Murphy is the people engaged in the industry. The people involved in farming are often very different than people from any other occupational area.

Young workers, often less than 16 years old, are often exposed to and work with hazards and in environments beyond what is appropriate for their physical or mental abilities (Murphy, 2003). The exposure of children to the dangers of farm work is both routine and extensive. A *Successful Farming* study determined the age and extent to which children are exposed to tractor dangers. It was concluded that 65% of farm boys were operating tractors by the age of 12, and 95% of boys and girls between the ages of seven and nine were allowed to ride on tractors with a parent (Murphy et al., 1996). Despite parents' concern for their children's safety, they often expose their children to the same hazards and dangerous environments in which they work. Additionally, day care for children is often unavailable or not affordable in rural areas which results in young children being babysat by the farming parent, often times side-by-side their parent. There are additional reasons children are exposed to agricultural dangers including the farm and residence overlap, children using the farm as a playground, and children required to help out on the farm as inexpensive or free labor (Murphy et al., 1996).

In agriculture, work hours are not regulated (Murphy, 2003). Work hours and work routines both can be highly irregular, and it is not uncommon for a work week to be 60–80 hours long, which could lead to operator fatigue and increased risk of an incident. Lack of adequate instruction applies, and many farmers learn their trade and teach others simply by observation and experience, with little to no training (Murphy, 2003).

Social, economical, and political factors contribute greatly to the reasons agriculture is a dangerous occupation and create some of the greatest challenges for agricultural health and safety education (Murphy, 2003). Family owned and operated farms, which make up between 85–90% of all farms, are exempt from many federal safety regulations (Cole, 2002).

Factory workers are supervised at a plant, but professional safety officers cannot be placed on every farm to make sure the operator or farmer is practicing safety (Florio & Stafford, 1969).

Culturally, farming has been a profession of risk-taking in which concern for serious injury or death is suppressed. Hazards and injuries are prevalent and accepted by many farm workers (Murphy 2003). Farmers agree that agriculture is a dangerous, unpredictable industry and do not believe anything can be done to prevent injuries or death besides being careful. Many agriculturalists do not view safety or the risk of injury as an immediate concern like they view commodity prices, machinery repairs, or workloads. Parents continuously expose their children to the same risks and hazards they expose themselves to, despite being concerned for their children's safety (Murphy, 2003).

Murphy (2003) named the "disconnect between farm people's safety knowledge, values, and practice" the farm safety-risk paradox, in that there is a contradiction in what people know about hazards and their behavior towards farming (Murphy, 2003). The farm safety risk paradox is problematic for safety and health professionals. Approaches to farm safety research and education must consider the interconnectedness of the many factors of farming and how these factors influence beliefs and practice (Murphy, 2003).

The Agricultural Safety and Health Council for America (ASHCA) in 2007 started establishing national strategies to create less-hazardous agricultural work environments. In perusing its goal, ASHCA identified several critical issues it must overcome before making strides in agricultural safety. The critical issues as identified by ASHCA (2007) are:

> Minimal support for farm safety cooperative extension programs and specialists within land grant universities and high levels of USDA administration; minimal

> mention of farm safety and health in the Farm Bill; lack of support for farm safety and health by state departments of agriculture, health, education, and labor; the importance of commodity groups exerting leadership in agricultural safety and health; making better connections between agricultural cooperatives, insurance companies, farm and ranch suppliers, and support services to professional safety and health organizations and societies; raising the bar for acceptable/unacceptable safety behaviors on the farm; safety education and training for future generations and types of farmers and farm workers; understanding differences between "valuing" farm safety and being "for farm safety" (we need to walk the walk, not just talk the talk); lack of unity and direction for implementing farm and ranch occupational safety and health best practices. (p. 2–4).

The agricultural workforce is changing and these changes create a need for educational information and methods (Murphy & Lee, 2009).

Internal Challenges to Agricultural Safety and Health Education

Agricultural safety and health education also faces internal challenges to the effectiveness of programs and successful communication of information. Internal challenges are defined as challenges within agricultural safety and health education that inhibit its own success. Internal challenges to agricultural safety and health education include the approach safety professionals take to education, lack of research-based theories, and lack of effective program evaluation (Murphy, 2003).

Ensuring a non-threatening approach to agricultural safety and health education is vital in a program's success. Murphy (2003) identified the farm safety paradox as mentioned in the previous section, and defined it as "the disconnect between farm people's safety

knowledge, values, and practice" (p. 3). The farm safety risk paradox is problematic for safety and health professionals. Approaches to farm safety research and education must consider the interconnectedness of the many factors of farming, and how these factors influence beliefs and practice (Murphy, 2003).

At the 1991 Surgeon General's Conference, professionals discussed how agricultural safety and health education for children has dual benefits. At the conference, Dr. Walter Armbruster stated:

> In trying to achieve behavior change, youth may provide a more readily adaptable audience than some older clients that we try to reach. Hence, a focus on youth education and youth intervention may be very effective in changing their behaviors for their lifetime. We also believe that reaching adults through youth is a very effective channel for modifying adult behavior (as cited by Murphy et al., 1996, p. 394).

Another message from the 1991 conference was the importance of respecting people while also trying to help them, referring to the cultural traditions of agriculture, as well as encouraging voluntary cooperation among affected groups as a preferred method to injury reduction (Murphy et al., 1996).

Louis Sullivan of the U.S. Department of Health and Human Services stated, "The critical, vital factor that will determine our success in lowering the risk of agricultural work—is local initiatives and efforts" (Murphy et al., 1996, p. 395). Reducing farm injuries and death must be a community effort, and it is important to view agricultural safety as a public issue and not an industrial issue. Safety and health professionals should respect the people they try to help and also engage them in the intervention as much as possible.

Agricultural safety has long been a point of importance for many agricultural businesses or organizations such as county Farm Bureaus and equipment dealerships. Other groups include insurance agencies, fire departments, and high school agricultural educators (Murphy et al., 1996). In the past, agricultural and safety efforts by these groups tended to be directly focused on educating farmers and not the community. The interconnectedness of communities and farmers, however, makes it important that both rural and non-rural members of communities learn about agricultural safety and health. Many community members might not be aware of the extreme economic and social consequences of an agricultural injury or death (Murphy et al., 1996).

Historically, agricultural health and safety professionals have lacked well-articulated, research-based theories or models to guide agricultural health and safety educational programs (Murphy, 2003). From agricultural safety and health literature, there is little evidence that program theory or program evaluation has ever driven injury prevention education. Program theory in injury prevention is the construction of practical ideas of how an agricultural incident prevention program works, with the ideas coming initially from the experiences and expertise of those creating the programs (Murphy, 2003). Eventually, for theory to turn into a scientific-based statement, a research hypothesis must be tested. Hypothesis testing moves practical ideas of how a program works from guessing to a more concrete statement of cause and effect. Program evaluation is understanding, as accurately as possible, the cause and effect relationship. Contemporary program evaluation focuses primarily on program outcomes or impacts (Murphy, 2003). In general, there is a lack of published program evaluation of agricultural safety and health programs, which raises questions of its effectiveness. This shortfall is a combination of educational background and

job expectations. Educational backgrounds of cooperative extension employees, who often have assumed leadership roles in agricultural safety and health education, would not have included scientific program evaluation nor would it have been taught on-the-job (Murphy, 2003).

Contrary to what Murphy (2003) stated about a lack of program evaluation in agricultural safety and health education, researchers have begun to document the positive effect of safety education for youth. A study done by Murphy himself in 1985 found a 20% improvement on test scores among students in vocational agriculture who received education on farm safety, and 25% of those participants had improved behavioral practices as a result of the agricultural safety and health training. A 1993 study found that youth who participated in Wisconsin's Tractor Certification and Tractor and Machinery Certification program not only increased their knowledge of health, safety, and equipment operation but also improved safety practices (Murphy et al., 1996). While these studies do show statistical data representing the effectiveness of youth agricultural safety and health education, the studies are flawed in their methodologies; inadequate designs, too short of follow-up periods, and overreliance on self-reported outcomes limit their scientific validity (Murphy et al., 1996). Despite researchers questioning the scientific validity of studies claiming to increase youth's knowledge about agricultural safety and health and change youth's safety behavior, there have been decreases in farm-related incidents or deaths among young people (Rivara, 1997).

Farm injury death rates have been on the decline the past decade (Rivara, 1997). Between 1991 and 1993, 104 people under the age of 20 died as a result of an agricultural incident. While this number is still high, it's a 39% decrease when compared to the 1979-1981 data for the same age group (Rivara, 1985). There have been multiple reasons

cited for this welcoming decline including better emergency services and trauma care, and prevention efforts such as education (Rivara, 1997).

Agricultural Safety and Health Education

Government and non-profit organizations have been established to work towards reducing the number of agricultural injuries and deaths in young people. Effective learning theories and teaching methods have been identified as most effective in teaching young people about agricultural safety and health.

Agricultural Safety and Health Learning Theory

Although Murphy (2003) argued that the agricultural safety and health profession lacked a well-articulated research base, three learning theories have been described as effective means to educating the public about agricultural safety and health. They are the behaviorist learning theory, the constructivist learning theory, and the socioculturalist learning theory (Cole, 2002).

The behaviorist learning theory stresses "response strengthening" through reinforcing behavior that leads to the desired habit (Cole, 2002). This learning style was most popular between 1900 and 1950 and was known as the A-B-C model, where A represents antecedent conditions, or things that people can hear or see and that cue specific behavior. When an antecedent condition is presented, the way in which an individual responds is their behavior (B) which leads to various consequences (C). Based on the outcome (consequence), either positive or negative, behaviors are either encouraged and rewarded or discouraged (Cole, 2002). In his book, *Looking Beneath the Surface of Agricultural Safety and Health*, Dr. Murphy (2003) identifies three limiting assumptions the behaviorist learning theory make including: "(a) a thought occurs deep inside the individual's body; (b) behavior and cognition

are mechanical processes, thus they follow rules; and (c) full understanding of a learning event can be obtained by reducing it to its most basic components" (p. 33).

The second learning theory often used in agricultural safety and health education is constructivism, which became widely known beginning in the 1960s (Cole, 2002). The constructivist view states that people construct knowledge as they interact with the world, building blocks of knowledge and understanding (Murphy, 2003). This learning theory compares the human mind to a computer, taking in information, organizing information, putting information in memory, and constantly upgrading the information and building upon it (Cole, 2002). Individuals are viewed as taking information from the environment and organizing that information within existing knowledge and experiences and making meaning of the information (Cole, 2002). In explaining the constructivist learning theory, Dr. George Hein (1991) identified nine principles of constructivism including one stating that learning is contextual and individuals do not learn isolated facts, but learn in relation to what else they know and believe. In formal education, information is often presented in a well-organized fashion and in a way that learners can understand the relevancy to their life, goals, and existing knowledge. Within agricultural safety and health education, constructivism works to help individuals recognize hazards and adopt safe practices (Cole, 2002).

John Dewey first wrote about learning from experience in the 1920s, with the argument that when one experiences something they act upon it and undergo consequences leading to learning (Murphy, 2003). Kolb conceptualized experiential learning explaining the learning process as one where knowledge is shaped through the transformation of experience (Murphy, 2003).

It was not until the 1980s and 1990s that socioculturalism became a recognized learning theory in the United States.

> The sociocultural view of learning holds that knowledge basic to the performance of complex tasks, including health and safety behavior, is the product of an ongoing interaction with the work at hand, the tools used to perform this work, and negotiations among members of the work group. (Cole, 2002, p. 151)

Meaning attitudes, beliefs, knowledge, and skills required to perform work safely do not lie within an individual but are distributed amongst the individuals who make up a social group (Cole, 2002). In the socioculturalism learning theory, safety education becomes a process of empowering workers to understand the hazards in which they work and help them to identify the resources, tools, and knowledge available to their community. The overarching goal is to encourage a group to be more proactive in improving health and safety in their social groups (Cole, 2002).

Changing attitudes and beliefs about agricultural safety and health is one of the challenges identified by Murphy (2003). The development and continuation of a safe working environment and safe behaviors are a direct result of attitudes, skills, and beliefs of the agricultural educator responsible for the agricultural education department (Hubert et al., 2001). One "key feature of sociocultural learning theory is the role of narrative in the construction of meaning, the formation of beliefs and attitudes, and the prescribing of behavior" (Cole, 2002). When teaching attitudes, one does not change their attitude by being told to do something or how to do something. Attitudes are most affected by the observation of a model's behavior, an indirect method of instruction (Cole, 2002).

Teaching Methods in Agricultural Safety and Health

For safety education to be successful in reducing on-farm incidents or injuries, educators must be familiar with the hazards on the farm and methods that can be effectively used to alter the attitudes and behaviors of the learner (Florio & Stafford, 1969). The problem-solving approach has been promoted by the agricultural profession as a teaching approach to use in teaching secondary agriculture students (Cano & Garton, 1994).

Educators have identified effective strategies in teaching agricultural safety and health. For example, since 1972, the Department of Agricultural and Biosystems Engineering at Iowa State University has offered a course on agricultural safety. Students enrolled were to identify hazards on their farm or agricultural workplace and determine solutions to eliminate the hazards (Lehtola & Boyd, 1992). As cited by Lehtola and Boyd (1992), the course's philosophy was rooted in Strasser et al.'s (1973) implications to safety education. Strasser et al. identified the following parameters in safety education:

1. Educational programs that simply present factual information for students to memorize and lack any understanding or application are not adequate.
2. The greatest promise for change in human behavior requires student involvement coupled with group pressures.

The course, as cited by Lehtola and Boyd (1992), also recognized Silletto's (1976) recommendations to safety education which include:

1. In order for an environment to be a safe place to work and live, safety must be an integral part of daily activities.
2. Individuals involved in agriculture need to be able to recognize risky and hazardous situations.

3. To allow more of society to develop a positive attitude towards safety, safety education must be continued, and material should be presented in such a way that will encourage these positive attitudes.

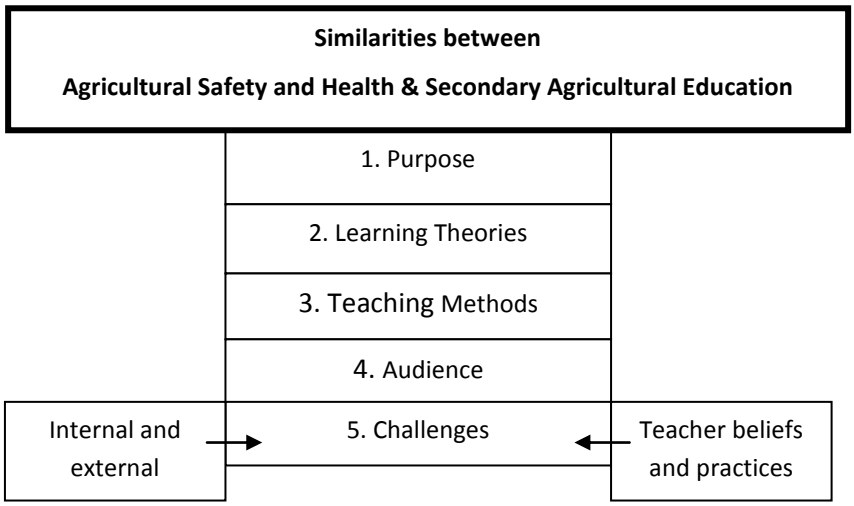
In the course taught at Iowa State University, educational methods included discussions, case studies, and simulators. Recognizing students learn differently, a variety of teaching methods were incorporated into the course. Often in agricultural safety, gruesome pictures are used to depict potential results of hazardous or dangerous situations. While these photos are effective at displaying consequences, they should not be used alone as an educational tool (Lehtola & Boyd, 1992). People respond positively when explained the scientific reason as to why a situation or piece of machinery is hazardous. Adoption of safe behavior is more likely if there is understanding instilled in the learner (Lehtola & Boyd, 1992).

Agricultural Safety and Health in Secondary Education

Farm safety educational programs have been an agenda item for many different organizations and businesses. County Farm Bureaus, fire departments, and insurance agents are a few groups that often assume the responsibility of educating a community about agricultural safety and health. Educational efforts by these parties, however, are often sporadic, narrowly focused, and only reach those in the community who have a personal relationship with those hosting the program (Murphy et al., 1996). In his book, *Looking Beneath the Surface of Agricultural Safety and Health*, Dr. Murphy (2003) recommended a national agenda for agricultural safety and health and incorporating national farm service and commodity group representatives, legislators, federal agencies, farm parents, teen workers, and seasonal farm workers in the process (Murphy, 2003).

Given the intent to reach teen workers, one viable educational route would be through high school agricultural education programs (Figure 1). Similarities between agricultural safety and health education and school-based education include common learning theories and teaching methods as well as the target audience, high school students.

Figure 1. Relationship between agricultural safety and health education and school-based agricultural education



Agriculture has one of highest fatality rates of all occupations. Because the idea of agricultural education is to prepare students to enter the agricultural workforce, agricultural health and safety is a vital part of student education (Hubert, Ullrich, Lindner, & Murphy, 2003).

Establishment and Purpose of Secondary Agricultural Education

Agricultural education programs in high schools prepare students for careers and further study in one of the many sectors within the food and fiber industry (Hubert et al., 2003). Agricultural education programs offer hands-on opportunities to develop academic and vocational skills. The unique combination of classroom instruction and laboratories

allow students to actively engage and experiment in greenhouses, food processing labs, school farms, and livestock facilities (Hubert et al., 2003).

In the United States, the history of agricultural education is closely aligned with that of vocational education. In the 1900s, vocational education served as an instructional program that produced a supply of prepared workers for farming or agricultural industry. The scope of agricultural education was broadened in 1963 to include training for non-farm agricultural occupations (Talbert, Vaughn, Croom, & Lee, 2007). Like other vocational programs, agricultural education evolved into what is known today as career and technical education.

Today, agricultural education encompasses three unique and important aspects: (a) classroom instruction, (b) experiential learning in the form of supervised agricultural experiences, and (c) leadership development as applied in the National FFA Organization. These three components contribute to a successful agricultural education program (Talbert et al., 2007).

Classroom instruction is the core of a successful agricultural education program and often sets the stage for how out-of-class activities will be conducted. The classroom component includes both group and individual instruction and often serves as a precursor to laboratory and leadership experiences (Newcomb, McCracken, Warmbrod, & Whittington, 2004).

Supervised agricultural experiences emphasize the development of occupational competencies necessary to enter the agricultural workforce. Students put into practice the science and skills developed in the classroom into a variety of different laboratories including farms, ranches, and agricultural businesses (Newcomb et al., 2004).

The National FFA Organization provides an opportunity for agricultural education students to develop and apply leadership and citizenship skills. FFA is an important part of an agricultural education program and completes the educational circle when the organization's activities are developed as laboratory activities, reinforcing the knowledge and skills introduced in the classroom setting (Newcomb et al., 2004).

