PROBLEM

“Agriculture is one of the most dangerous industries in the nation. Each year, more than 2 million youth under the age of 20 are exposed to farm-related safety hazards. As a result, a significant number of young people are killed, injured or permanently disabled on farms in the United States,” according to the OSHA Youth in Agriculture webpage.

Lacking knowledge of safety regulations and personal safety practices at all experience levels puts workers at serious risk of debilitating injury or fatality. By developing students’ knowledge and awareness of safety in real occupational settings, we can begin to stop and prevent unsafe habits and practices from developing, while giving young workers a sense of independence and control over their own personal safety.

There is a clear lack of formal safety-related curricula that are easily accessible by agricultural educators to meet nationally accepted standards for teaching agriculture to youth. Educating youth about best safety practices helps them reduce the risk of injury and death. Reducing the risk of injury or death for these young people is a goal of Safety in Agriculture for Youth (SAY), as we develop a coordinated national approach to youth farm safety education.

MISSION

The major goal of this project was to develop a sustainable and accessible National Clearinghouse for agricultural safety and health curriculum for youth. The project builds upon several current and in-development curricula, projects, programs, and activities that together constitute a coordinated approach to national curriculum materials for agricultural safety and health for youth.

Led by safety experts in Penn State’s College of Agriculture Sciences, the Safety in Agriculture for Youth (SAY) project will serve as an umbrella for curricula, programs, activities, and expertise across the country, with an eye toward increasing safety and health knowledge and reducing hazard and risk exposure to youth on farms and ranches. Project team includes members from the following organizations: Penn State University, Ohio State University, Utah State University, University of Kentucky, and CareerSafe LLC.

By working together, we can be sure that young people in rural America have the opportunity to reap the many benefits of helping out on the farm, while also staying safe.

Tom Vilsack
U.S. Secretary of Agriculture
SAY PROJECT TEAM

Led by safety experts at Penn State’s College of Agriculture Sciences, the Safety in Agriculture for Youth (SAY) project serves as an umbrella for curricula, programs, activities, and expertise across the country. The project brought together experts from Penn State University, Ohio State University, Utah State University, University of Kentucky, and CareerSafe Online. The project team met weekly to monitor project activities to assure the project objectives were being met.

NATIONAL STEERING COMMITTEE

The National Steering Committee and three stakeholder groups helped identify content needs for the national curricula, developed a system to review curricula for alignment with nationally accepted educational standards, and helped to promote educational programs and products of the National Clearinghouse to stakeholder groups and target audiences. The National Steering Committee also developed a set of recommendations to USDA-NIFA that would assure continued development and sustainability of the National Clearinghouse.

- National FFA Organization
- U.S. Department of Education
- U.S Department of Labor
- NIOSH Ag Centers
- Agri-Services Agency
- U.S. Department of Agriculture - NIFA
- American Farm Bureau Federation
- National Children’s Center
- National Farmers Union
- National Council for Agricultural Education
- Agricultural Safety and Health Council of America
- Michigan State University
- Purdue University
- American Association for Agricultural Educators
- National Association of Agricultural Educators
SAY NATIONAL CLEARINGHOUSE

A major objective of the SAY project was to identify existing youth safety educational resources, determine alignment of these educational resources to national standards, and organize them in a single clearinghouse. Educators were asked to submit their agricultural safety curricula for review and inclusion in the SAY National Clearinghouse. Based on recommendations from the United States Department of Agriculture (USDA) to provide access to pertinent educational resources for youth farm safety, a process was established to determine alignment of these educational resources to the National Agriculture, Food, and Natural Resources (AFNR) - Career Cluster Standards (CS). A committee of Curriculum Alignment Advisors (CAAs) provided leadership to the alignment process. This group was comprised of six stakeholders that have experience as faculty members in agriculture education and are also familiar with AFNR Standards. The project team developed an online curriculum alignment tool (CAST) and created detailed instructions based on the final curriculum alignment rubric. There are currently 13 formal curricula and 7 other supporting resources on the National Clearinghouse.