Learning Theory in Agricultural Education

One recognized learning theory within agricultural education is the constructivist learning theory, a learning theory the core of which is based on learners constructing meaning from experiences (Doolittle & Camp, 1999). In secondary education, experiential learning has been a cornerstone for agricultural educators evident in problem solving activities, fieldtrips, laboratories, and supervised agricultural experiences (Roberts, 2006). Epistemologically, the experiential learning theory aligns most appropriately with constructivism (Roberts, 2006).

Before constructivism became more prominent, behaviorism was the primary theoretical foundation for agricultural education (Doolittle & Camp, 1999). The goal of agricultural education, or more broadly, career and technical education, was not only to prepare students for careers but also develop thinking and problem-solving skills. In behaviorism, learners develop behavior as a result of a positive or negative outcome to a situation (Cole, 2002).

Teaching Methods in the Secondary Agricultural Classroom

The primary task of an agricultural education teacher is to assist in student learning. In helping students learn, educators must employ various methods and techniques to teaching

(Newcomb et al., 2004). Common classroom teaching methods in agricultural education include group teaching and individualized teaching.

Group teaching techniques are those appropriate for providing instruction to a group of students at the same time. Group teaching techniques include classroom discussions, field-trips, demonstrations, and cooperative learning. In many of the group teaching techniques, students' psychomotor skills are engaged through hands-on activities (Newcomb et al., 2004).

In addition to group learning techniques, individualized teaching techniques are often employed in agricultural education to meet the needs of specific students and further develop individual interests. Common individual learning techniques include supervised studies, experiments, and independent studies—all which allow students the opportunity to explore various topics of interest and claim responsibility for their learning (Newcomb et al., 2004). In agricultural education, a common individualized learning technique for students is supervised agricultural experiences (Newcomb et al., 2004).

Teaching Safety in the Secondary Agricultural Classroom

There are specific techniques used to educate students on safety specifically. Safety education is important not only for the immediate welfare of students in shop or mechanics classes, but also important for future endeavors and careers in the agricultural industry (Newcomb et al., 2004).

When teaching safety, it is important that teachers keep in mind that safety is a matter of attitude, and instruction should not only impact a student's cognitive domain, but also the affective domain (Newcomb et al., 2004). Cognitive domain refers to the development of mental skills and includes metal recognition and recall. The affective domain refers to how

one deals emotionally and often includes attitudes and beliefs (Miller, 2005). Safety instruction should connect to both domains of a learner influencing them mentally and emotionally. Instructional methods should appeal to all senses of a student, and students should learn in the physical environment when possible, such as bringing in agribusiness professionals to share experiences so students can see how safety is dealt with in real-life situations (Newcomb et al., 2004).

An example of successfully connecting agricultural safety and health education to both the cognitive and affective domains of students is evident in a study done by the University of Kentucky. The economic consequences of an agricultural incident are especially serious, even with insurance (Myers, Cole, Mazur, & Isaacs, 2006). An incident requiring substantial recuperating time could disrupt farm production (Florio & Stafford, 1969). While many farm risks are low probability events, it is often cost-effective to implement injury prevention or protective technologies when the costs of injuries or deaths are considered (Myers et al., 2006).

The University of Kentucky launched a study in 2004 where high school students, 11th graders, specifically, were taught economics using case studies regarding protection against agricultural injuries. Using the application of economics concepts, the study sought to determine who in a community is susceptible to agricultural injury or death, what is the cost of injuries or death and who bears the costs, and how such injuries or deaths can be prevented and why it is cost effective to do so (Myers et al., 2006).

Four different case studies were used in this study: a tractor overturn, a fall from a horse, a chronic effect due to hearing loss, and a roadway collision between a car and a tractor/trailer. The case studies outlined various costs including what preventative measures

would have cost when compared to the cost various injuries and deaths had on society. This study found that the use of case studies in teaching economics provided relevance of economics in decision making and also aided in changing attitudes of students (Myers et al., 2006).

Factors Influencing Teacher Practices

When considering teaching styles, or teaching practices, teacher demographics have been identified as having some influence. Educator gender has been identified as influencing the way teachers teach and stems from the idea that men and women have different communication styles (Bress, 2000). Studies suggest that men are more comfortable in a lecturing role whereas women are more comfortable in a listening role, and in terms of teaching utilize more group discussion and exploration—talking with students as opposed to at students (Bress, 2000). Male teachers tend to be authoritative, thus comfortable in a lecturing role, and females tend to be more supportive and expressive (Duffy, Warren, & Walsh, 2001).

Teaching styles of educators influence student learning. Two main learning styles exist in agricultural education, field-dependent and field independent. According to Raven et al. (1993), "Individuals with a field-dependent learning style tend to perceive the world in a global fashion" (p. 41). As socially-oriented learners, these students best learn material with a social content, such as student-centered activities; these educators, however, need more explicit guidance in problem-solving (Raven et al., 1993).

"Field-independent learners view the world more analytically" (Raven et al., 1993, p. 41). Field-independent learners rely most often on self-defined goals and situations that are self-structured. Teachers with a field-independent learning style tend to guide their students

as opposed to teach them, are more likely to use a problem-solving approach to learning, and emphasize the cognitive aspect of instruction (Raven et al., 1993).

A study of preservice student teachers determined that males are split evenly between the two learning styles, 50.0% were field-dependent learners, 50.0% were independent learners. Females, however, were more divided with only 28.8% identified as a field-dependent learners and 71.4% as a field-independent learners (Cano, Garten, & Raven, 1992). Thus, teaching style would be affected by teacher gender in some instances.

Factors Influencing Teacher Attitudes

Demographics influence an individual's attitude or beliefs. People from differing backgrounds have varying beliefs and value systems (Bill, 2003). An individual's attitudes are affected by many factors including knowledge and values stemming from personal or familiar culture and social settings (Bill, 2003). Considering this information, the connection is made that a teacher's attitude could be influenced by personal experiences and upbringing.

Educational levels of an individual have also been found to have impact on one's attitude or belief system, specifically, epistemological beliefs (Schommer, 1998). Evidence suggests that both age and education affect individuals' epistemological beliefs (Schommer, 1998).

Affect of Teachers' Attitude on Practice

Until the mid-1970s, studies on teachers' thought processes had been focused on teachers' decision-making, with little to no concern for the thought process or knowledge of subject matter in which the decisions are based. Within the last 20 years, emphasis has been placed on determining why teachers teach what they do and how they teach (Fang, 1996).

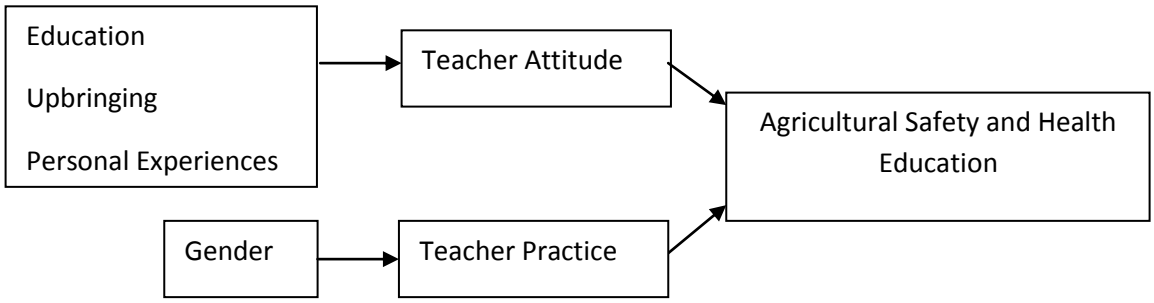
Teaching involves two domains:; (a) a teacher's thought process, and (b) a teacher's actions (or behavior). A teacher's thoughts occur in his/her head and thus are unobservable; teacher actions are observable, however, and are found to have impact on student behavior and student achievement (Fang, 1996). It was originally assumed "that causality is unidirectional, with teachers' classroom behavior affecting students' classroom behavior, which ultimately affects students' achievement" (Fang, 1996, p. 48). Recently researchers have begun to view this causality as cyclical, suggesting teacher behavior affects student's behavior which affects teacher behavior and eventually affects a student's academic achievement (Fang, 1996).

Beliefs are the best indicators of the decisions individuals make throughout their lives (Pajares, 1992). Since student academic achievement is largely affected by a teacher's behavior, and teacher behavior is influenced by a teacher's thought process, it is important to understand the educator's thought processes. Teachers' thought processes have been categorized into three fundamental types: (a) teacher planning, (b) teacher's interactive thoughts and decisions, and (c) teacher's theories and beliefs (Fang, 1996). An educator's beliefs represent a pool of general knowledge of people, events, and objects that affect their thoughts, decisions, and classroom behavior. A teacher's beliefs are shaped by many different factors such as the influence of discipline subculture, preservice experiences, and opportunity for reflection. A teacher's beliefs may be present in that teacher's expectations for their classroom/students or their personal views about a particular subject, which can affect teaching and learning in one way or another (Fang, 1996).

Based on the presented literature and the impact that an educator's attitude has on practice, it can be deducted that gender, educational level, upbringing, and personal

experiences could influence a teacher's agricultural safety and health education practices and attitudes (Figure 2)

Figure 2. Effect of teacher demographics on agricultural safety and health education



Literature suggests that education, upbringing, and personal experiences influence a teacher's attitude, and gender influences a teacher's practices. Both teacher and attitude impact the educator's reception of agricultural safety and health education.

Summary

In an effort to help educate the public on the importance of agricultural safety and health and bring awareness to the hazards of agriculture, agricultural health and safety organizations have been established. Today, there are governmental and non-profit organizations working to promote agricultural safety and health by educating the public, working for safety legislation, and conducting public educational efforts.

Farm injury death rates have been on the decline the past decade (Rivara, 1997). Since 1981, there has been a 39% decrease in farm fatalaties (Rivara, 1985). There have been multiple reasons cited for this welcoming decline including better emergency services and trauma care, and prevention efforts, such as education (Rivara, 1997).

Despite experiencing success in lowering the number of agricultural injuries and deaths in young people, safety and health organizations face many challenges. The

University of Iowa's Institute of Agricultural Medicine compiled a list of external factors that contribute to farming's hazardous nature and restrict educational efforts. These factors are: (a) environmental, (b) people, (c) work activity, and (d) social, economic, and political (Murphy, 2003). Agricultural safety and health education also faces internal challenges to the effectiveness of programs which include; ensuring a non-threatening approach to agricultural safety and health education, lack of effective program evaluation (Murphy, 2003).

Farm safety educational programs have been an agenda item for many different organizations and businesses. Educational efforts by various organizations, however, are often sporadic, narrowly focused, and only reach those in the community who have a personal relationship with those hosting the program (Murphy et al., 1996). Given the intent to reach teen workers, one viable educational route would be through high school agricultural education programs, especially when similarities in educational theory, teaching styles, and audience between agricultural education and agricultural safety and health education are considered.

Though similar, the success of agricultural safety and health education in high school agricultural education classrooms is dependent on the teacher and their interest in the area of study. When considering teaching practices and teacher attitudes, educator demographics have been identified as having some influence. Educator gender has been identified as influencing the way teachers teach and stems from the idea that men and women have different communication styles thus different teaching techniques (Bress, 2000). Background, or upbringing, has been found to have an affect on one's attitude or belief system (Bill, 2003), as does educational level and personal experiences (Schommer, 1999).

Both teacher practice and teacher attitude influence a teacher's reception to agricultural safety and health education (Fang, 1996).

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CHAPTER III. METHODS

The purpose of this census study was to determine the attitudes of Iowa high school agricultural educators regarding agricultural safety and health education and to what extent they are integrating agricultural safety and health materials into their curricula. Current practices and attitudes of Iowa agricultural educators were identified using a web-based questionnaire. In this chapter, the population will be identified, the survey mode will be explained and justified, the survey instrument will be discussed in detail, and limitations and ethical issues will be addressed.

Population, Sampling Frame, and Sample Design

This study identified the current practices and attitudes of Iowa high school agricultural educators regarding agricultural safety and health, thus the target population for this research study was all agricultural educators within the state of Iowa. The frame included all agricultural teachers working in an agricultural education department within a K-12 school district in Iowa. The Iowa Department of Education maintains a list of all high school agricultural educators in the state and included 216 contacts. The list was evaluated for frame error, or mistakes or errors in the list of the population (Groves, Fowler, Couper, Lepkowski, Singer & Tourangeau, 2009). All names were checked to ensure corresponding email addresses were available, and any missing data were sought out by contacting the school district in which the agricultural educator was employed.

A census is a systematic effort to cover an entire population (Groves et al., 2009). It was determined that a census was appropriate to meet the purpose and objectives of this study because the population being studied was well defined, and appropriate contact information was available for the frame. Because the population of high school agricultural

educators ($N = 216$) in Iowa is less than 300, and it is important to have an adequate response rate, all agricultural educators were contacted.

Conducting a census study also helped eliminate any coverage errors. The four main types of coverage error are undercoverage, ineligible units (or overcoverage), duplication, and clustering (Groves et al., 2009). Undercoverage occurs when there are members of the population that do not, or cannot, appear in the frame (Groves et al., 2009). In this study, undercoverage would only occur if there was an agricultural education department within the state of Iowa that was not on the email list received by the Iowa Department of Education. Since all departments are registered with the state, undercoverage was deemed a non-issue.

Ineligible units, or overcoverage, occur when units in the sampling frame are not in the target population (Groves et al., 2009). Overcoverage would only occur if there were names of agricultural educators, or anyone for that matter, from schools that do not have an agricultural education department. If a school recently eliminated their department, there still might be a contact person on the master list. Also if someone recently retired or left a program, their name might have still appeared as a contact for a school's agricultural education department. If they responded to the survey, overcoverage would have been an issue. The Iowa Department of Education supplied an accurate list of all Iowa high school agricultural educators for the 2009–2010 academic school year.

Duplication is when several frame units are mapped into the single element in the target population (Groves et al., 2009). There was a chance of duplication within the sampling frame. In some rare situations, one agricultural educator might teach at two or more schools. Thus one agricultural educator will be asked to respond to the survey more than once, as they will have multiple email addresses that will receive the invitation to

participate in the study. One teacher might respond to the survey two or more times, resulting in duplicate answers and opinions. Prior to contacting agricultural educators in the state of Iowa, the contact list was evaluated to determine if any duplicate names and emails existed and any duplicates were deleted, ensuring an agricultural educator could respond to the survey only once.

Clustering is when multiple elements of the target population are linked to the same single frame element (Groves et al., 2009). Clustering would occur only if two agricultural educators were teaching in one school and shared an email address, in which case one person would complete the survey representing two different people. Clustering was not expected to occur in this research study. Even if two agricultural teachers did work in the same school, they would each have their own email address and each have the opportunity to complete the survey. This study did not seek to understand a school's or department's attitudes and practices towards agricultural safety and health, but the individual teacher's attitudes and practices. Therefore, the census study consisted of all Iowa high school agricultural educators.

Survey Mode

A web-based, or internet, questionnaire was identified as the most feasible and appropriate method to collect the necessary data for this study. Web surveys have the potential to reach large populations, can be conducted quickly and easily, and are very inexpensive when compared to mail surveys, telephone interviews, or face-to-face interviews (Ary, Jacobs, & Sorensen, 2010). Additionally, respondents report more accurately when they self-administer a survey, as opposed to answering questions over a phone or in person (Tourangeau, Rips, & Rasinkski, 2000).

Concerns with this web-based questionnaire included response rate, which tends to be lower for online surveys as opposed to face-to-face interviews, phone interviews, and even mailed questionnaires (Groves et al., 2009). For self-administered surveys, paper-based methods tend to produce higher response rates than their electronic equivalent (Groves et al., 2009). These concerns were addressed by selecting a large population and sending several reminders over the course of the research study period. Another disadvantage of web-based surveys is that samples are restricted to those with access to the technology necessary to support them (Ary et al., 2010). All agricultural educators in Iowa are provided with an email address through the school district in which they are employed. All agricultural educators had the technology available to receive and respond to the agricultural safety and health questionnaire.

Another response rate issue is timing of the data collection. This survey of agricultural educators regarding their practices and attitudes of agricultural safety and health education needed to take place before teachers were released for the summer in late May or early June but after all the spring FFA activities in April, creating about a one-month window. Thus the speed in which online surveys can be conducted is highly beneficial.

A web-based survey gave respondents the opportunity to complete the survey when it is most convenient for them, as the survey could be accessed 24 hours a day. Additionally, submitting the survey online was very easy when compared to completing a paper survey and having to mail it back. The online survey required no interaction between the respondent and an interviewer. Thus, there was a degree of privacy and anonymity unavailable through telephone or face-to-face interviews. This should encourage accurate answers and honest opinions of the agricultural teachers (Tourangeau et al., 2000). The online questionnaire also

eliminates any social desirability bias. "Social desirability bias" is the tendency of a respondent to present him or herself in a favorable light. Social desirably bias usually refers to illegal issues or sensitive topics such as illegal drug use or sexual behaviors (Groves et al., 2009). In identifying current practices and attitudes of Iowa agricultural educators, some teachers might have felt as though they needed to portray themselves as a certain type of teacher and lie about their actual teaching behaviors in order to make themselves look good or like a quality teacher.

Survey Development

The agricultural safety and health questionnaire was developed to identify Iowa agricultural educators' practices and attitudes towards agricultural safety and health education. The survey was divided into three different sections: (a) current practices of agricultural educators, (b) attitudes of educators towards agricultural safety and health education, and (c) demographics of Iowa agricultural educators. Developing each section of the instrument took time and consideration. Researchers considered the order of the sections, the type of questions, and the instructions necessary to obtain a high response rate for the agricultural safety and health study.

The order of the sections within the questionnaire was very important (Groves et al., 2009). The first section asked about current agricultural safety and health practices of agricultural educators. These questions were easy for agricultural educators to complete as they were factual questions concerning their behavior. The purpose of the first section was to get teachers thinking about agricultural safety and health and lead into the second section. The second section asked about perceptions, attitudes, and opinions. Once teachers were thinking about agricultural safety and health in a factual way, they could begin to think more

in-depth and evaluate their opinions and attitudes about the issue. Finally, the section that asked about the demographics was at the end of the questionnaire. Demographic sections are generally easy for respondents to complete without requiring much thinking. Profile-type questions traditionally go at the end of a survey (Groves et al., 2009).

In order to achieve a high response rate, the type of questions asked in the three sections of the agricultural safety and health questionnaire was considered. The agricultural safety and health questionnaire was comprised of mostly multiple choice questions. For those questions asking about agricultural educators' attitudes of agricultural safety and health education a Likert-type scale was used. The Likert-type scale is one of the most commonly used methods to measure attitudes (Ary et al., 2010). For attitudinal questions, respondents rated their level of agreement to various statements about agricultural safety and health education on a 4 point scale (1= strongly disagree to 4= strongly agree). There was one open-ended question. The final question of the questionnaire asked respondents to comment, in general, about agricultural safety and health education. It is believed that as a result of taking the survey certain, opinions or emotions might have arisen in respondents; having a space for general comments or concerns might be beneficial to the researchers.

Providing respondents with survey specifics, including explicit instructions and definitions, will help ensure accurate reporting (Groves et al., 2009). As part of the instructions, agricultural educators were asked to describe their current agricultural safety and health practices and reflect on the last academic year (i.e., 2009–2010). Specifying the timeline helped respondents answer the questions because they knew how far back in time they have to consider (Tourangeau et al., 2000). Defining agricultural safety and health can be difficult because people define it in many different ways. Respondents were provided

with a definition of agricultural safety and health. For the purpose of this research agricultural safety and health was defined as the proper handling and operating of agricultural equipment, livestock, tools, chemicals, etc., so as to ensure maximum safety of the operating individual and minimized risk of injury or death. Supplying a definition ensured that all agricultural educators were thinking along similar lines when completing the survey (Groves et al., 2009).

Survey Design

The questionnaire included a brief introduction explaining the study and providing directions for completing the instrument. After the introduction, the instrument was organized into three different sections: current practices of Iowa agricultural educators regarding agricultural safety and health education in their classroom, current perceptions or attitudes of Iowa agricultural educators regarding agricultural safety and health education, and demographics of surveyed Iowa agricultural educators.

Introduction

The questionnaire introduction thanked participants for participating in the survey and asked that they answer the questions to the best of their ability. This section also reminded participants that all questions were optional, the survey could be terminated at any point, and all responses would be kept in complete confidence. This introduction helped build trust between the respondent and researcher (Tourangeau et al., 2000). The introduction also included a consent statement which stated by clicking "NEXT" at the end of the introduction, the respondents agreed that they had read the research study procedures and were voluntarily participating in the study. This consent question documented that general consent was asked for and granted.

Section 1: Current Practices

The first section of the questionnaire asked about current agricultural safety and health education practices of teachers. This section was developed to specifically address the first research objective, which was to identify the current agricultural safety and health education practices of Iowa agricultural educators. These questions gave researchers an idea as to what teachers are currently doing in their classrooms, if anything, in terms of educating students about the dangers and hazards of the agricultural industry. The questionnaire directed respondents to think about their agricultural safety and health educational practices from last academic year, August 2009–May 2010, when responding to the questions. In this section, respondents were asked to identify from a list of 24 agricultural safety and health topics those they were currently teaching, explain how they were teaching those topics in the curriculum, identify where they obtained their teaching resources, and acknowledge whether or not they were familiar with a list of agricultural safety and health organizations and websites.

Section 2: Current Attitudes

The second section of the survey asked teachers about their current attitudes towards agricultural safety and health education and available agricultural safety and health educational materials. These questions determined Iowa agricultural educators' level of satisfaction, interest, and current knowledge of educational materials. This section asked respondents to determine what kind of materials agricultural educators would be interested in using. Participants rated the importance of various agricultural safety and health topics in their opinion, responded to statements based on the extent to which they agreed or disagreed,

listed teaching limitations, and provided a list of teaching resources they would be interested in using such as movies, simulators, pamphlets or literature, or guest speakers, etc.

Agricultural educators were asked to rate the level of importance related to teaching a variety of agricultural safety and health topics. Agricultural educators rated, in their opinion, the level of importance of agricultural safety and health topics using a four point Likert-type scale ranging from one (not important) to four (very important). Topics were divided into three categories: (a) agriculture, (b) mechanics, and (c) personal health. Agricultural educators rated the various topics on a four point Likert-type scale. The agriculture category included very traditional agricultural areas such as tractor safety and livestock safety. The 10 items within this category had a Cronbach's Alpha coefficient of .93. The mechanics category included topics such as welding safety and power tool safety. The nine items within this category had a Cronbach's Alpha coefficient of .92. The final category, health, included such topics as hearing protection and personal protective equipment. The five items within this category had a Cronbach's coefficient of .89. Educators were asked to respond to six different statements about agricultural safety and health with a Cronbach's rating of .80. Agricultural educators were also asked to identify resources they would be interested in using to teach agricultural safety and health. The seven items within this construct had a Cronbach's rating of .68. This section ended with the only open-ended question of the survey, asking respondents about any additional comments or thoughts they have regarding agricultural safety and health. Open-ended questions offer several advantages to the researcher including the opportunity to learn the unexpected. They do not limit the answers only to those the researcher has anticipated (Fowler, 1995). Open-ended questions, however, are difficult to analyze (Fowler, 1995). The open-ended question was put at the end of the

section so that by the time the agricultural educators got to it, they will have had to critically think and consciously acknowledge their opinions and attitudes about agricultural safety and health. This may lead to thoughts or ideas that respondents would want to share.

Section 3: Demographics

The third section of the questionnaire asked demographic questions about the respondents in order to better understand the agriculture teachers who responded to the survey. These questions asked about the respondent's age, education, gender, and about any personal experiences or tragedies they have experienced as a result of an agricultural accident. Some questions asked about the community in which the respondent teaches in an effort to understand the extent to which agriculture and farming influenced the community's livelihood. All of these factors may add importance to teaching agricultural safety and health in the classroom, or vice versa. One question even asked specifically if the community or school the educator was teaching in had experienced any recent agricultural-related deaths or incidents and if recent events had influenced their teaching about agricultural safety and health.

Rights and Welfare of Participants

Before beginning research, it is important that any ethical issues are addressed and the welfare of the study's participants are considered. When working with human subjects, the researcher must protect the population's rights, dignity, privacy, and sensitivities (Ary et al., 2010). The agricultural safety and health questionnaire designed to identify the current practices and attitudes of Iowa agricultural educators did not raise any ethical issues. This study did not attempt to mislead participants or have any sort of ulterior motive. This study

was designed to gain insight into Iowa agricultural educators' opinions and current educational practices regarding agricultural safety and health in their classrooms.

The questions in this survey did not ask about any sensitive issues nor did answering the questions cause any physical distress to the respondents. In the third section of the questionnaire, respondents were asked if they had had any friends or family members or if they themselves had ever been involved in an agriculture-related accident. This question required a simple yes or no response and was asked to determine if such events might play a role in the teachers' attitudes and perceptions. This was the only question that may have caused emotional distress assuming the respondent had a tragic life experience as a result of an agricultural accident. This was the only question, however, that would have potentially led to emotional discomfort.

In the emails introducing the research study, all Iowa agricultural educators were told that the questionnaire was completely voluntary and their responses would be kept in complete confidence. They were informed that they could skip any questions they did not feel comfortable answering, and the questionnaire could be terminated at any point. Before beginning the survey, respondents had to agree that they had read and understood the research procedures described in the survey introduction.

Before this study could begin, the researchers had to attain permission to proceed with the study from the Institutional Review Board (IRB) at Iowa State University. The IRB served as third party verification and confirmed that the study was ethical and would not cause harm or danger to any participants. Participants were supplied with the contact information to Iowa State University's IRB and encouraged to contact their office in the event of a question or concern. Making sure that Iowa's agricultural educators had all the

information they needed and felt comfortable with, the study hopefully encouraged participation. IRB approval was requested and granted (Appendix B).

Survey Validity

Respondents have various issues when completing surveys. These issues include comprehension, retrieval, and reporting (Groves et al., 2009). Comprehension includes various processes including attending to the question, assigning meaning to the question, and understanding instructions. Retrieval is the process of recalling information relevant to answering the question from long-term memory (Groves et al., 2009). Reporting is the process of selecting and communicating an answer (Groves et al., 2009). These issues can prevent accurate reporting by respondents and result in survey break-off. Survey break-off occurs when respondents quit the survey prior to finishing it; this can greatly affect survey inference (Peytchev, 2009). To minimize survey break-off and alleviate problems with comprehension, retrieval, or reporting, the instrument was thoroughly evaluated for validity by various representatives.

Validity, the extent to which an instrument measures what it claimed to measure, is an important consideration when developing and evaluating a survey (Ary et al., 2010). Two potential problems that can affect a study's validity are construct underrepresentation and construct-irrelevant variance. Construct underrepresentation means a measurement tool is too narrow and does not include critical dimensions of the construct. Construct-irrelevant variance is the degree to which measurement scores are affected by variables that are irrelevant to the constructs (Ary et al., 2010). The agricultural safety and health education instrument was evaluated for validity.

Dr. Charles Schwab, professor of Agricultural and Biosystems Engineering at Iowa State University, has been working with agricultural safety and health education for many years. Dr. Schwab evaluated the survey to ensure proper vocabulary was being used to address agricultural safety and health issues. Additionally, Dr. Schwab helped develop some questions to ensure that the questions would help primary researchers achieve the objectives of the study. Dr. Schwab has developed and disseminated agricultural safety and health curricula and is very familiar with what is currently available to teachers and with the many organizations that work to educate the public on agricultural safety and health. Thus, he helped to ensure that the organizations cited in the survey are, in fact, relevant, active, and available to teachers.

Dr. Michael Retallick is an assistant professor in the Department of Agricultural Education and Studies and a past high school agricultural educator. Dr. Retallick examined the survey from an Iowa high school agricultural educator's perspective to make sure agricultural educators would comprehend the questions correctly and be able to give an appropriate response.

Four agricultural education student teachers preparing to teach agricultural education also examined the survey. These students evaluated the survey to ensure they could comprehend and answer the questions. As educators with less than a year of teaching experience and never having had a classroom of their own, the student teachers did not complete the survey.

Data Collection–Survey Administration

The agricultural safety and health questionnaire was administered through SurveyMonkey, an online survey site that allows surveys to be created. As responses were

submitted, SurveyMonkey tracked email addresses and removed respondents from the list. This process allowed researchers to handle non-response error because researchers knew who had and had not responded. Non-respondents could be reminded to participate, and those who had already completed the survey would not be bothered. Email addresses were not attached to surveys to ensure complete confidentiality of respondents and their opinions. SurveyMonkey collected the data as surveys were returned, and raw data were downloaded to the researcher's computer for analysis.

Dillman (2006) recommended a five-step contact approach to encourage survey response: four contacts of the same mode and one "special contact" of a different mode. The five contacts suggested were: (a) a prenotice letter, (b) a questionnaire mailing, (c) a thank you postcard, (d) a replacement questionnaire or different attempt at contacting non-respondents, and (e) a final contact (Dillman, 2006). This order of communication is more likely to yield a higher response rate than five randomly chosen contacts. Each communication effort needs to have a unique feel to it and appear different than the ones before it (Dillman, 2006). The agricultural safety and health questionnaire tailored Dillman's method to make it appropriate for the internet-based instrument. Dillman makes specific suggestions for email surveys including using a multiple contact strategy, personalizing the first email, and keeping the cover letter brief (Dillman, 2006). All suggestions were adopted in the agricultural safety and health study.

Iowa high school agricultural educators were contacted via email beginning with a pre-notification letter (Appendix C). Sending the frame an advance letter or contact can cause increased rates of cooperation and responses than not sending a prenotificaiton letter (Groves et al., 2009). This letter invited them to participate in the study and explained the purpose of

the research, the importance of the research, and potential outcomes of the research. The letter also explained to respondents that all questions are optional, the questionnaire can be terminated at any point, and all responses will be kept completely confidential. Contact information of the primary researchers and Iowa State University's Institutional Review Board were provided in case of questions or concerns. This email did not include a link to the survey, but did tell all agricultural educators to watch for another email within the next few days that would include the link. This email went out to all 216 agricultural educators in the state of Iowa.

Two days after the pre-notification email was sent, a second contact was made with Iowa agricultural educators (Appendix C). This email looked very similar to the first one but did include the link to the online survey. This contact reiterated the purpose of the study and reminded Iowa agricultural teachers that the survey was optional, could be terminated at any point, provided contact information assuming the respondents had questions, and asked for their participation. This email also went out to all 216 agricultural educators in Iowa.

One week after the second contact was made, a third email was sent to Iowa agricultural educators (Appendix C). This email was much shorter and encouraged teachers to participate in the study and to consult previous emails for specific details if necessary. This email was only sent to the agricultural educators who had not yet responded to the survey.

The fourth contact was a unique, different reminder sent one week after the third contact. A postcard was mailed to any Iowa agricultural educators who had not yet responded to the agricultural safety and health questionnaire (Appendix C). The postcard included the link to the survey with very little additional information because of the size of

the postcard. A mixing of contact modes, in this case switching from an email to a mailed postcard, allows the researcher to optimize other resources to improve cooperation and increase response rate (Groves et al., 2009).

The fifth contact was made one week after the postcard was mailed out. Again, this email reminder only went to those who had not yet responded to the survey (Appendix C). This email was very short and included the link to the survey so respondents had no excuse to not complete it immediately. This email stated that it was the final reminder for the agricultural safety and health survey and stated the last day that the survey would be available. This letter also thanked the high school agricultural educator in advance for their participation. The initial five contacts took place over the course of four weeks (Table 1).

Table 1. Contact Mode and Date of Data Collection

Contact Mode	Date
Pre-notification Letter: Email	Thursday, May 20, 2010
Second Contact: Email	Tuesday, May 25, 2010
Third Contact: Email	Tuesday, June 1, 2010
Fourth Contact: Mailed Postcard	Tuesday, June 8, 2010
Fifth Contact: Email	Tuesday, June 21, 2010
Sixth Contact: Email	Tuesday, August 24, 2010
Seventh Contact: Email	Tuesday, August 31, 2010

As stated previously, the timing of this study was very important, and it was vital to contact teachers before they were released for summer break or got too busy with summertime activities. The time frame for the study, however, was a little too late in the spring. After the five contacts were made, researchers evaluated the response rate, which

was less than 55%. In their book, *Survey Methodology*, Groves et al. (2009) cited Babbie (2004) that a response rate of 50% is adequate for analysis, and a 60% response rate is good. For the purpose of the agricultural safety and health survey, it was decided to contact the Iowa agricultural educators again. Early fall was identified as an ideal time to contact those Iowa agricultural educators who had not responded, as they would be back in school for the year and more available than during the summer months. Before the additional contacts could be made, additional materials were submitted to the Institutional Review Board, and study modifications were approved (Appendix B).

The Iowa agricultural educators who had not responded to the agricultural safety and health questionnaire were emailed a sixth time at the end of August. Educators were reminded of the study and asked again to take the time to complete the survey. A seventh and final reminder went out to those who still had not completed the survey one week later. After seven contacts were made, the study yielded a response rate of 67.1% (n=145) and a useable response rate of 63.4% (n=137).

Of the 216 Iowa agricultural educators, 145 made an attempt to complete the survey. Nine respondents were removed from the study for unit non-response. Unit non-response is the total failure to complete the questionnaire (Groves et al., 2009). In the agricultural safety and health study, nine respondents answered the first question only. These respondents were removed from the response population. Item non-response is partial failure to complete the questionnaire (Groves et al., 2009). In the agricultural safety and health survey, there were some respondents who skipped over questions, but for the most part they completed the questionnaire. These respondents were not removed from the response population.

Post-Collection Data Processing

Agricultural safety and health surveys were returned via SurveyMonkey. Surveys were not coded or marked in any way. As questionnaires were returned, SurveyMonkey removed the respondents' email addresses so that only the non-respondents would be contacted in subsequent follow-ups. SurveyMonkey managed the data collection and, once the data collection phase ended, all data were downloaded into an Excel spreadsheet. The raw data were cleaned, saved, uploaded into a Statistical Analysis Software (SPSS 19.0), and analyzed. All electronic records and data were stored in a password protected computer, and hard copies of the data were stored in a file cabinet in a locked office.

Descriptive statistics were used to analyze the results of this study. For questions on the survey that utilized a Likert-type scale, the means, medians, mode, and frequency of responses were used, and the standard deviations were determined. Open-ended questions (Appendix D) were not analyzed statistically.

Response Error

In dealing with response error, one method is to identify early and late respondents and compare the two groups to identify any statistical differences that might inhibit a researcher from generalizing results to a larger population. Lindner, Murphy, and Briers (2001) recommended that late respondents be categorized by participants who responded to the last wave of stimulus, such as the last email or letter sent to the population (2001). In the study of agricultural educators regarding agricultural safety and health education, the last stimulus was an email follow-up sent on August, 31, 2010. This final wave generated 14 responses which were defined as "late respondents." Lindner, Murphy, and Briers, however, also recommend that there be at least 30 responses categorized as late respondents. If the final wave of contact did not generate 30 responses, the researcher should back-up and use

the responses from the last two stimuli, or last three stimuli, etc. (Lindner et al., 2001). After the fifth contact made on June 21, 2001, there were 28 respondents, two respondents short of the suggested 30. Another recommendation for separating early and late respondents is to divide respondents into two equal groups, with the first half being early respondents and the second, later half being the late respondents (Lindner et al., 2001). Considering that researchers would have to go back to the fourth wave to achieve the suggested 30 late respondents, and that the fourth wave was the middle contact (of the total seven), it was concluded that the respondents would be split in half (50/50) to determine early and late respondents. Of the 137 useable responses, 68 (48.6%) of the respondents were classified as early, and 69 (50.4%) were classified as late.

Early and late respondents' survey results were compared on questions to determine if any statistical significant difference existed between the two groups. Levene's Test for Equality of Variances was used to determine statistical significance. A statistically significant difference between two variables is assumed if the test yields a rating equal to or less than .05. For ratings greater than .05, equal variance is assumed (Leech, Barrett, & Morgan, 2008). When asked to rate the importance of 24 agricultural topics, early and late respondents' mean ratings differed significantly on five of the 24 listed. Those five topics were: machinery safety ($p=.016$), tractor safety ($p=.031$), ATV safety ($p=.002$), fire safety ($p=.041$), and welding safety ($p=.023$). Early and late respondents' means did not differ significantly on any of the six belief statements presented in the attitudes portion of the survey, and equal variances were assumed for all potential teaching resources educators might be interested in using to teach agricultural safety and health. Based on the results of

these independent t-tests, the results of this study could be generalized to the entire population, with the exception of the five topic areas and their importance.

Limitations

This study identifying high school agricultural educators' current practices and attitudes regarding agricultural safety and health education did face some limitations. Limitations included any challenges or weaknesses facing constructs which are being evaluated, aspects of the population, and the survey mode which may interfere with the results of the study.

This study was limited to the opinions and views of high school agricultural educators in Iowa. This study did not attempt to understand the practices and attitudes of agricultural educators beyond Iowa in other states or regions. The findings of this study were not able to be generalized to any state or region besides Iowa. In order to make more geographically broad statements about agricultural safety and health agricultural educators from across the United States would need to be included in the frame and population. This limitation was introduced at the beginning of the research study and will persist indefinitely.

The agricultural safety and health survey was limited by the electronic survey mode that had been selected. While all Iowa agricultural educators have an email address, not all teachers may be in favor of responding to a survey online. This limitation might have resulted in a lower response rate and was introduced once the survey had been emailed. Multiple reminders to complete the survey and explaining the importance of the survey were used to counteract this limitation.