CURRICULUM ALIGNMENT OF SAFETY RESOURCES

01 Connecting and enhancing existing educational resources

02 Develop a centralized location for relevant training and farm safety materials for formal (school) and non-formal settings

03 Develop a national strategy that will enhance awareness, access & utilization of farm safety materials by youth & educators

Developed a rubric by which educational resources will be compared to the Agriculture, Food, and Natural Resources (AFNR) - Career Cluster Standards

Identified curriculum and resources that aligns with national standards

Developed procedures/recommendations for categorizing resources in the SAY Clearinghouse

Pilot tested the CAST rubric with four existing educational resources
Small and family agriculture operations often recognize the value of safety training but have access to few outlets for training resources specific to their operation. There was a significant gap in opportunities to provide worker training programs that meet both industry and small farm safety needs. Youth seeking employment in agricultural occupations benefit in increased awareness of hazard identification, injury prevention, and worker rights. OSHA industry training programs are designed to increase workplace safety awareness and compliance; the benefits of a training program are immediate in that participants learn to recognize hazards and prevent injuries.

**Topic Modules**

- Introduction to OSHA
- Confined Spaces
- Safety Around Animals
- Fire Prevention & Protection
- Electrical Safety
- Personal Protective Equipment
- Tractor Safety
- Hazardous Communications
- Machine Guarding including Caught-In/Between, Struck-By, & Materials Handling
- Safety & Health including Ergonomics and Weather Stress
- Walking Working Surfaces including Fall Protection
- Emergency Action including Exit Routes

**Instructor-led: Ohio State University**

The Ohio State University OSHA 10-Hour General Industry (Agriculture) instructor-led safety training is designed to provide entry-level workers and employers with the ability to recognize, avoid, and prevent safety and health hazards within the agricultural industry. In 2015, OSU pilot tested this safety course to high school agricultural students in their classrooms. Like the online course, students that successfully complete the course will receive an industry recognized OSHA 10-Hour General Industry credential.

**Online: CareerSafe**

CareerSafe® is the country’s leading provider of online OSHA safety training specifically designed for youth. In September 2014, CareerSafe launched the online OSHA 10-Hour General Industry (Agriculture) training course. Using only private funds, CareerSafe worked with the OSHA Training Institute to develop an OSHA 10-Hour training designed specifically for young workers in agriculture. The initial pilot of the course was launched with support from the National FFA Organization and has now been implemented in 40 states with over 5,000 students enrolled.
RISK ASSESSMENT PROTOCOL & PRACTICES

As an educator and former high school agriculture teacher - I believe we have the responsibility to adolescents that we teach and supervise....to educate them about the risks involved with agriculture, but to also teach them about the safety that comes along with working in this industry. I believe we are taking the necessary steps with this piece of the project, to bring awareness of safety and risk assessment to school-based agricultural education, particularly with the SAE component, where we can continue to have a proactive approach to student safety and experiential learning.

Rebecca Lawyer
Assistant Professor of Agricultural Education at University of Utah State

A supervised agriculture experience, or SAE, is an experiential learning component of the School-Based Agricultural Education Program. It can be anything from raising livestock for your school farm or at your home, working on the family farm, teaching kids about agriculture, working at a feed store, and many others. There are four types of SAE projects:

- Placement
- Entrepreneurship
- Agriscience Research
- Exploratory

Students are at an impressionable age when safety practices must be understood and enforced by peers, supervisors, and adults involved in their SAE. Exploratory

Agriculture is one of the most dangerous industries in the nation. Youth involved are at a high level of risk for accidental injury while working on farms or ranches.