Another limitation of this study was the time frame of the data collection, late May and early June. Because this survey was used as part of a Master's project, the research must

be collected before Fall 2010. Spring is a very busy time for Iowa agricultural educators as there are many conferences and conventions, all of which concluded in late April. Agricultural educators were released for the summer beginning around June 1, 2010. IRB approval was not received until late May, which only allowed researchers a few short weeks to contact Iowa high school agricultural educators before they were released for the summer. This limitation was introduced once the first email was sent to agricultural educators. Making the survey rather short and easy to complete helped to counteract this limitation. End of the year schedules for Iowa agricultural educators contributed to a low response rate.

The final limitation to the agricultural safety and health study was how rapidly some of this data might be outdated. As agriculture continues to evolve, so will agricultural safety and health. Agricultural technology is constantly changing the way people farm and the way the agricultural industry runs. As time goes by, technology gets more advanced, machines and equipment get bigger, tools get more powerful, and chemicals get more effective. Each of these agricultural advancements will present a new list of dangers to operators. This study only considered the agricultural safety and health issues related to present day machinery and equipment, and did not begin to explore future agricultural equipment. This limitation was introduced at the beginning of the study. Attempts to make the survey broad to include general areas of agricultural safety and health and not necessarily specifying certain equipment helped to counteract this limitation.

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CHAPTER IV. INTEGRATION AND NEEDS OF IOWA AGRICULTUARL EDUCATORS REGARDING AGRICULTURAL SAFETY AND HEALTH EDUCATION

A paper to be submitted to the *Journal of Agricultural Education*

Josie Rudolphi & Dr. Michael Retallick

Abstract

Agricultural injuries and deaths among young people have been on the decline due in part to increased educational efforts (Rivara, 1997). However, one weakness of agricultural safety and health education is the dispersed workforce and the difficulty of gathering groups/people for education (Murphy, 2003). One possible educational outlet for agricultural safety and health is secondary agricultural classrooms (Florio & Strafford, 1969). This study investigated the attitudes of Iowa agricultural educators toward agricultural safety and health education. Data were collected using an internet questionnaire designed to determine a) Iowa high school agricultural educators' practices in agricultural safety and health education and b) educators' attitudes towards agricultural safety and health education. The study found that Iowa high school agricultural educators believed 22 of 24 safety areas were important for students education. Major limitations to agricultural safety and health education included lack of available time and resources. Teachers also identified the need for training or professional development for agricultural safety and health education materials.

Introduction

According to Rivara (1985), farming is the second most hazardous occupation in the United States and uncommon to most industries, children and young adults make up a

significant portion of the workforce. The National Committee for Childhood Agricultural Injury Prevention (NCCAIP) suggested there are more than 2 million youth under the age of 20 exposed to agricultural risks and hazards each year, including those who live on a farm or ranch, those who live in the household of a hired farm or ranch worker, and those who regularly or irregularly visit farms (MaCallum et al., 2005).

Children and youth's exposure to the dangers of farm work is both routine and extensive. *Successful Farming* conducted a study to determine the age and extent to which youth are exposed to tractor dangers, and reported that 65% of farm boys were operating tractors by the age of 12 and 95% of boys and girls between the ages of seven and nine were allowed to ride with a parent (Murphy et al., 1996).

There are various governmental and non-profit organizations that exist to educate the public on agricultural safety and health. Educating youth on the importance of agricultural safety and health has been identified as a successful way to encourage safe behavior changes in agricultural situations (Murphy, 2003). Given the intent to reach teen workers, one viable educational route would be high school agricultural education programs, especially when similarities in educational theory between agricultural education and agricultural safety and health education are considered. Because the purpose of agricultural education is to prepare students to enter the agricultural workforce, agricultural health and safety is a vital part of student education (Hubert et al., 2001).

In their book, *Safety Education*, Florio & Stafford (1969) stated "Education is the only feasible means of achieving this goal, and its failure to date indicates merely that initial efforts have not been sufficiently intensive and widespread. All schools in rural areas should

provide training in farm safety and should support the activities of other organizations interested in this work" (p. 341). The issue of agriculture health and safety has not diminished. Dyer & Andreasen (1999) concluded that safety of students is the most important job of an agricultural educator and parents demand their children be educated to use materials, tools, and equipment properly.

Conceptual Framework

Farm injury death rates have been on the decline the past decade (Rivara, 1997). Between 1991 and 1993, 104 people under the age of 20 died as a result of an agricultural incident. While this number is still high, it is a 39% decrease when compared to the 1979-1981 data for the same age group (Rivara, 1985). There have been multiple reasons cited for this welcoming decline including better emergency services, trauma care, and prevention efforts, such as education (Rivara, 1997).

Florio and Strafford (1969) initially suggested agricultural safety and health should become part of secondary agricultural education programs as early as the 1960s and, when considering commonalities between agricultural education and agricultural safety and health, secondary agricultural classrooms are a viable route for agricultural safety and health. Dyer and Andreasen (1999) more recently stated that safety of students is an important job of high school agricultural educators. The conceptual framework for this study was designed around the interrelationship between agricultural education and school-based agricultural education (Figure 1). Agricultural safety and health education and agricultural education will both be discussed followed by the similarities between the entities.

Agricultural Safety and Health Education

In an effort to help educate the public on the importance of agricultural safety and health and bring awareness to the hazards of agriculture, agricultural health and safety organizations, non-profit groups, and interest groups have been established such as Farm Safety 4 Just Kids, the Iowa Center for Agricultural Safety and Health, and the National Ag Safety Database. These organizations educate the public in a variety of different modes. The Ag Safety Database provides materials and literature available online for download (National Ag Safety Database, n.d.). Farm Safety 4 Just Kids employs educational outreach coordinators to coordinate safety days and presentations for youth about agricultural safety and health (Farm Safety 4 Just Kids, 2010).

Despite experiencing success in lowering the number of agricultural injuries and deaths in young people, safety and health organizations face many challenges in combating agricultural hazards. There are many aspects of agriculture that contribute to its hazardness and the difficulty of reducing risks through education. The University of Iowa's Institute of Agricultural Medicine compiled a list of external factors that contribute to farming's hazardous nature which are; 1) environmental, 2) people, 3) work activity, and 4) social, economic and political (Murphy, 2003). Agricultural safety and health education also faces internal challenges to the effectiveness of programs and successful communication of information which include ensuring a non-threatening approach to agricultural safety and health education and lack of effective program evaluation (Murphy, 2003).

Secondary Agricultural Education

In the United States, the history of agricultural education is closely aligned with that of vocational education. In the 1900s, vocational education served as an instructional program that produced a supply of prepared workers for farming or agricultural industry. The scope of agricultural education was broadened in 1963 to include training for non-farm agricultural occupations (Talbert et al., 2007). Today, agricultural education encompasses three unique and important aspects 1) classroom and laboratory instruction, 2) experiential learning in the form of supervised agricultural experiences, and 3) leadership development as applied in the National FFA Organization. These three components contribute to a successful agricultural education program (Talbert et al., 2007). Because of its nature, safety and health education is not only an important element of agricultural education, but also an important responsibility of an agricultural educator as parents demand their children be educated to use materials, tools, and equipment properly (Dyer & Andreasen, 1999).

There are many variables that affect what and how agricultural educators teach including personal attitudes towards specific subjects, gender, and experience levels. Within the last 20 years, emphasis has been placed on determining why teachers teach what they do and how they teach (Fang, 1996). Beliefs are the best indicators of the decisions individuals make throughout their lives (Pajares, 1992). Since student academic achievement is largely affected by a teacher's behavior and teacher behavior is influenced by a teacher's thought process it is important to understand educator's thought processes. Teachers' thought processes have been categorized into three fundamental types: 1) teacher planning, 2) teacher's interactive thoughts and decisions and 3) teacher's theories and beliefs (Fang, 1996). Knowing that beliefs influence teaching, and teaching influences student learning and

achievement (Fang, 1996), agricultural educators' readiness to teach agricultural safety and health is dependent on their attitudes towards agricultural safety and health education.

Teaching styles of educators influence student learning. Two main learning styles exist in agricultural education, field-dependent and field independent. According to Rave, Cano, Carton, & Shelhamer (1993) "Individuals with a field-dependent learning style tend to perceive the world in a global fashion" (p. 41). As socially-oriented learners, these students best learn material with a social context, such as student-centered activities; however, these educators need more explicit guidance in problem-solving (Raven et al., 1993).

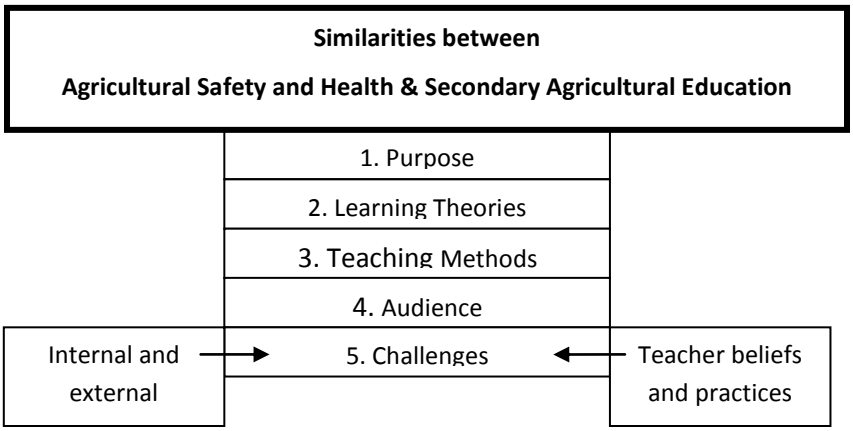
"Field-independent learners view the world more analytically" (Raven et al., p. 41). Field-independent learners rely most often on self-defied goals and situations that are self-structured. Teachers with a field-independent learning style tend to guide their students as opposed to teach them, are more likely to use a problem-solving approach to learning and emphasize the cognitive aspect of instruction (Raven et al., 1993).

A study of preservice student teachers determined that males were split evenly between the two learning styles, 50% were field-dependent learners, 50.00% were independent learners. Females, however, were more divided with only 29% identified as a field-dependent learners and 71% as a field-independent learners (Cano, et al., 1992). Thus, teaching style would be affected by teacher gender in some instances.

Commonalities between Agricultural Safety and Health and School-based Agricultural Education

When the literature of agricultural safety and health and school-based agricultural education were analyzed and compared, a common set of audiences, learning theories and teaching methods were ascertained (Figure 1). Each of these areas are described below.

Figure 1. Inter-relationship between ASH education and secondary agricultural education



Audience

Secondary agricultural education and agricultural safety and health education share a common audience - young adults. At the 1991 Surgeon Generals Conference, those in attendance discussed the importance of educating youth about agricultural safety and health, espousing that targeting young people will have dual benefits in that 1) youth are more adaptable to change and will more readily adapt to changes in behavior and 2) targeting youth will be an effective channel with which to educate adults who are in contact with youth (Murphy et al., 1996). Farm Safety 4 Just Kids, a non-profit organization, aims at educating youth, specifically, about working and living in rural areas and around agriculture (Farm Safety 4 Just Kids, 2010).

Secondary agricultural education aims at educating high school students in grades 9-12, and in some cases middle school students, about agricultural science. Agricultural

education was created for high school students and considered a component of vocational education, a job training educational program within high schools that prepares students for careers after graduation (Talbert et al., 2007). Given this purpose, agriculture and health safety would be a natural component of the agricultural education program.

Historically, responsibility for agricultural safety and health education fell upon the Cooperative Extension Service in each state. However, due to limited resources, community groups, insurance agencies, and other businesses assumed the role of providing agricultural safety education. These organizations hosted farm safety training events that target children and youth, specifically (McCallum et al., 2005). Murphy (2003) identified the dispersion of the agricultural workforce as one challenge to agricultural safety and health. Gathering agricultural workers for an educational event is difficult. However, secondary agricultural education classrooms offer an opportunity for agricultural safety and health education because many students/ part time agricultural workers are gathered in the same place.

Learning Theory in Agricultural Safety and Health and Agricultural Education

Three different learning theories have been described as effective means of educating the public about agricultural safety and health and include behaviorism, constructivism, and socioculturalism (Cole, 2002). The behaviorist learning theory stresses "response strengthening" through reinforcing behavior that leads to the desired habit. Constructivism, which became widely known beginning in the 1960s (Cole, 2002), suggests that people construct knowledge as they interact with the world, building blocks of knowledge and understanding (Murphy, 2003). It was not until the 1980s and 1990s that socioculturalism became a recognized learning theory in the United States. "The sociocultural view of

learning states that knowledge basic to the performance of complex tasks, including health and safety behavior, is the product of an ongoing interaction with the work at hand, the tools used to perform this work, and negotiations among members of the work group" (Cole, 2002).

Like agricultural safety and health, agricultural education has adapted and used several learning theories throughout its history including constructivism and behaviorism. Agricultural education has adopted and promoted the constructivist learning theory, in which the core is based on learners constructing meaning from experiences (Doolittle & Camp, 1999). In secondary education, experiential learning has been a corner stone for agricultural educators evident in problem-solving activities, fieldtrips, laboratories, and supervised agricultural experiences (Roberts, 2006). Epistemologically, the experiential learning theory aligns most appropriately with constructivism (Roberts, 2006). Before constructivism became more prominent, behaviorism was the primary theoretical foundation for agricultural education (Doolittle & Camp, 1999). The goal of agricultural education, or more broadly, career and technical education, was not only to prepare students for careers but also develop thinking and problem-solving skills. In behaviorism, learners develop behavior as a result of a positive or negative outcome to a situation (Cole, 2002).

Both agricultural safety and health education and secondary agricultural education align themselves with the constructivism and behaviorism learning theory, lending to the idea that agricultural safety and health education has a place in the secondary agricultural education classroom. These two theories, constructivism and behaviorism, are similar in that learning results from a physical action by the learner, either as behavior or experience.

Teaching Methods in Agricultural Safety and Health and Agricultural Education

Similarities in agricultural safety and health education and secondary agricultural education also include teaching methods most successful and most often utilized in each area. In secondary agricultural education, the problem-solving approach has been promoted by the agricultural profession as a teaching approach to use in teaching secondary agriculture students and educators within the discipline (Cano & Garton, 1994). In teaching safety, instructional methods should appeal to all senses of a student, and students should learn in the physical environment when possible. Bringing in agribusiness professionals to share experiences so students can see how safety is dealt with in real-life situations is also effective in teaching students about agricultural safety and health education (Newcomb et al., 2004).

Safety professionals have identified teaching methods most successful in educating individuals on agricultural safety and health. Making sure that individuals can recognize agricultural hazards and understand why risks exist is vital to effective education and reached using case studies, considering farm economics, and allowing students hand-on experiences in working to create safer agricultural environments (Lehtola & Boyd, 1992).

Both agricultural education and agricultural safety and health education use hands-on, real word experiences to educate youth. In agricultural education, supervised agricultural experiences, laboratories, and greenhouses are used to provide students with a hands-on, experiential learning opportunity (Hubert et al., 2003). In agricultural safety and health education, case studies are utilized to provide learners with similar experiences (Lehtola & Boyd, 1992).

Problem Statement

Literature suggests that agricultural safety and health education should be a community effort. It's also suggested that educating youth, a more impressionable and adaptable portion of the population, could have great impact on attitudinal and behavioral changes in agricultural safety and health (Murphy et al., 1996). Secondary school agricultural departments have been recognized as a possible avenue for successful agricultural safety and health education instruction. Therefore, more information is needed about high school agricultural teachers' agricultural safety and health efforts.

Research Questions

In order for the secondary agricultural education classroom to become a successful outlet for the dispersion of agricultural safety and health education, a better understanding of agricultural teachers' attitudes of agricultural safety and health education is needed. Therefore, the purpose of this study was to determine the attitudes, needs, and limiting factors related to teaching agriculture safety and health. The following research objectives were investigated to address this purpose.

1. Determine the Iowa high school agricultural educators current practices in agricultural safety and health education.
2. Determine the Iowa high school agriculture teachers' perceived level of importance in teaching agriculture, mechanics, and personal safety and health topics.

3. Determine the Iowa agriculture teachers' attitudes toward agriculture safety and health based on their response to six belief statements.
4. Identify the factors that limit agriculture and health safety in school-based agriculture classrooms.
5. Identify the types of resources Iowa agricultural educators would be interested in using to teach agricultural safety and health in their classrooms.

Methodology

This census study identified the current practices and attitudes of Iowa agricultural educators regarding agricultural safety and health education. The population for this study was all agricultural educators within the state of Iowa. The Iowa Department of Education maintains a list of all agricultural educators in the state and included 216 contacts.

A web-based questionnaire was identified as the most feasible and appropriate method to collect data for the agricultural safety and health education study. Web surveys can be conducted quickly, reach large populations, and are inexpensive when compared to other survey modes (Ary, Jacobs, & Sorensen, 2010).

The agricultural safety and health questionnaire was developed to identify Iowa agricultural educators' practices and attitudes towards agricultural safety and health education. The survey was developed in three sections; 1) current practices of agricultural educators in terms of agricultural safety and health education in their classrooms, 2) attitudes of agricultural educators towards agricultural safety and health education, and 3) demographics of Iowa agricultural educators.

The instrument was submitted to a panel of experts to determine face and content validity. The panel of experts included current agricultural education student teachers, a former high school agricultural educator, and a university faculty member at Iowa State University with expertise in agricultural safety and health. The instrument was deemed to be valid.

The agricultural safety and health questionnaire was administered through SurveyMonkey, an online survey site that allows surveys to be created and returned online. The researchers adopted Dillman's (2006) recommended five-step contact approach to obtaining responses from internet surveys, which included four contact of the same mode and one "special contact" of a different mode. The first email was personalized and all written contacts were kept brief as suggested by Dillman (2006).

Iowa agricultural educators were contacted five times over a four week period beginning in late May, 2010. A pre-notification letter was sent and a few days later an email reminder was sent to all agricultural educators inviting them to participate in the study. This email included a link to the surrey online. A third email was sent one week later, and a fourth, unique contact was made the next week. The fourth contact was a mailed postcard, sent to all agricultural educators who had not responded to the survey by the third week. Finally, a fifth email was sent four weeks after the initial pre-notification email was sent. The first five contacts yielded a response rate of 55%. Because of the moderate response rate, the agricultural educators who had not responded to the online survey were contacted an additional two times in the fall of 2010. After seven contacts were made the study produced a response rate of 67.1% (n=145) and a useable response rate of 63.4% (n=137). The initial

data collection procedures as well as the modified contacts conducted in the fall were approved by the Intuitional Review Board.

Data were downloaded from SurveyMonkey and analyzed using SPSS 19.0 and Microsoft Excel®. Descriptive statistics including frequencies, percentages, means and standard deviations were calculated as a means for answering the research objectives.

Findings

Those that responded to this study consisted of 100 (73.0%) male and 37 (27.0%) female Iowa agricultural educators. Respondents were asked to identify their age within one of eight different age groups provided (Table 1). The age distribution of respondents varied from less than 25 years old to over 56 years old. The group with the largest representation was 46-50 year olds (21.2%) The smallest represented group was the 41-45 year olds (5.1%).

Table 1. Age of Agricultural Safety and Health Study Respondents (*N*=137)

Age (Years)	Respondents (f)	Respondents %
Less than 25	13	9.5%
26-30	22	16.1%
31-35	18	13.1%
36-40	13	9.5%
41-45	7	5.1%
46-50	29	21.2%
51-55	19	13.9%
56 and up	16	11.7%

Iowa Agricultural Educators' Practices in Agricultural Safety and Health Education

Iowa agricultural educators were asked to identify the topics within agricultural safety and health education that they had taught in the last academic year (Table 2). Topics were divided into three categories 1) agriculture, which included ten topics such as livestock and machinery safety, 2) mechanics, which included topics such as welding and power tool safety, and 3) personal health, which included topics such as personal protective equipment and hearing protection.

Table 2. Agricultural Safety and Health Topics Taught by Iowa Agricultural Educators (N=137)

Topic	Respondents Teaching *(f)*	Respondents Teaching %
Agriculture		
Animal	115	83.9%
Machinery	94	68.6%
Chemical	87	63.5%
Tractor	72	52.6%
Grain Handling	62	45.3%
ATV	51	37.2%
Combine	41	29.6%
Confined Spaces	37	27.0%
Rural Driving	29	21.2%
Manure	24	17.5%
Taught NO Agriculture Safety	5	3.6%
Mechanics		
Welding	97	70.8%
Power Tool	96	70.1%
Hand Tool	94	68.6%
Electrical	61	44.4%
Fire	57	41.6%
Small Gas Engine	53	38.7%
Lawnmower	51	10.9%
Chainsaw	26	19.0%
Taught NO Mechanics	15	10.9%
Ladder	10	7.3%
Personal Health		
Personal Protective Equipment	80	58.4%
Hearing Protection	44	32.1%

(Continued)

Table 2. Agricultural Safety and Health Topics Taught by Iowa Agricultural Educators (N=137)(continued)

Topic	Respondents Teaching *(f)*	Respondents Teaching %
First Aid	44	32.1%
Back Protection	29	21.2%
Taught NO Personal Health	28	20.4%
Heat/Cold Protection	14	10.2%

Topics within agriculture were identified as being taught the most, with animal safety being taught by over 80% of Iowa agricultural educators. Within mechanics safety, 70.1% of teachers taught power tool safety, and within personal health 58.4% of Iowa agricultural educators taught personal protective equipment. Only 3.6% of Iowa agricultural educators admitted not teaching any aspect of agricultural safety, whereas 10.9% admitted to not teaching any aspect of mechanical safety, and 20.4% admitted not teaching any personal health.

Teachers were asked to identify the ways they taught agricultural safety and health. Iowa agricultural educators were asked to select from a list of four possible options the one that best describes how they teach agricultural safety and health (Table 3). Respondents could select more than one option from the supplied list.

Table 3. Integration of Agricultural Safety and Health in Iowa Agricultural Educators' Curricula (N=137)

Integration Technique	Respondents (*f*)	Respondents %
As part of an agricultural science unit	120	87.6%
As a workshop or lab in class	65	47.4%
As an extra-curricular activity outside the classroom	29	21.2%
As its own unit	19	13.9%

Almost 90% of Iowa agricultural educators taught agricultural safety and health education as part of another agricultural science unit, for instance taught animal safety as part of a larger livestock unit. Only 13.9% of teachers claimed to have taught agricultural safety and health as its own unit.

Iowa high school agriculture teachers were asked to identify the sources they use to acquire information to teach agricultural safety and health in their classrooms (Table 4). Agricultural educators were presented with a list of possible resources to select from and also allowed to add to the list if they use a resource not identified by researchers.

Table 4. Resources Iowa Agricultural Educators use to Teach Agricultural Safety and Health (N=137)

Resource	Respondents (*f*)	Respondents %
Textbooks	86	62.8%
Non-profit Organizations	86	62.8%
Educational System (Extension, etc)	49	35.8%
Government Organizations	47	34.3%
Agri-businesses	22	16.1%
Professional Teaching Organizations	12	8.8%

Iowa agricultural educators identified textbooks and non-profit organizations such as Farm Safety 4 Just Kids or the National Safety Council, as the primary resources they use in acquiring the information to teach agricultural safety and health in their classrooms. Less than 10% of Iowa agricultural educators identified professional teaching organizations as resources they use to aid them in teaching agricultural safety and health.

Iowa Agricultural Educators' Attitudes towards Agricultural Safety and Health Education

Agricultural educators were asked to rate the level of importance related to teaching a variety of Agricultural Safety and Health Topics. Agricultural educators rated, in their opinion, the level of importance of agricultural safety and health topics using a four point Likert-type scale ranging from one (not important) to four (very important) (Table 5). Topics were divided into three categories; 1) agriculture, 2) mechanics, and 3) health. Agricultural educators rated the 24 topics on a four-point Likert-type scale.

Table 5. Agricultural Safety Topic Importance as Perceived by Iowa Agricultural Educators

Agriculture Safety Topic	Frequency (*f*) Percent (%)				*M*	*SD*
	1	2	3	4		
Machinery	1	1	50	83	3.59	.550
	.7%	.7%	37.0%	61.5%		
Tractor	1	1	54	80	3.57	.554
	.7%	.7%	39.8%	58.8%		
ATV	1	9	45	81	3.51	.655
	.7%	6.6%	33.1%	59.6%		
Chemical	1	5	57	73	3.49	.608
	.7%	3.7%	41.9%	53.7%		
Animal	1	6	62	67	3.43	.617
	.7%	4.4%	45.6%	49.3%		
Combine	1	11	60	64	3.38	.666
	.7%	8.0%	44.1%	47.1%		
Grain	1	11	62	62	3.36	.663
	.7%	8.0%	45.6%	45.6%		
Rural Driving	3	13	58	62	3.32	.737
	2.2%	9.6%	42.6%	45.6%		
Confined Spaces	2	23	62	48	3.16	.752
	1.5%	16.8%	45.9%	35.6%		
Manure Pit	1	26	63	45	3.13	.737
	.7%	19.3%	46.7%	33.3%		

Note. Criteria were measured on a four-point scale (1=*not important*, 4=*very important*)

Machinery safety, tractor safety, and ATV safety rated amongst the most important agriculture topics by Iowa high school agricultural educators. Confined space safety and manure pit safety were considered least important when rated by Iowa high school agriculture teachers. Iowa high school agricultural educators were also asked to rate, in their opinion, the mechanics safety topics introduced earlier in the survey on the same four-point Likert-type scale (Table 6).

Table 6. Mechanics Safety Topic Importance as Perceived by Iowa Agricultural Educators (N=137)

Mechanics Safety Topic	Frequency (*f*) Percent (%)				*M*	*SD*
	1	2	3	4		
Power Tool	1	6	59	67	3.44	.621
	.8%	4.5%	44.4%	50.4%		
Welding	0	9	58	67	3.34	.619
	0%	6.7%	43.3%	50.%		
Fire	2	9	60	64	3.38	.697
	1.5%	6.7%	44.4%	47.4%		
Lawnmower	1	11	64	58	3.34	.660
	.7%	8.0%	47.8%	43.3%		
Electrical	1	12	64	58	3.33	.667
	.7%	8.9%	47.4%	43.0%		
Hand Tool	1	21	58	52	3.22	.734
	.8%	15.9%	43.9%	39.4%		
Chainsaw	2	16	73	43	3.17	.698
	1.5%	11.9%	54.5%	32.1%		
Small Gas Engine	1	17	77	38	3.14	.653
	.8%	12.8%	57.9%	28.6%		

Note. Criteria were measured on a four-point scale (1=*not important*, 4=*very important*)

All topics within mechanics safety were considered important when rated by Iowa highs school agricultural educators. Topics that rated most important within the category included power tool safety and welding safety. Finally, Iowa high school agriculture teachers

rated the personal health and safety topics based on their opinion of the topics importance (Table 7).

Table 7. Personal Health and Safety Topic Importance as Perceived by Iowa Agricultural Educators (N=137)

Personal Safety Topic	Frequency (*f*) Percent (%)				*M*	*SD*
	1	2	3	4		
First Aid	2	10	61	62	3.36	.685
	1.5%	7.4%	45.2%	45.9%		
Personal Protective Equipment	1	18	57	55	3.27	.721
	.8%	13.7%	43.5%	42.0%		
Hearing Protection	2	29	60	41	3.06	.769
	1.5%	22%	45.5%	31.1%		
Back Protection	3	34	67	31	2.93	.755
	2.2%	25.2%	49.6%	23.0%		
Heat/Cold Protection	9	41	64	21	2.72	.807
	6.7%	30.4%	47.4%	15.6%		

Note. Criteria were measured on a four-point scale (1=*not important*, 4=*very important*)

Iowa high school agricultural educators rated all topics listed under personal safety and health as important. Those topics considered most important included first aid and personal protective equipment. Heat/cold protection was rated the least important by agriculture teachers.

Iowa agricultural educators were asked to report their level of agreement with various statements regarding agricultural safety and health education using a four-point Likert-type scale. Educators agreed to all the statements with the exception to the statement asking if they believed there is adequate training and professional development for teachers on agriculture safety and health (Table 8). The respondents disagreed with that statement.

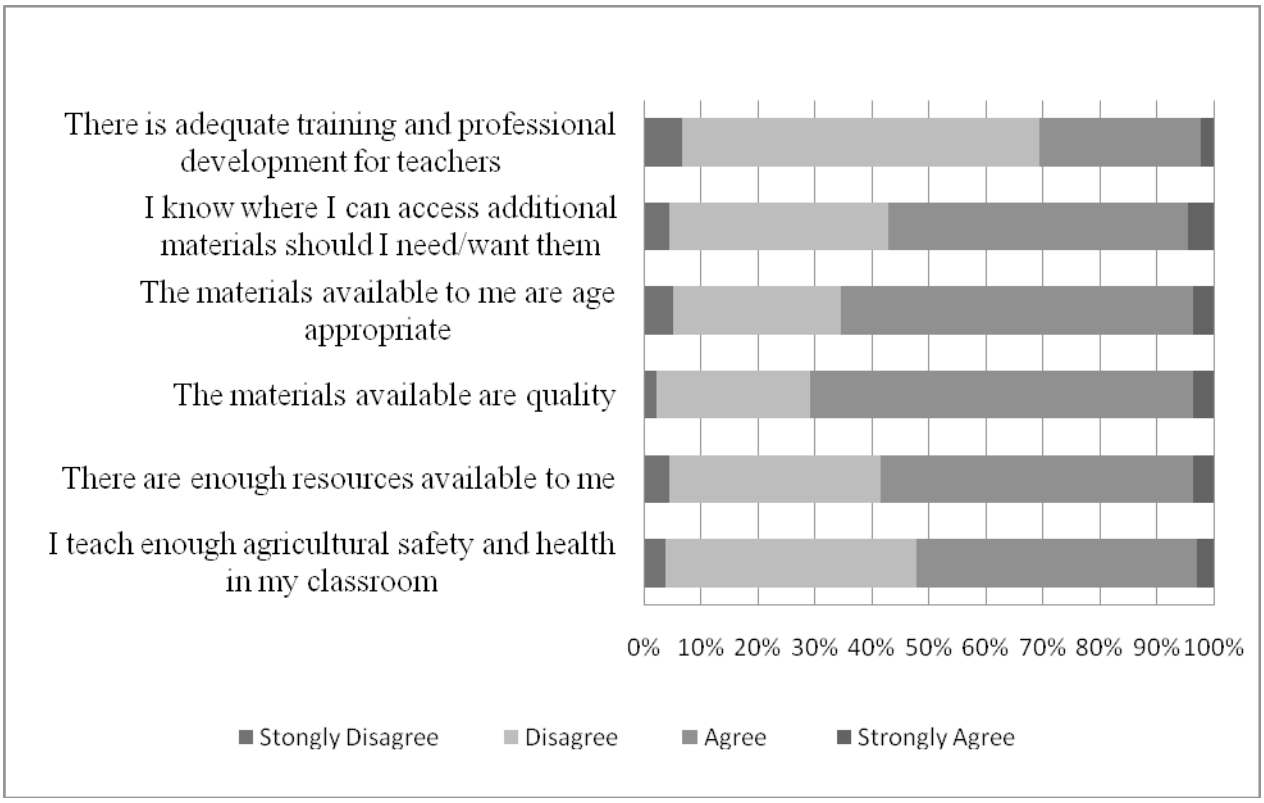
Table 8. Agricultural Educators' Level of Agreement on Agricultural Safety and Health Belief Statements

Statement	*M*	*SD*
I believe the materials available to me about ASH are quality educational materials.	2.74	.548
I believe the materials available to me about ASH are age appropriate for my students.	2.64	.640
I believe there are enough resources available to me about ASH.	2.58	.640
I am knowledgeable on where I can find additional materials concerning. ASH should I want or need them.	2.57	.653
I believe I teach enough ASH in my classroom.	2.51	.620
I believe there is adequate training and professional development for teachers on ASH.	2.26	.612

Note. Criteria were measured on a four-point scale (1=*strongly disagree*, 4=*strongly agree*)

While the first five belief statements could be rounded to a 3.0 indicating Iowa high school agricultural educators agree with the statements (3.0= agree), the statements' mean scores are not the most accurate figure in explaining teacher attitude. When percentages are considered (Graph 1) nearly half of respondents disagree that they (1) teach enough agricultural safety and health in their classrooms, (2) know where to find additional materials, and (3) that there are enough resources available to them.

Figure 2. Percentage of Iowa high school agricultural educators' agreement with belief statements



Agricultural educators were asked to identify limitations they faced in teaching agricultural safety and health in their classrooms (Table 9). Nearly three-fourths of the respondents (73.3%) reported that time was an issue that limited agricultural health and safety. Availability and quality of resources was less of an issue (43.8% and 40.1%, respectively), while teacher understanding of the content and the importance of agriculture safety were reported as limitations by only 11.7% and 4.4% of respondents, respectively.

Table 9. Agricultural Safety and Health Education Limitations (N=137)

Limitation	Respondents (*f*)	Respondent %
Time Availability in Classroom	101	73.3%
Availability of Resources	60	43.8%
Quality of Resources	55	40.1%
Understanding of Content	16	11.7%
Importance of Agricultural Safety	6	4.4%

Iowa agricultural educators were supplied with a list of educational resources and asked to identify the teaching tools they might be interested in using to assist them in teaching agricultural safety and health in their classroom (Table 10).

Table 10. Agricultural Educators' Interest in Agricultural Safety and Health Educational Tools

Educational Tool	*M*	*SD*
Videos	2.76	.561
Simulators	2.75	.482
PowerPoint Presentations	2.63	.584
Games	2.56	.642
Guest Speakers	2.40	.672
Literature	2.38	.672

Note. Scale: 1= Would not be interested in, 2= Undecided, 3= Would be interested in

From the list of potential resources, videos (*M*=2.76), simulators (*M*=2.75), and PowerPoint presentations (*M*=2.63) were rated the highest by Iowa high school agricultural educators as resources they would be interested in using to teach agricultural safety and health.

Conclusions

In identifying the practices and attitudes of Iowa agricultural educators towards agricultural safety and health education, the following conclusions were made.

When asked to identify the agricultural safety and health topics they taught in the last academic year, only 3.6% admitted not teaching any agriculture topics, however, 20.4% of Iowa agriculture teachers admitted to not teaching any personal health topics.

The majority of Iowa agriculture teachers taught agricultural safety and health as part of a larger agricultural science unit, and textbooks and non-profit organizations were identified as the resources teachers used to acquire information to aid in teaching agricultural safety and health.

Of the 24 agricultural safety and health areas recognized, Iowa agricultural educators identified 22 of them as being important for students to learn about, and two topics were somewhat important. Of the three categories, agriculture and mechanics topics were viewed collectively as more important than personal health topics.

When asked to rate a series of belief statements, agricultural educators were more divided. Iowa agricultural educators would agree that they teach enough agricultural safety and health in their classroom, know where they can find additional materials, and believe the

materials are high quality and age appropriate for their students. However, agricultural educators believe there is not enough training or professional development on agricultural safety and health educational materials.

Almost three-fourths of Iowa agricultural educators recognized lack of available time as a major limitation they faced in teaching agricultural safety and health in their classroom and almost half of all respondents reported availability of resources as a limitation they face. Less than five percent of Iowa agricultural educators who responded to the survey believe agricultural safety and health is not important and the reason they do not teach it in their classroom.

Agricultural educators were interested in using videos, simulators, and/or PowerPoint presentations to teach their students about agricultural safety and health. Less popular educational resources included guest speakers and/or developed curriculum units.

Implications and Recommendations

These findings have implications for professional development of agricultural educations. There is a need to improve the awareness on personal health and safety, offer professional training and development, and offer teaching materials that are appropriate and of interest to the teachers. Improved professional development could increase the integration of safety materials in secondary agricultural education classrooms. Additionally, these activities will improve agricultural safety and health in secondary agricultural education, thus, further improving the health and safety of agriculturalists.

Based on the conclusions and these implications related to the findings of this study, the following recommendations are offered. Understandably, large machinery and exposure to dangerous chemicals are serious agricultural risks and Iowa agricultural educators rated most areas of agricultural safety and health as important to students' education. However, educators do not hold personal health safety to the same importance. Increasing educators' awareness on the importance of personal health safety including heat/cold protection and personal protective equipment should be an agenda item for agricultural safety and health professionals as prolonged exposure to health risks could be as devastating to a worker's livelihood.

While Iowa agricultural educators believe the agricultural safety and health materials available to them are high quality and age appropriate, and they know where to locate more materials if needed, they recognize a void in educational materials training and professional development. Increased training and professional development on agricultural safety and health educational materials could increase teachers' understanding of materials and increase the likelihood of materials being used in classrooms.

Time availability and resource availability were cited as the major limitations to agricultural safety and health education. Increasing Iowa agricultural educators' awareness of agricultural safety and health education materials and their location is key to encouraging teachers to implement lessons and activities in their classrooms. The National Ag Safety Database has hundreds of activities, games, and informational programs available online free of charge (National Ag Safety Database, n.d.).

Iowa agricultural educators are most interested in teaching agricultural safety and health using videos, simulators, and PowerPoint presentations. Literature suggests that students respond better to hand-on activities and experiential learning when identifying agricultural risks and hazards (Murphy, 2003). The resources most appealing to teachers (videos and PowerPoint presentations) might not be effective in educating youth about agricultural safety and health. Instead, activities and lesson plans that utilize case studies and experiential learning activities would be more beneficial for students.