The three phase assessment includes:

- The opportunity to conduct a pre-work assessment
- An opportunity to assess safe working conditions
- Generate an injury preparedness plan

An analysis of state level safety policies and procedures designed for school-based work experience programs was conducted to identify safety best practices for supervised agricultural experiences. The best practices identified have been integrated into the SAE risk assessment protocol that has been developed by adapting the Haddon Matrix for intervention development and Safety Guidelines for Hired Adolescent Farm Workers created by the National Children’s Center for Rural and Agricultural Health and Safety. The SAE risk assessment protocol assists teachers, parents, employers, and students in clearly defining the potential injury risk of a supervised agricultural experience, and implementing supervision interactions that are expected and/or defined. Three state, one regional and one national level workshops were presented to agriculture teachers to introduce the SAE risk assessment protocol.

Safety can be easily integrated into pre-existing practices and content.

01

02

03

04
The overarching goal of this grant objective was to provide guidance on the development of a database of exam items (test questions) to satisfy the testing component of the Department of Labor (DOL) regulated Agricultural Hazardous Occupations Orders (AgHOs) tractor and machinery certification programs. Based on literature, the proposed steps to preparing items (questions) for use in a database include: (1) Review existing items for content and format, and (2) Review alignment of existing items to learning outcomes (objectives, competencies, etc.) and standards (national, state, local, etc.). Below is a diagram that more fully explains how to review existing exam items.

Avoid options that give clues to the correct answers, and make distractors plausible

Place main idea in the stem, not the choices

Format items vertically, instead of horizontally

Avoid negative word such as ‘not’ and/or ‘except’

All/None of the above should be used sparingly

Place items in logical or numerical order

Vary the location of the correct answer

Edit items for clarity, grammar, punctuation, capitalization, and spelling

Avoid opinion-based and trick items

Base items on important content to learn

Avoid options that give clues to the correct answers, and make distractors plausible

Figure 1. Exam Item that is Poorly Aligned to a Competency

Example: How well does competency 1.6 align to test item 1.6.1?

1.6 Identify at least five of the following characteristics of youth that cause them to be at greater risk of injury while performing farm/ranch work.

• Knowledge of hazards
• Experience
• Endurance
• Coordination
• Maturity

1.6.1 Special instructions for towing heavy loads can be found in a tractor operator’s manual.

A. TRUE
B. FALSE

Degree of Alignment

1 2 3

Example from the Gearing Up for Safety curriculum

Figure 2. Exam Items with Medium Degree of Alignment to a Standard

Example: How well does AFNR standard CS.06 align to test item 44?

CS. 06.02.01a - Use proper safety practices/personal protective equipment (PPE)

What personal protective equipment (PPE) is recommended when you see this symbol?

A. Cowboy hat
B. Bump cap
C. Hard hat
D. Ball cap

Degree of Alignment

0 1 2 3

Example from the National Safe Tractor and Machinery Operation Program

This level of analysis can help answer the question “is the assessment tool (test/quiz) measuring what ‘I’ (curriculum developer/instructor/subject matter expert) believe is important for the students to know?” This methodology will ensure the learner is being tested on the most pertinent information, identify gaps in testing, and document alignment to learning outcomes and standards.

Future research is needed to determine what types of assessment tools (exams, worksheets, etc.) instructors are using and what additional resources are needed to support teaching agricultural safety and health content. This information would guide specific functionality and features of an accessible exam.
Scenarios were developed for three common farm hazards: tractor rollover, Power Take-Off (PTO) entanglement, and tractor run over. The guided experience includes preventative actions, unsafe actions, and injury outcomes for each scenario, and the student has the opportunity to repeat the activity to experience both positive and negative consequences.

The next steps are to complete user testing with 4-H groups in the target demographic, reiterate based on their feedback, and begin development of a version using the Unity game engine. The eventual goal is to make this experience available as a single-user standalone learning game for PC.

The project explored the potential of immersive 3D to capture the interest of young people learning about agricultural workplace safety. Using the latest in 3D virtual reality technology, such as the Oculus Rift and the Unity game engine, SAY will be positioned on the intersection of experiential learning and games for education.