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CHAPTER V. ROLE OF DEMOGRAPHICS IN IOWA HIGH SCHOOL AGRICULTURAL EDUCATORS' ATTITUDES TOWARDS AGRICULTURAL SAFETY AND HEALTH EDUCATION

A paper to be submitted to the *Journal of Agricultural Education*

Josie Rudolphi & Dr. Michael Retallick

Abstract

Agricultural injuries and deaths among young people have been on the decline due in part to increased educational efforts (Rivara, 1997). However, one weakness of agricultural safety and health education is the dispersed workforce and the difficulty of gathering groups/people for education (Murphy, 2003). One possible educational outlet for agricultural safety and health is secondary agricultural classrooms (Florio & Strafford, 1969). Classroom variables, including the teacher's practices and attitude effect the integration of agricultural safety and health materials. This research study investigated the attitudes of Iowa agricultural educators toward agricultural safety and health education. Data were collected using an internet questionnaire designed to determine a) educators' attitudes towards agricultural safety and health education, b) the influence of demographics on educators' attitudes towards agricultural safety and health education. The study found that Iowa high school agriculture teachers, regardless of selected demographic characteristics, believe most topics within agricultural safety and health are important.

Introduction

Farming is one of the most hazardous occupations in the United States and uncommon to most industries, children and young adults make up a significant portion of the workforce (Rivara, 1985). Children and youth's exposure to the dangers of farm work is both routine and extensive (Murphy et al., 1996).

There are various governmental and non-profit organizations that exist to educate the public on agricultural safety and health. Educating youth on the importance of agricultural safety and health has been identified as a successful way to encourage safe behavior changes in agricultural situations (Murphy, 2003). Given the intent to reach teen workers, one viable educational route would be high school agricultural education programs, especially when similarities in educational theory between agricultural education and agricultural safety and health education are considered.

In their book, *Safety Education*, Florio & Stafford (1969) stated "Education is the only feasible means of achieving this goal, and its failure to date indicates merely that initial efforts have not been sufficiently intensive and widespread. All schools in rural areas should provide training in farm safety and should support the activities of other organizations interested in this work" (p. 341). The issue of agriculture health and safety has not diminished.

Conceptual Framework

In the past decade, farm injury death rates have been on the decline (Rivara, 1997). Since 1979, farm fatalities have decreased 39% (Rivara, 1985). There have been multiple reasons cited for this welcoming decline including better prevention efforts such as education (Rivara, 1997).

Florio and Strafford (1969) initially suggested agricultural safety and health should become part of secondary agricultural education programs as early as the 1960s and, when considering commonalities between agricultural education and agricultural safety and health, secondary agricultural classrooms are a viable route for agricultural safety and health.

Agricultural Safety and Health Education

In an effort to help educate the public on the importance of agricultural safety and health and bring awareness to the hazards of agriculture, safety organizations have been established. These organizations educate the public in a variety of different modes. The Ag Safety Database provides materials and literature available online for download (National Ag Safety Database, n.d.). Farm Safety 4 Just Kids employs educational outreach coordinators to coordinate safety days and presentations for youth about agricultural safety and health (Farm Safety 4 Just Kids, 2010).

Despite experiencing success in lowering the number of agricultural injuries and deaths in young people, safety and health organizations face many challenges in combating agricultural hazards. Agricultural challenges that contribute to its hazardous nature include the environment, the people, the work activity, and social, political, and economic factors. Agricultural safety and health education also faces internal challenges to the effectiveness of programs which include ensuring a non-threatening approach to agricultural safety and health education and lack of effective program evaluation (Murphy, 2003).

Secondary Agricultural Education

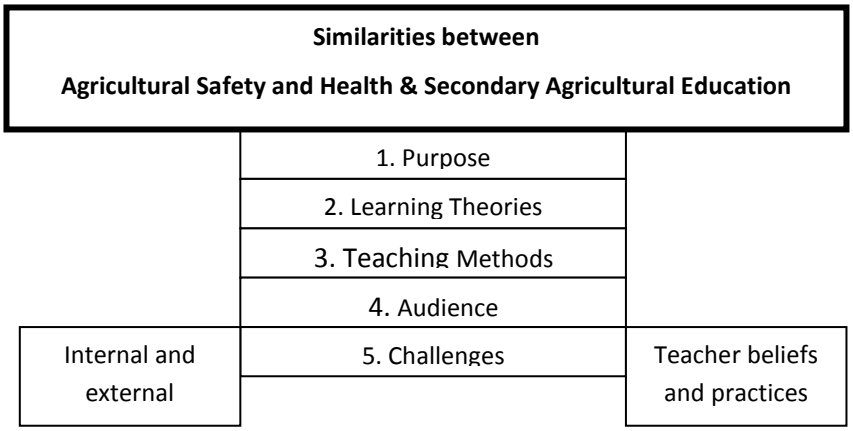
In the United States, the history of agricultural education is closely aligned with that of vocational education and originally served as an instructional program that produced a supply of prepared workers for farming or agricultural industry. The scope of agricultural education was broadened in 1963 to include training for non-farm agricultural occupations (Talbert et al., 2007). Today, agricultural education encompasses three unique and important aspects: 1) classroom and laboratory instruction, 2) experiential learning in the form of supervised agricultural experiences, and 3) leadership development as applied in the National

FFA Organization. These three components contribute to a successful agricultural education program (Talbert et al., 2007). Because of its nature, safety and health education is not only an important element of agricultural education, but also an important responsibility of an agricultural educator as parents demand their children be educated to use materials, tools, and equipment properly (Dyer & Andreasen, 1999).

Commonalities between Agricultural Safety and Health and School-based Agricultural Education

When the literature of agricultural safety and health and school-based agricultural education were analyzed and compared, a common set of audiences, learning theories and teaching methods were ascertained (Figure 1). Each of these areas are described below.

Figure 1. Inter-relationship between ASH education and secondary agricultural education



Audience

Secondary agricultural education and agricultural safety and health education share a common audience—young adults. Youth have been identified as a primary audience for agricultural safety and health because: 1) youth are more adaptable to change and will more readily adapt to changes in behavior, and 2) targeting youth will be an effective channel with which to educate adults who are in contact with youth (Murphy et al., 1996).

Secondary agricultural education educates high school students in grades 9-12 about agricultural science. Agricultural education was created for high school students and considered a component of vocational education, a job training educational program within high schools that prepares students for careers after graduation (Talbert et al., 2007). Given this purpose, agriculture and health safety would be a natural component of the agricultural education program.

Learning Theory in Agricultural Safety and Health and Agricultural Education

Three different learning theories have been described as effective means of educating the public about agricultural safety and health and include behaviorism, constructivism, and socioculturalism (Cole, 2002).

Like agricultural safety and health, agricultural education has adopted and used several learning theories throughout its history including constructivism and behaviorism. More recently, the agricultural education has adopted and promoted the constructivist learning theory, a learning theory that's core is based on learners constructing meaning from experiences (Doolittle & Camp, 1999).

Both agricultural safety and health education and secondary agricultural education align themselves with the constructivism and behaviorism learning theory. These two theories are similar in that learning results from a physical action by the learner, either as behavior or experience.

Teaching Methods in Agricultural Safety and Health and Agricultural Education

Similarities between secondary agricultural education and agricultural safety and health education also include teaching methods often utilized in each discipline. The problem-solving approach has been promoted by the agricultural profession as a teaching

approach to use in teaching secondary agriculture students and educators within the discipline (Cano & Garton, 1994). In teaching safety specifically, instructional methods should appeal to all senses of a student, and students should learn in the physical environment when possible (Newcomb et al., 2004).

Agricultural safety and health professionals have identified teaching methods most successful in educating individuals on agricultural safety and health. Making sure that individuals can recognize agricultural hazards and understand why risks exist is vital to effective education and reached using case studies, considering farm economics, and allowing students hand-on experiences in working to create safer agricultural environments (Lehtola & Boyd, 1992).

Both agricultural education and agricultural safety and health education used hands-on, real-world experiences to educate youth on their respective areas of study.

Factors Influencing Teacher Practices

When considering teaching styles, or teaching practices, teacher demographics have been identified as having some influence. Educator gender has been identified as influencing the way teachers teach and stems from the idea that men and women have different communication styles (Bress, 2000). Studies suggest that men are more comfortable in a lecturing role whereas women are more comfortable in a listening role, and in terms of teaching utilize more group discussion and exploration— talking with students as opposed to at students (Bress, 2000). Male teachers tend to be authoritative, thus comfortable in a lecturing role, and females tend to be more supportive and expressive (Duffy, Warren, & Walsh, 2001).

Teaching styles of educators influence student learning. Two main learning styles exist in agricultural education, field-dependent and field independent. According to Raven, Cano, Carton, & Shelhamer (1993) "Individuals with a field-dependent learning style tend to perceive the world in a global fashion" (p. 41). As socially-oriented learners, these students best learn material with a social content, such as student-centered activities; however, these educators need more explicit guidance in problem-solving (Raven et al., 1993).

"Field-independent learners view the world more analytically" (Raven et al., 1993 p. 41). Field-independent learners rely most often on self-defined goals and situations that are self-structured. Teachers with a field-independent learning style tend to guide their students as opposed to teach them, are more likely to use a problem-solving approach to learning, and emphasize the cognitive aspect of instruction (Raven et al., 1993).

A study of preservice student teachers determined that males are split evenly between the two learning styles, 50% were field-dependent learners, 50% were independent learners. Females, however, were more divided with only 29% identified as a field-dependent learners and 71% as a field-independent learners (Cano, Garten, & Raven, 1992). Thus, teaching style would be affected by teacher gender in some instances.

Factors Influencing Teacher Attitudes

Demographics influence an individual's attitude or beliefs. People from differing backgrounds have varying beliefs and value systems (Bill, 2003). An individual's attitudes are affected by many factors including knowledge and values stemming from personal or familiar culture and social settings (Bill, 2003). Considering this information, the assumption can be made that a teacher's attitude could be influenced by personal experiences and upbringing.

Educational levels of individuals have also been found to have impact on one's attitude or belief system, specifically epistemological beliefs (Schommer, 1998). Evidence suggests that both age and education affect individuals' epistemological beliefs (Schommer, 1998).

Effect of Teacher's Attitude/Belief on Practice

Until the mid1970s, studies on teachers' thought processes had been focused on teachers' decision-making, with little to no concern for the thought process or knowledge of subject matter in which the decisions are based. Within the last 20 years, emphasis has been placed on determining why teachers teach what they do and how they teach (Fang, 1996).

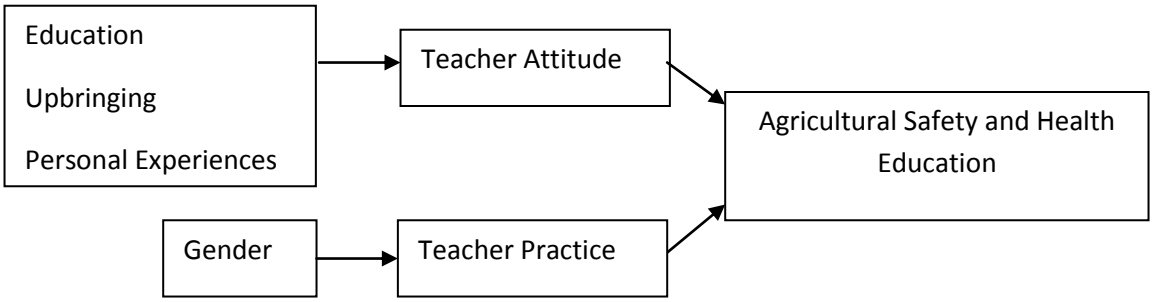
Teaching involves two domains: 1) a teacher's thought process, and 2) a teacher's actions (or behavior). A teacher's thoughts occur in their head and thus are unobservable, teacher actions, however, are observable and are found to have impact on student behavior and student achievement (Fang, 1996). It was originally assumed "that causality is unidirectional, with teachers' classroom behavior affecting students' classroom behavior, which ultimately affects students' achievement" (Fang, 1996, p. 48). Recently researchers have begun to view this causality as cyclical, suggesting teacher behavior effects student's behavior which affects teacher behavior and eventually affects a student's academic achievement (Fang, 1996).

Beliefs are the best indicators of the decisions individuals make throughout their lives (Pajares, 1992). Since student academic achievement is largely affected by a teacher's behavior and teacher behavior is influenced by a teacher's thought process, it is important to understand educator's thought processes. Teachers' thought processes have been categorized into three fundamental types: 1) teacher planning, 2) teacher's interactive thoughts and

decisions, and 3) teacher's theories and beliefs (Fang, 1996). An educator's beliefs represent a pool of general knowledge of people, events, and objects that affect their thoughts, decisions, and classroom behavior. A teacher's beliefs are shaped by many different factors such as the influence of discipline subculture, preservice experiences, and opportunity for reflection. A teacher's beliefs may be present in that teacher's expectations for their classroom/students or their personal views about a particular subject, which can affect teaching and learning in one way or another (Fang, 1996).

Based on the presented literature and the impact that an educators' attitude has on practice, it can be deducted that gender, educational level, upbringing, and personal experiences could influence a teachers' agricultural safety and health education practices and attitudes (Figure 2).

Figure 2. Influence of Demographics in Teacher Practice and Attitude



Problem Statement

Literature suggests that agricultural safety and health education should be a community effort and educating youth, a more impressionable and adaptable portion of the population, could have great impact on attitudinal and behavioral changes in agricultural safety and health (Murphy et al., 1996). Secondary school agricultural departments have been recognized as a possible avenue for successful agricultural safety and health education

instruction. Therefore, more information is needed about high school agricultural teachers' agricultural safety and health attitudes and specific demographic characteristics that influence such attitudes.

Research Questions

In order for the secondary agricultural education classroom to become a successful outlet for the dispersion of agricultural safety and health education, a better understanding of agricultural teachers' attitudes of agricultural safety and health education is needed, specifically if attitudes are influenced by teacher demographics. Therefore, the purpose of this study was to determine the role of demographics in attitudes, needs, and limiting factors related to reaching agriculture safety and health in Iowa agricultural educators. The following research objectives were investigated to address this purpose.

1. Determine the role of demographics in Iowa agriculture teachers' perceived level of importance in teaching agriculture, mechanics, and personal safety and health topics.
2. Determine the role of demographics in Iowa agriculture teachers' attitudes toward agriculture safety and health based on their response to six belief statements.
3. Identify the role demographics play in determining limitations Iowa agriculture teachers face in teaching agricultural safety and health.
4. Identify the types of resources Iowa agricultural educators would be interested in using to teach agricultural safety and health in their classrooms based on demographics.

Methodology

This census study identified the current practices and attitudes of Iowa agricultural educators regarding agricultural safety and health education. The population for this study was all agricultural educators within the state of Iowa. The Iowa Department of Education maintains a list of all agricultural educators in the state and included 216 contacts.

A web-based questionnaire was identified as the most feasible and appropriate method to collect data for the agricultural safety and health education study. Web surveys can be conducted quickly, reach large populations, and are inexpensive when compared to other survey modes (Ary, Jacobs, & Sorensen, 2010).

The agricultural safety and health questionnaire was developed to identify Iowa agricultural educators' practices and attitudes towards agricultural safety and health education. The survey was developed in three sections: 1) current practices of agricultural educators in terms of agricultural safety and health education in their classrooms, 2) attitudes of agricultural educators towards agricultural safety and health education, and 3) demographics of Iowa agricultural educators.

The instrument was submitted to a panel of experts to determine face and content validity. The panel of experts included current agricultural education student teachers, a former high school agricultural educator, and a university faculty member at Iowa State University with expertise in agricultural safety and health. The instrument was deemed to be valid and received IRB approval.

The agricultural safety and health questionnaire was administered through SurveyMonkey, an online survey site that allows surveys to be created and returned online. The researchers adopted Dillman's (2006) recommended five-step contact approach to obtaining responses from internet surveys, which included four contacts of the same mode

and one "special contact" of a different mode. The first email was personalized, and all written contacts were kept brief as suggested by Dillman (2006).

Iowa agricultural educators were contacted five times over a four week period beginning in late May, 2010. A pre-notification letter was sent, and a few days later an email reminder was sent to all agricultural educators inviting them to participate in the study. This email included a link to the survey online. A third email was sent one week later, and a fourth, unique contact was made the next week. The fourth contact was a mailed postcard, sent to all agricultural educators who had not responded to the survey by the third week. Finally, a fifth email was sent four weeks after the initial pre-notification email was sent. The first five contacts yielded a response rate of 55%. Because of the moderate response rate, the agricultural educators who had not responded to the online survey were contacted an additional two times in the fall of 2010. After seven contacts were made, the study produced a response rate of 67.1% and a useable response rate of 63.4% (N=137). The initial data collection procedures as well as the modified contacts conducted in the fall were approved by the Intuitional Review Board.

Data were downloaded from SurveyMonkey and analyzed using SPSS 19.0 and Microsoft Excel®. Descriptive statistics including frequencies, percentages, means, and standard deviations were calculated as a means for answering the research objectives. To determine differences between demographics, Levene's Test for Equality of Variances was used to determine statistical significance. A statistically significant difference between two variables is assumed if the test yields a rating equal to or less than .05. For ratings greater than .05, equal variance is assumed (Leech, Barrett, & Morgan, 2008).

Findings

Iowa high school agricultural educators were surveyed to determine their current attitudes toward agricultural safety and health education. Demographic information was collected including gender, age, and education. Additionally, agriculture teachers were asked to identify themselves as having been raised on a farm, and/or personally experienced an agriculture related injury.

Of the 137 respondents to the agricultural safety and health study, 73% (*n*= 100) were males, and 27% *(n*= 37) were females; 61% of respondents held Bachelor's degrees, and 39% held Master's degrees. Of the 137 respondents, 94% were raised on a working farm around livestock or agricultural equipment. Respondents were split evenly when asked if they had personally sustained an injury as a result of agriculture.

Table 1. Demographics of Respondents (N=137)

	Gender					
	Female (*n*=37)		Male (*n*=100)		Total (*N*=137)	
	n	% of total	*n*	% of total	*N*	% of total
Education						
Bachelor's Degree	24	64.9%	59	59.0%	83	60.6%
Master's Degree	13	35.1%	40	40.0%	53	38.7%
Upbringing						
Rural	36	97.3%	93	93.0%	129	94.2%
Urban	1	2.7%	6	6.0%	7	5.1%
Missing	0	0	1	1.0%	1	.73%
Victim of Agricultural						
Yes	11	29.7%	57	57.0%	68	49.6%
No	25	67.6%	43	43.0%	68	49.6%

Iowa high school agriculture teachers were surveyed to determine their attitudes towards agricultural safety and health education. Teachers were asked to rate, in their

opinion, the level of importance of various agricultural topics, rate their level of agreement with six agricultural safety and health education belief statements referring to their educational effort and opinion of available materials, and identify common limitations they face in teaching agricultural safety and health in their classrooms. Responses were analyzed based on four demographics, as literature suggests that demographics including gender and experience play an important role in determining an educator's attitudes and beliefs (Bress, 2000; Bill, 2003).

Topic Importance

Iowa high school agricultural educators were asked to rate, in their opinion, the level of importance of 24 agricultural safety and health topics. Agricultural health and safety topics were divided into three categories: 1) agriculture, 2) mechanics, and 3) personal health. Study respondents were presented with the list initially during the practices portion of the survey. Teachers rated topics on a four-point Likert-type scale ranging from not important to very important (Table 2).

Demographically, males and female respondents were evaluated to determine any gender differences among topic importance. Education, educator upbringing (rural vs. non-rural) and whether the agriculture teacher sustained a personal injury from agriculture were also analyzed to determine any difference.

Statistically there was no difference between male and females ratings of the agricultural safety and health topic importance except on the topics of ATV safety ($p=.027$), and heat/cold safety ($p=.004$). When education was considered, there was no significant difference between Bachelor and Master's degree holders expect on the topic of machinery

safety (p=.015). Respondents raised on a working farm differed from those not raised on a farm on topics of tractor safety (p=.000), and grain handling safety (p=.012).

Table 2. Agricultural Safety and Health Topic Importance Based on Gender

Topic	Male		Female		
	M	*SD*	*M*	*SD*	*Sig*
Agriculture					
Animal	3.37	.632	3.59	.551	.319
Machinery	3.57	.556	3.65	.538	.460
Manure	3.04	.772	3.35	.588	.476
Tractor	3.57	.574	3.57	.502	.510
Combine	3.34	.702	3.46	.558	.154
Grain	3.33	.700	3.43	.555	.156
ATV	3.46	.690	3.65	.538	.027*
Rural Driving	3.24	.784	3.51	.559	.121
Chemical	3.44	.626	3.59	.551	.249
Confined Spaces	3.08	.791	3.36	.593	.354
Mechanics					
Electrical	3.29	.689	3.42	.604	.588
Fire	3.34	.688	3.47	.654	.966
Welding	3.39	.620	3.54	.611	.768
Ladder	2.93	.750	3.06	.684	.371
Hand Tool	3.20	.759	3.29	.667	.455
Power Tool	3.45	.628	3.43	.608	.890
Chainsaw	3.14	.714	3.26	.611	.741
Small Gas Engine	3.08	.684	3.31	.530	.839
Lawnmower	3.27	.697	3.51	.507	.163
Personal Health					
First Aid	3.27	.712	3.58	.554	.260

Note. Criteria were measured on a four-point scale (1=*not important*, 4=*very important*)
*Sig = $p \leq .05$

(continued)

Table 2. Agricultural Safety and Health Topic Importance Based on Gender (continued)

Topic	Male		Female		
	M	*SD*	*M*	*SD*	*Sig*
Heat/Cold	2.62	.829	3.00	.676	.004*
Back	2.87	.791	3.11	.622	.054
PPE	3.19	.741	3.50	.615	.554

Note. Criteria were measured on a four-point scale (1=*not important*, 4=*very important*)
*Sig = $p \leq .05$

Belief Statements

Iowa agricultural educators were asked to rate their level of agreement with six different belief statements about agricultural safety and health education on a four-point Likert-type scale (1=strongly disagree, 4=strongly agree). The six statements asked about the resources available to teachers and asked them to gauge their own agricultural safety and health education effort.

Table 3. Iowa Agriculture Teachers' Level of Agreement with Agricultural Safety and Health Belief Statements

Statement	Teacher Gender		*Sig*
	Male	Female	
I believe I teach enough ASH in my classroom.	2.58	2.35	.936
I believe there are enough resources available to me on ASH education.	2.58	2.57	.851
I believe the ASH materials are quality materials.	2.76	2.68	.142
I believe the ASH materials are age appropriate	2.73	2.41	.004*
I know where I can find more ASH materials should I need them.	2.65	2.35	.844
I believe there is adequate training and professional development for teachers on ASH topics.	2.34	2.05	.000*

Note. Criteria were measured on a four-point scale (1=*strongly disagree*, 4=*strongly agree*)
*Sig = $p \leq .05$

There was significant statistical difference between males and females in regards to their opinions of the materials being age appropriate for their students and there being enough professional development available to teachers about agricultural safety and health. When comparing education levels, upbringing, and personal experiences (agricultural injury) there was no significant difference between groups within each demographic and their responses to the six belief statements about agricultural safety and health.

Resources

Iowa high school agricultural educators were asked to identify the types of resources they would be interested in using to teach agricultural safety and health. Teachers were provided with a list of educational resources and asked to rate on a three-point Likert-type scale whether they would be interested in using each. Again, respondents were analyzed based on demographic information including gender, education, upbringing, and whether they were victim of an agricultural injury (Table 4).

Table 4. Interest in Agricultural Safety and Health Education Resources Based on Gender

Resource	Males		Females		Sig
	M	*SD*	*M*	*SD*	
Videos	2.80	.534	2.68	.626	.063
Simulators	2.71	.499	2.86	.419	.001*
Guest Speakers	2.28	.685	2.72	.513	.007*
PowerPoint Presentations	2.71	.539	2.42	.649	.013*
Literature	2.34	.720	2.49	.658	.405
Games	2.45	.674	2.86	.424	.000*
Curriculum Units	2.39	.744	2.60	.604	.027*

Note. Scale: 1=*Not interested*, 2=*Undecided*, 3=*Interested*
*Sig = $p \leq .05$

Statistically males and females differed significantly on five of the seven proposed educational materials suggesting differences between genders and preferred teaching

techniques/styles. No statistical difference existed between respondents with Bachelor's degrees and Master's degrees when considering materials educators would be interested in using to aid in teaching agricultural safety and health. When teacher upbringing was considered, differences existed between teachers who were raised in a rural setting and those raised in an urban setting on two of the proposed educational resources; simulators (p=.031), and literature (p=.041). Significant difference existed between respondents who had experienced a personal injury as a result of agriculture and respondents who had not on two of the proposed educational resources: videos (p=.002), and games (p=.005).

Limitations Facing Teachers

Iowa agriculture teachers were asked to identify the limitations they face in teaching agricultural safety and health in their classrooms. A list of potential limitations was provided, and teachers had the option of adding to the list, assuming they experienced barriers not already identified. Educators could select and list more than one limitation.

Table 5. Limitations to Agricultural Safety and Health Education Based on Gender

Limitation	Males (*n*=100)		Females (*n*=37)	
	n	% of total	*N*	% of total
Quality of Resources	37	37.0%	18	48.6%
Availability of Resources	39	39.0%	21	56.8%
Understanding of Content	13	13.0%	3	8.1%
Time Availability	73	73.0%	28	75.7%
Importance of Topic	5	5.0%	1	2.7%

Male and female Iowa high school agriculture teachers both identified *time availability in the classroom* as the major limitation they face in teaching agricultural safety

and health. *Understanding of content* was listed as less of a major limitation, and less than 5% of both men and women cited the *importance of agricultural safety and health* as a limitation and a reason for not teaching it in their classrooms.

Table 6. Limitations to Agricultural Safety and Health Education Based on Education

Limitation	**Bachelor's (*n*=83)**		**Master's (*n*=53)**	
	n	% of total	*N*	% of total
Quality of Resources	33	39.8%	22	41.5%
Availability of Resources	38	45.8%	22	41.5%
Understanding of Content	12	14.5%	4	7.5%
Time Availability	62	74.7%	38	71.7%
Importance of Topic	4	4.8%	2	3.8%

Both Iowa high school agriculture teachers with Bachelor's and Master's degrees identified *time availability in the classroom* as the major limitation they face in teaching agricultural safety and health in their classroom. Nearly 50% of both groups acknowledged *availability of resources* as a limitation. *Understanding of content* was recognized as a limitation by 14.46% of respondents with a Bachelor's degree, while only 7.52% of respondents with Master's degrees identified *understanding of content* as a limitation. Again, less than 5.0% of both groups identified *importance of agricultural safety and health* as a limitation and reason for not teaching on the topic in their classroom.

Table 7. Limitations to Agricultural Safety and Health Education Based on Teachers' Upbringing

Limitation	Rural Upbringing (*n*=129)		Non-Rural Upbringing (*n*=7)	
	n	% of total	*N*	% of total
Quality of Resources	53	41.1%	2	28.6%
Availability of Resources	57	44.2%	3	42.9%
Understanding of Content	15	11.6%	1	14.3%
Time Availability	95	73.6%	5	71.4%
Importance of Topic	6	4.7%	0	0%

Time availability was also identified as the major limitation by both Iowa agriculture teachers who were raised on a working farm and those who were not. Over 40% of both groups also identified *availability of resources* as a limitation. Half as many non-rural raised respondents identified *quality of resources* as a limitation, and zero non-raised respondents listed *importance of agricultural safety and health* as a limitation.

Table 8. Limitations to Agricultural Safety and Health Education; Agricultural Injury

Limitation	Sustained Personal Injury (*n*=68)		Did NOT Sustain Personal Injury (*n*=68)	
	N	% of total	*N*	% of total
Quality of Resources	27	39.7%	28	41.2%
Availability of Resources	33	48.5%	27	39.7%
Understanding of Content	6	12.3%	10	14.7%
Time Availability	50	73.5%	50	73.5%
Importance of Topic	4	5.9%	2	2.9%

Time availability in the classroom was also identified as the major limitation to agricultural safety and health education by both respondents who had sustained an agricultural injury and those who had not. Both *quality of resources* and *availability of resources* were also identified by both groups as top limitations to agricultural safety and

health education. Interestingly, twice as many non-injured respondents reported the *importance of agricultural safety and health* as a limitation to agricultural safety and health education than injured respondents.

Conclusions

Of the 24 agricultural safety and health education topics listed, Iowa agricultural educators identified all 24 as being important for students to learn about. Females, in general, rated the areas as being more important than males did, but the differences were not statistically significant. Of the demographics considered; gender, education, upbringing, and agricultural injury, no two groups differed significantly in their ratings of agricultural safety and health topic importance.

When asked to agree or disagree with six belief statements about agricultural safety and health education, females were the only group to disagree that they were teaching enough agricultural safety and health in their classroom. All respondents, especially females, disagreed that there was enough training and professional development for teachers on agricultural safety and health education. Gender was the only demographic that yielded any statistically significant difference between groups. Males and females disagreed significantly that the materials available are age appropriate and there is enough professional development for teachers.

Both males and females are interested in using videos and simulators to help teach agricultural safety and health education in their classrooms. Males are more interested in using pre-made PowerPoint presentations then females. Females are more interested in utilizing guest speakers and games to aid in teaching then males are. Statistically males and females differed significantly on five of the seven proposed materials, suggesting difference

between teaching techniques/styles between males and females. No statistically significant difference existed between respondents with Bachelor's degrees and Master's degrees. Respondents from a rural upbringing and non-rural upbringing different significantly on two of the seven proposed materials, as did respondents who had and had not sustained an agricultural injury.

All respondents of the agricultural safety and health education study identified *time* as a major limitation to teaching agricultural safety and health. Other major limitation cited included *quality of resources* and *availability of resources.*

Based on the results of this specific study Iowa agricultural educators attitudes towards agricultural safety and health education do not differ significantly based on demographics including gender, education, upbringing, and personal experiences.

Implications and Recommendations

These finding have implications for professional development of agricultural educations. There is a need to improve the awareness on personal health safety, offer professional training and development, and offer teaching materials that are appropriate and of interest to the teachers. These activities will improve agricultural safety and health in secondary agricultural education, thus, further improving the health and safety of agriculturalists.

Based on the conclusions and these implications related to the finding of this study, the following recommendations are offered. Understandably, large machinery and exposure to dangerous chemicals are serious agricultural risks and Iowa agricultural educators rated most areas of agricultural safety and health as important to students' education. However, educators do not hold personal health safety to the same importance. Increasing educators'

awareness on the importance of personal health safety including heat/cold protection and personal protective equipment should be an agenda item for agricultural safety and health professionals as prolonged exposure to health risks could be as devastating to a worker's livelihood.

While Iowa agricultural educators believe, for the most part, the agricultural safety and health materials available to them are high quality and age appropriate, and they know where to locate more materials if needed, they recognize a void in educational materials training and professional development. Increased training and professional development on agricultural safety and health educational materials could increase teachers' understanding of materials and increase the likelihood of materials being used in classrooms.

Time availability and recourse availability were cited as the major limitations to agricultural safety and health education. Increasing Iowa agricultural educators' awareness of agricultural safety and health education materials and their location is key to encouraging teachers to implement lessons and activities in their classrooms. The National Ag Safety Database has hundreds of activities, games, and informational programs available online free of charge (National Ag Safety Database, n.d).

Iowa agricultural educators are most interested in teaching agricultural safety and health using videos, simulators, and PowerPoint presentations. Literature suggests that students respond better to hand-on activities and experiential learning when identifying agricultural risks and hazards (Murphy, 2003). The resources most appealing to teachers (videos and PowerPoint presentations) might not be effective in educating youth about agricultural safety and health. Instead, activities and lesson plans that utilize case studies and experiential learning activities would be more beneficial for students.

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CHAPTER VI. SUMMARY, MAJOR FINDINGS, CONCLUSIONS, RECOMMENDATIONS, AND IMPLICATIONS

Summary

The purpose of this study was to determine the practices and attitudes of Iowa agriculture teachers regarding agricultural safety and health education. The study sought to determine the current educational practices by agricultural educators in terms of agricultural safety and health in their classrooms and their general attitude towards the idea of agricultural safety and health education. The objectives of the study were to:

1. Identify the attitudes of Iowa agricultural educators towards agricultural safety and health education.
2. Determine the extent to which Iowa high school agricultural educators were teaching agricultural safety and health in their classrooms.
3. Identify the need for further education and materials within agricultural safety and health.
4. Identify selected demographic information of the respondents.
5. Identify the role of demographics in Iowa agriculture teachers' attitude towards agricultural safety and health education.

The census study utilized a descriptive survey research design. The accessible population consisted of 216 agricultural educators within the state of Iowa. A web-based survey designed using SurveyMonkey was used to collect data for this study. The survey instrument consisted of three major sections: (a) practices, (b) perceptions/attitudes, and (c) demographics, related to the study's objectives. Before implementation, the instrument was tested for validity and deemed adequate for the study.

The survey instrument was sent to 216 agriculture teachers in the state of Iowa, and a total of 137 useable questionnaires were returned for a response rate of 62.96%. Initial data provided by SurveyMonkey were imported into an Excel spreadsheet for organization and then transferred into a Statistical Analysis Software (SPSS 19.0).

Descriptive statistics were used to analyze the data. Inferential statistics were used to determine differences among selected groups.

Major Findings

Demographics revealed that the majority of respondents were males. A majority of respondents held Bachelor degrees, though a high percentage had attained Master's degrees. All but seven respondents reported having been raised on a working farm around livestock and/or machinery, and half had claimed to have personally sustained an injury as a result of agriculture.

Most Iowa agriculture teachers taught agricultural safety topics (i.e., livestock, machinery, chemicals) in their classrooms. One in five teachers, however, did not teach any personal health in their classroom related to agricultural safety and health (i.e., first aid, personal protective equipment, hearing conservation).

Most Iowa agricultural educators teach agricultural safety and health as part of another unit in their classroom and utilize textbooks and non-profit organizations most often for information on the subject.

Iowa agricultural educators perceive the 24 agricultural safety and health topic areas they were presented to be important or very important for students to learn about. Educators also generally believe they teach enough agricultural safety and health in their classrooms, the materials available to them are high quality, and the materials are age appropriate for

their students. Educators disagree that there is adequate training and professional development for teachers on agricultural safety and health topics.

Time availability in the classroom was the major limitation Iowa agricultural educators met in teaching agricultural safety and health; quality of resources and availability of resources, however, were also cited as major limitations.

Demographics including gender, personal experiences, and education do not highly influence Iowa agricultural educators' attitude towards agricultural safety and health education.

Conclusions

The following conclusions were drawn based on the findings as they relate to the practices and attitudes of Iowa agricultural educators towards agricultural safety and health education:

1. While most Iowa agriculture teachers agree to teaching agriculture safety and mechanics safety, one in five Iowa agricultural educators is not teaching personal health as it relates to agriculture.
2. The most common way for Iowa agriculture teachers to teach agricultural safety and health is part of a larger agricultural science unit, as in teaching animal safety as part of an animal science unit. The least common way to teach agricultural safety and health as identified by Iowa agriculture teachers is as its own unit.
3. Textbooks and non-profit organizations (Farm Safety 4 Just Kids, National Safety Council) were identified as the main resources used to help Iowa agricultural educators teach agricultural safety and health in their classroom.

4. Of 24 proposed agricultural safety and health topic areas, Iowa agriculture teachers identified all as either important or very important for their students to learn about.
5. Iowa agricultural educators agree they are teaching enough agricultural safety and health in their classrooms, and believe the materials available are easy to find and high quality.
6. Iowa agricultural educators do not believe there is adequate training and professional development for teachers on agricultural safety and health topics.
7. Time availability was cited as the main limitation to teaching agricultural safety and health. Interestingly, quality and availability of resources were also cited as major limitations, though in previous questions teachers agreed there are enough resources available, they know where to find additional materials, and they believe the materials are high quality.
8. Males and females differed on the types of materials they would be interested in to teach agricultural safety and health. Males were more interested in using pre-made PowerPoint presentations then females. Females were more interested than males in utilizing guest speakers and games to aid in teaching.

Recommendations

The following recommendations were made based on the findings of this agricultural safety and health study:

1. Increase Iowa agricultural educators' awareness of personal health education. While the event of tractor rollover or other agricultural incident could be tragic,

prolonged exposure to intense sun or intense cold could have equally detrimental effects on an individual.

2. Increase professional development and training for agriculture teachers on agricultural safety and health topics. Increasing teachers' understanding of content area and importance could encourage material implementation in their classrooms.
3. Increase Iowa agricultural educators' awareness of where agricultural safety and health materials and resources are located. Teachers identified lack of available resources as a major limitation to teaching agricultural safety and health education. Increasing location awareness may encourage integration.
4. Increase agricultural educators' understanding of effective safety education. Iowa agricultural educators are most interested in teaching agricultural safety and health using videos, simulators, and PowerPoint presentations. Literature suggests that students respond better to hand-on activities and experiential learning when identifying agricultural risks and hazards (Murphy, 2003). The resources most appealing to teachers (videos and PowerPoint presentations) might not be effective in educating youth about agricultural safety and health. Instead, activities and lesson plans that utilize case studies and experiential learning activities would be more beneficial for students.

Further Research

The following recommendations for further research are offered based on the findings of this study:

1. Agricultural educators should be surveyed to better identify the limitations they face in teaching agricultural safety and health. In this study there was a contradiction when asked major limitations and if the agricultural educators believed there were enough resources available and quality resources available.
2. A similar study should be conducted in other states to determine other agricultural educators' practices and attitudes towards agricultural safety and health. This could validate the findings of this study and possibly result in determining universal attitudes towards agricultural safety and health.

Implications and Educational Significance

The agricultural safety and health study offers several implications for the future and is educationally significant to agricultural safety and health education professionals. While agricultural safety and health education faces many internal and external limitations, its viability in secondary agricultural education classrooms is apparent considering the information gathered in this study. Findings from this study encourage further development of agricultural safety and health education materials, and lend teacher opinions and needs to agricultural safety and health professionals. Given the information provided, educational materials can better meet the needs of secondary agricultural educators.