LuAnn Phillips
Virtual Worlds Specialist

Virtual reality brings Cooperative Extension education to life in immersive and interactive learning environments. These 3D experiences engage learners more deeply and teach in ways not possible in the physical world.

The SAY project developed a prototype of an interactive 3D farm safety learning activity geared toward youth ages 13 to 15. The environment is accessed using a computer and high-speed Internet connection. The student interacts with the content using an avatar, a personal representation of oneself.

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Post-test vs. pre-test:
2D - 52% improved
3D - 86% improved

3D learning increased pupil attention from 50% to 94%

86%

85%

94%

92%

86%

94%

3D learning increased pupil attention from 50% to 94%

85%

92%

Of children prefer to learn by seeing and doing
Of students paid attention during 3D lessons compared to 46% in traditional learning environment

The National Youth Farm and Ranch Safety Symposium was held on October 27-28, 2014 in Louisville, KY. Professionals from many disciplines and interest areas came together to discuss the topic of safety for youth working in agriculture. The goal of the symposium was to develop a national strategy to enhance awareness of, access to, and utilization of farm and ranch materials by youth and adults who instruct and/or work with youth.

The opening session explored the U.S. history of regulating youth for agricultural employment as well as milestones of coalition work over 3 decades on this topic. Plenary sessions offered opportunities to learn and discuss how the modern farm structure allows for safe youth employment opportunities; how parents and/or employers determine when youth are ‘ready’ to work in agriculture; and if age is the best indicator for prescribing farm chores, or are there other ways to measure competency for task performance.

The symposium culminated by revealing a newly created National Clearinghouse of educational resources for teaching agricultural safety to youth. 100% of the participants felt that the symposium addressed the latest developments in agricultural safety for youth and that it provided networking opportunities that otherwise would have not been made.

The Symposium initiated a conversation that will continue to be discussed by key stakeholders and agricultural organizations.

“This eclectic gathering of stakeholders started the conversations about how teens can be safely involved in agriculture. There is no secret that young workers are highly involved in America’s farms and ranches; the topic for discussion is how to maintain their safety while they learn responsibility and develop occupational skills.”

S. Dee Jepsen, PhD
Associate Professor, Department of Food, Agricultural & Biological Engineering at The Ohio State University

“Really helped clear up some understanding of current laws and curriculum needs for ag classrooms.”

“The diversity of backgrounds among the speakers and attendees to get a well rounded view of the issue.”

“There was a lot of great information. Great job to the Steering Committee and organizers for a great symposium.”

“Enforcement agencies can play a key role in helping to implement the educational outreach goals of the symposium by incorporating the endeavor into the schools and youth programs.”

“Overall, it was a great symposium with great topics. I think that the two day session was way too short. It was over so fast!”
ACCOMPLISHMENTS

Through a two-year collaborative process, efforts were made to improve and increase youth safety education resources. The Safety in Agriculture for Youth (SAY) project has developed a sustainable National Clearinghouse of safety and health curricula, programs, activities and resources. Several educators have submitted their curricula and resources aligned to AFNR Career Cluster Content Standards. The OSHA training program enrolled over 5,000 young workers where the students received their industry recognized 10-Hour General Industry credential. The SAY project has also developed a risk assessment protocol for teachers, students, employers or parents to apply when planning supervised agriculture experiences (SAE’s) for students. These resources are invaluable to creating an environment of safety for youth.

Through the support and commitment of the individuals and groups from our national steering committee, these collaboratively-developed resources are invaluable in creating an environment of safety for youth, but our work is not over. We are committed to combating youth injuries and death statistics and establishing a supportive and impactful community within the agricultural industry. With more than 2 million youth under the age of 20 exposed to agriculture production and business related hazards every year, reducing the risks of this age group is of great importance to educators, businesses and industries alike. As long as one young person is at risk, we are dedicated to the safety and education of youth in agriculture.

Dr. Dennis Murphy
Nationwide Insurance Professor of Agricultural Safety and Health
Penn State University