Literature (Bill, 2003; Schommer, 1998) suggests that demographics play a role in helping determine an individual's attitudes, as well as affect an individual's practice (Cano et al., 1992). The agricultural safety and health education study identified that individuals, regardless of selected demographic information, held agricultural safety and health topic to an overall high importance. Considering that information, agricultural safety and health professionals can capitalize on the already favorable disposition of Iowa agricultural

educators towards some agricultural topics to encourage equal respect for other topics such as personal health. This study identified those topics which Iowa agriculture teachers think are very important and less important.

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APPENDIX A. SURVEY INSTRUMENT

Agricultural Health & Safety Survey

Thank you for participating in this questionnaire. Please answer all questions to the best of your ability and know all responses will be kept in confidence. All questions are voluntary and the questionnaire can be terminated at any point.

For the purpose of this study, agricultural health and safety is defined as: the proper handling and operating of agricultural equipment, livestock, tools, chemicals, etc, as to ensure maximum safety of the operating individual and minimized risk of injury or death.

Thank you for your participation.

By clicking "NEXT" you are agreeing that you have read the procedure described above and are voluntarily participating in the study.

NEXT

PRACTICES: Please answer the following questions based upon your practices in the last academic year (August 2009-May 2010).

1. In which of the following areas, if any, did you teach agricultural safety in the last academic year? (Check all that apply).

O Animal/Livestock

O Machinery/Vehicle

O Manure Lagoons

O Tractor

O Combine/Harvester

O Grain Handling/Storage/Transportation

O ATV

O Rural Driving

O Chemical

O Confined Spaces

O Did not teach any agricultural safety

2. In which of the following areas, if any, did you teach mechanics safety in the last academic year? (Check all that apply).

O Electrical

O Fire

O Welding

O Ladder

O Hand Tool

O Power Tool

O Chainsaw

O Small Gas Engine

O Lawnmower

O Did not teach any mechanics safety

3. In which of the following areas, if any, did you teach personal health in the last academic year? (Check all that apply).

O First Aid

O Hearing Conservation

O Heat/Cold Illness

O Back Safety

O Personal Protective Equipment (PPE)

O Did not teach any personal health

4. How do you teach agricultural health and safety to your students? (Check all that apply).

O As its own unit

O As part of an agricultural science unit (Example: Teach livestock safety as part of a livestock unit)

O As a workshop or lab in class (Example: Ag Safety Day or similar activity)

O As an extra curricular activity outside the classroom

5. What sources do you use to acquire the agricultural health and safety materials you teach?

O Textbooks

O Agri Businesses

O Government Organizations (OSHA, NIOSH, CDC)

O Non-profit Organizations (Farm Safety 4 Just Kids, National Safety Council)

O Educational Systems (High school, community college, university)

O Professional Teaching Organizations (ITEEA, NAAE)

O Other (Please specify): _____

6. Which of the following medias do you use to access the agricultural health and safety materials you teach? (Check all that apply)

O Published (Books, manuals)

O Online Resources

O Periodicals (Magazines, journals, newspapers)

O Video

O Radio

7. Which of the following website have you used or are aware of, if any, as a resource to gather information about agricultural health and safety? (Check one column for each website).

Website	Unaware of	Aware of but have not used	Have used
	1	2	3
Farm Safety 4 Just Kids	O	O	O
National Safety Council	O	O	O
National Institute for Occupational Safety and Health	O	O	O
National Agricultural Safety Database	O	O	O
National Institute for Farm Safety, Inc.	O	O	O

PERCEPTIONS:

1. In your personal opinion, please select the importance of the following health and safety areas, not important to very important. (Please check one column for each safety area).

Topic	Not Important	Somewhat Important	Important	Very Important
	1	2	3	4
Animal/Livestock	O	O	O	O
Machinery/Vehicle	O	O	O	O
Manure Lagoons	O	O	O	O
Tractor	O	O	O	O
Combine/Harvester	O	O	O	O
Grain Handling/Storage/Transportation	O	O	O	O

ATV	O	O	O	O
Rural Driving	O	O	O	O
Chemical	O	O	O	O
Confined Spaces	O	O	O	O
Electrical	O	O	O	O
Fire	O	O	O	O
Welding	O	O	O	O
Ladder	O	O	O	O
Hand Tool	O	O	O	O
Power Tool	O	O	O	O
Chainsaw	O	O	O	O
Small Gas Engine	O	O	O	O
Lawnmower	O	O	O	O
First Aid	O	O	O	O
Hearing Conservation	O	O	O	O
Heat/Cold Illness	O	O	O	O
Back Safety	O	O	O	O
Personal Protective Equipment (PPE)	O	O	O	O

2. In your opinion, to what extent do you agree with the following statements, strongly disagree to strongly agree. (Please check one column for each statement).

Statement	Strongly Disagree 1	Disagree 2	Agree 3	Strongly Agree 4
I believe I teach enough agricultural health and safety in my classroom.	O	O	O	O

I believe as though there are enough resources available to me about agricultural health and safety.	O	O	O	O
I believe the materials available to me about agricultural health and safety are quality educational materials.	O	O	O	O
I believe the materials available to me about agricultural health and safety are age appropriate for my students.	O	O	O	O
I am knowledgeable on where I can find additional materials concerning agricultural health and safety should I want or need them.	O	O	O	O
I believe there is adequate training and professional development for teachers on agricultural health and safety topics.	O	O	O	O

3. What limitations do you face in teaching agricultural health and safety, if any? (Check all that apply).

O Quality of resources

O Availability of resources

O Understanding of content

O Time availability in the classroom

O Importance of agricultural safety

O Other (please specify): _____

4. Which of the following tools would you be interested in using to teach your students about agricultural health and safety? (Check the following items as something you would be interested in using or something you would not be interested in using).

Resource	Not Interested	Undecided	Interested In
	1	2	3
Videos	O	O	O
Simulators, Displays	O	O	O
Expert/Guest Speakers	O	O	O
Pre-made PowerPoint Presentations	O	O	O
Literature (booklets, pamphlets)	O	O	O
Games	O	O	O
Curriculum Units	O	O	O

5. Do you have any additional thoughts or comments regarding agricultural health and safety? Share comments here: _____

PROFILE:

6. What is your age?

O 25 and less O 26-30

O 31-35 O 36-40

O 41-45 O 46-50

O 51-55 O 56 and up

7. What is your gender?

O Male O Female

8. What is your highest degree of education?

O Bachelor's Degree

O Master's Degree

O Ph. D

9. Did you grow up on a working farm (around livestock or agricultural equipment)?

O Yes

O No

10. Have you ever experienced an injury as a result of agriculture?

O Yes

O No

11. Has someone close to you (family or friend) ever been injured or killed in an agricultural related incident?

O Yes

O No

12. In the past 5 years, has a student in the school you teach been injured or killed in an agricultural related incident?

O Yes

O No

O Unknown

13. In the past 5 years, has someone in the local community where you teach been injured or killed in an agricultural related incident?

O Yes

O No

O Unknown

14. Has your teaching of agricultural health and safety been influenced by a student/community member/ family of friend's injury or death as a result of an agricultural incident?

O Yes

O No

O Unknown

15. Estimate the percent of students in your classes that have a farm background.

O Less than 50%

O More than 50%

O Unknown

Submit

APPENDIX B. HUMAN SUBJECTS APPROVAL

IOWA STATE UNIVERSITY
OF SCIENCE AND TECHNOLOGY

Institutional Review Board
Office for Responsible Resear
Vice President for Research
1138 Pearson Hall
Ames, Iowa 50011-2207
515 294-4566
FAX 515 294-4267

Date: 5/17/2010

To: Josie Rudolphi
223 Curtiss Hall

CC: Dr. Michael Retallick
206 Curtiss Hall

From: Office for Responsible Research

Title: Practices and Perceptions of Iowa Agricultural Educators Regarding Agricultural Health and Safety

IRB Num: 10-212

Submission Type: New **Exemption Date:** 5/13/2010

The project referenced above has undergone review by the Institutional Review Board (IRB) and has been declared exempt from the requirements of the human subject protections regulations as described in 45 CFR 46.101(b). The IRB determination of exemption means that:

- **You do not need to submit an application for annual continuing review.**
- **You must carry out the research as proposed in the IRB application**, including obtaining and documenting informed consent if you have stated in your application that you will do so or if required by the IRB.
- **Any modification of this research should be submitted to the IRB on a Continuing Review and/or Modification form, prior to making any changes**, to determine if the project still meets the federal criteria for exemption. If it is determined that exemption is no longer warranted, then an IRB proposal will need to be submitted and approved before proceeding with data collection.

Please be sure to **use only the approved study materials** in your research, including the **recruitment materials and informed consent documents that have the IRB approval stamp.**

Please note that you must submit all research involving human participants for review by the IRB. **Only the IRB may make the determination of exemption**, even if you conduct a study in the future that is exactly like this study.

IOWA STATE UNIVERSITY
OF SCIENCE AND TECHNOLOGY

Institutional Review Board
Office for Responsible Resear
Vice President for Research
1138 Pearson Hall
Ames, Iowa 50011-2207
515 294-4566
FAX 515 294-4267

Date: 8/4/2010

To: Josie Rudolphi
223 Curtiss Hall

CC: Dr. Michael Retallick
206 Curtiss Hall

From: Office for Responsible Research

Title: Practices and Perceptions of Iowa Agricultural Educators Regarding Agricultural Health and Safety

IRB Num: 10-212

Submission Type: Modification **Exemption Date:** 8/4/2010

The project referenced above has undergone review by the Institutional Review Board (IRB) and has been declared exempt from the requirements of the human subject protections regulations as described in 45 CFR 46.101(b). The IRB determination of exemption means that:

- **You do not need to submit an application for annual continuing review.**
- **You must carry out the research as proposed in the IRB application**, including obtaining and documenting informed consent if you have stated in your application that you will do so or if required by the IRB.
- **Any modification of this research should be submitted to the IRB on a Continuing Review and/or Modification form, prior to making any changes**, to determine if the project still meets the federal criteria for exemption. If it is determined that exemption is no longer warranted, then an IRB proposal will need to be submitted and approved before proceeding with data collection.

Please be sure to **use only the approved study materials** in your research, including the **recruitment materials and informed consent documents that have the IRB approval stamp**.

Please note that you must submit all research involving human participants for review by the IRB. **Only the IRB may make the determination of exemption**, even if you conduct a study in the future that is exactly like this study.

APPENDIX C. CONTACT LETTERS

Pre-Notification Letter: Fist Contact

Dear Agricultural Educator:

In a few days we will begin a statewide study to identify the current educational practices and current perceptions of agricultural educators regarding agricultural health and safety. As the agricultural educator contact in your school district, your input is valuable.

In the coming days we will be sending you a link to a web-based questionnaire regarding your current practices with agricultural health and safety education as well as your current attitudes towards available agricultural health and safety materials. For the purpose of this study, agricultural health and safety is defined as: the proper handling and operating of agricultural equipment, livestock, tools, chemicals, etc, as to ensure maximum safety of operating individual and minimized risk of injury or death.

Please consider participating in this study. Each year thousands of young people are injured or killed as a result of an agricultural accident. Agriculture ranks among the most dangerous industries and culturally children and youth have been called upon to work side-by-side adults, putting themselves at risk for serious injury or even death. Across the United States there are a multitude of organizations working to educate children and youth about agricultural health and safety by publishing materials and resources for educators and their classrooms. Your input will help developers of agricultural health and safety materials identify what agricultural educators are doing in the classrooms and better guide the development of new materials.

Please watch for an email from us in the coming days. If you have questions or comments please contact Josie by email at jrudolph@iastate.edu or by phone at (319) 430-0844.

Thank you in advance.

Josie Rudolphi
Graduate Research Assistant

Dr. Michael Ratallick
Assistant Professor

If you have any questions about the rights of research subjects or research-related injury, please contact the IRB Administrator, (515) 294-4566, IRB@iastate.edu, or Director, (515) 294-3115, Office for Responsible Research, Iowa State University, Ames, Iowa 50011.

First Questionnaire Letter: Second Contact

Dear Agricultural Educator:

We are conducting a study to determine Iowa agricultural educator's current practices regarding agricultural health and safety education in their classroom and identifying their perceptions towards the agricultural health and safety educational materials and resources available to them.

The link to the questionnaire is: [LINK]. Participation consent will be collected prior to beginning the questionnaire.

Your participation in the study is voluntary and you are welcome to withdraw your participation at any time during the study. You may skip any questions that you do not feel comfortable answering. Your responses will be held in confidence and used only for statistical purposes.

Please consider participating in this study. Each year thousands of young people are injured or killed as a result of an agricultural accident. Agriculture ranks among the most dangerous industries and culturally children and youth have been called upon to work side-by-side adults, putting themselves at risk for serious injury or even death. Across the United States there are a multitude of organizations working to educate children and youth about agricultural health and safety by publishing materials and resources for educators and their classrooms. Your input will help developers of agricultural health and safety materials identify what agricultural educators are doing in the classrooms and better guide the development of new materials.

If you have questions or comments about this study please contact Josie by email at jrudolph@iastate.edu or by phone at (319) 430-0844.

Your participation in this study is greatly appreciated.

Sincerely,

Josie Rudolphi
Graduate Research Assistant

Dr. Michael Ratallick
Assistant Professor

If you have any questions about the rights of research subjects or research-related injury, please contact the IRB Administrator, (515) 294-4566, IRB@iastate.edu, or Director, (515) 294-3115, Office for Responsible Research, Iowa State University, Ames, Iowa 50011.

First Reminder Letter: Third Contact

Dear Agricultural Educator:

Last week you were invited to participate in a survey identifying the current practices and perceptions of Iowa agricultural educators regarding agricultural health and safety. Recently, a link to a web-based questionnaire was sent to you via email. We have not yet received your responses to the questionnaire. Your participation in this study is very important to us.

The link to the survey is: [LINK]

If you have already completed and submitted the questionnaire, please accept our sincere thanks. Otherwise, please complete the questionnaire and submit it. Participation consent will be collected prior to beginning the questionnaire.

Please direct any questions or concerns to Josie at jrudolph@iastate.edu or by calling (319) 430-0844.

Your assistance is greatly appreciated.

Sincerely,

Josie Rudolphi
Graduate Research Assistant

Dr. Michael Ratallick
Assistant Professor

If you have any questions about the rights of research subjects or research-related injury, please contact the IRB Administrator, (515) 294-4566, IRB@iastate.edu, or Director, (515) 294-3115, Office for Responsible Research, Iowa State University, Ames, Iowa 50011.

First Reminder Postcard: Fourth Contact

Dear Agricultural Educator:

Two weeks ago you were invited via email to participate in a survey identifying the current practices and perceptions of Iowa agricultural educators regarding agricultural health and safety. We have not yet received your responses to the questionnaire. If you have already completed and submitted the questionnaire to us prior to receiving this postcard please accept our sincere thanks. Otherwise, please complete the questionnaire and submit it. Your participation in this study is very important to us.

The link to the survey is: [LINK]. Participation consent will be collected prior to beginning the survey.

Please direct any questions or concerns to Josie at jrudolph@iastate.edu or by calling (319) 430-0844.

Your assistance is greatly appreciated.

Sincerely,

Josie Rudolphi
Graduate Research Assistant

Dr. Michael Ratallick
Assistant Professor

If you have any questions about the rights of research subjects or research-related injury, please contact the IRB Administrator, (515) 294-4566, IRB@iastate.edu, or Director, (515) 294-3115, Office for Responsible Research, Iowa State University, Ames, Iowa 50011.

Final Contact Letter: Fifth Contact

Dear Agricultural Educator:

This is our final attempt to contact you and ask you to participate in a survey identifying the current practices and perceptions of Iowa agricultural educators regarding agricultural health and safety. Recently, a questionnaire was sent to you via email and a reminder postcard was mailed to you encouraging your participation. We have not yet received your response to the questionnaire. Please consider completing the instrument. Your participation in this study is very important to us.

The link to the questionnaire is: [LINK]. Participation consent will be collected prior to beginning the survey.

If you have already completed and submitted the questionnaire, please accept our sincere thanks. Otherwise, please complete the questionnaire and submit it. The following is the link to the questionnaire:

Please direct any questions or concerns to Josie at jrudolph@iastate.edu or by calling (319) 430-0844.

Your assistance is greatly appreciated.

Sincerely,

Josie Rudolphi
Graduate Research Assistant

Dr. Michael Ratallick
Assistant Professor

If you have any questions about the rights of research subjects or research-related injury, please contact the IRB Administrator, (515) 294-4566, IRB@iastate.edu, or Director, (515) 294-3115, Office for Responsible Research, Iowa State University, Ames, Iowa 50011.

APPENDIX D. OPEN ENDED SURVEY QUESTION RESPONSES

Question 9: What limitations do you face in teaching agricultural health and safety, if any?

- Age appropriate
- I have so few true ag students that I hate to waste everyone's time for just a few interested students.

Question 12: Do you have any additional thoughts or comments regarding agricultural safety and health?

- Very important that we continue to stress this topic.
- Everyone should teach safety as part of their curriculum, but time and resources are very limited."
- Would like to find one resource that covers all the areas mentioned in question 7."
- It would be nice to have updated materials available. I know the resources are out there, but there isn't a central location for the material.
- You often have to choose the amount of impact on students I am getting more and more students who have never been on a tractor but think animals a great so I might do animal safety and not tractor safety even though both are important. I have been teaching for five years and I have been surprised at the amount of first year teachers that do not stress saftey googles, not welding on closed containers, and wearing long sleeves while welding.
- It takes time. However, I do incorporate many safety issues with curriculum.
- I noticed in the Farm Bureau Spokesman that other chapters do Farm Safety Days in the spring while we have done ours in the fall season.
- What you teach for curricular units plays a big role in what you teach for safety.
- Any updated information on farm safety would be appreciated.
- Curriculum needs to be fun and exciting. Students need to actually SEE what can happen not just talk about it.

- You can never do enough.

- Time is my big issue. I teach safety in my shop so I feel all students can safely handle any situation which may arise and to relieve the liability to the school.

- There used to be great slide sets on PTO injuries, chemical accidents, tractor accidents, Anhydrous Amnonia burns and other ag injuries. I cannot find them anymore those gory videos anymore.

- WD School is located 4 miles from NECAS and we work closely with them on safety education.

- Safety is integral in the CASE curriculum. Stand alone units are good, but difficult to include every year. Safety IMO should be integrated throughout the curriculum. PPE in Greenhouse, etc.

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I am appreciative of the entire faculty and staff of the Agricultural Education and Studies Department at Iowa State University for their advice and assistance, always.

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Finally, to Dr. Retallick. Thank you for not always answering my questions, for not spearheading my conceptual framework, and not always offering your opinion. Your patience and questioning helped me understand and appreciate the research process and my research specifically. Thank you for the hours of meetings and responding to my thousands of emails. Without you this would not have been accomplished. Most importantly, thank you for suggesting I get my teaching license. I would have never imagined a single meeting could change my life— I've found my life's passion, and would never have done so without you.