# A Multi-State Evaluation of Agricultural Safety Learning through Secondary Students' Supervised Agricultural Experience Journal Entries

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## HIGHLIGHTS

- Five annual training topics were: Year 1) Tractor/Equipment Roll-Over Hazards, Year 2) ATV/UTV Operation Hazards, Year 3) Tractor/Equipment Operation Hazards, Year 4) PTO/Entanglement Hazards, and Year 5) Agricultural Machinery Transport Hazards Associated with Use on Public Roadways.
- To assess the influence of agricultural machinery safety training, student work-based, journal reflections were collected through the Agricultural Experience Tracker to qualitatively describe their production-based agricultural experiences.
- Most student journal entries focused on machinery operations.

**ABSTRACT.** *The Supervised Agricultural Experience Safety Award program was launched with Montana, Utah, and South Dakota agriculture teachers. A combination of video conferencing and in-person training workshops were offered to school-based agriculture teachers in Montana, Utah, and South Dakota. Zoom webinar workshops were held with teachers during the COVID-19 pandemic. The five annual training topics included: Year 1) Tractor/Equipment Roll-over Hazards, Year 2) ATV/UTV Operation Hazards, Year 3) Tractor/Equipment Operation Hazards, Year 4) PTO/Entanglement Hazards, and Year 5) Agricultural Machinery Transport Hazards Associated with use on Public*

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*Roadways. To assess the influence of agricultural machinery safety training, students' journal reflections were collected through the Agricultural Experience Tracker. Students' production-based agricultural experiences were coded by USDA National Agricultural Statistics Service (NASS) Commodity Codes, describing students' safety reporting using Supervised Agricultural Experience (SAE) journal entries, and quantifying teachers' workshop participation. A total of 2,257 journal entries were reviewed from Montana, Utah, and South Dakota. A total of 760 unique student journal entries were associated with a teacher participating in the training program. Most student journal entries focused on machinery operations. A total of 49 journal entries specifically reported safety. A total of 203 journal entries recorded the use of tractors. A total of 160 agricultural production work entries (38.8%, n = 412) noted crop production as the agricultural production work experience. The results provide recommendations for developing an application model for translation using an FFA award structure.*

***Keywords.*** *Education, Journaling, Machinery, Safety, Tractors, Training, Youth.*

The agriculture industry continues to have the highest worker fatality rate (19.5 per 100,000 workers) of all other industries (U.S. Bureau of Labor Statistics [BLS], 2022). Even more concerning data predictions are noted in the National Children's Center (2022) fact sheet, which reported that between 2011 and 2020, agriculture had the highest number of occupational fatalities for youth ages 17 and younger. Youth injuries and fatalities in production agriculture continue to be a significant public health concern (National Institute for Occupational Safety and Health (NIOSH), 2014). The USDA NIFA funded Youth Farm Safety Education and Certification (YFSEC) program has funded two major curriculums, Gearing Up and the National Safe Tractor and Machinery Program (NSTMOP), to address Federal Labor Regulations involving youth in agriculture. However, the Tractor and Machinery Certification (TMC) program came under review with proposed revisions in 2011 (76 Fed. Reg. 171, 2011). In the 2011 proposed rule change, it was reported that research documenting the impact of tractor and machinery youth certification programs was limited (NIOSH, 2002). With a refocus on youth farm safety, USDA NIFA funded SAY projects generated a greater repository of multiple safety curriculums with increased visibility, access, and curriculum standard alignment. Career and Technical Education (CTE) is one way to continue to develop students' safety skills. Within CTE, students can learn within the classroom and in laboratory settings. Love et al. (2022) found that CTE safety practices and factors correlate significantly with decreased accident occurrences. A Wisconsin study (Wilkinson et al., 1993) found youth who had completed a training program reported an increase in usage of tractors equipped with roll-over protection structures. Bush and Andrews (2013) noted the immense variation between states' career and technical education program structures, resulting in integration discrepancies among occupational safety and health curricula. As a major branch within career and technical education, school-based agricultural education prepares students for employment related to the agricultural industry. Students within school-based agricultural education (SBAE) programs may participate in supervised agricultural experiences (SAE) (National Council for Agricultural Education [NCAE], 2015), where they are provided work-based learning opportunities. This has been documented for secondary agricultural education programs, as researchers have reported variation in safety programming and student training (Lawver et al., 2024; Mann and Jepsen, 2019; Pate et al., 2016).

Conceptually, SBAE curriculum standards focus on developing career skills, such as agricultural safety, as they prepare for future career opportunities (FFA, 2022). As part of a complete agricultural education program, numerous studies have documented SAE benefits (Camp et al., 2000; Lewis et al., 2012; Moules, 2013; Rubenstein and Thoron, 2014), especially in the development of technical skills and workplace behaviors. A study conducted by Mann and Jepsen (2019) found students most frequently completed SAEs in the areas of livestock production, agricultural mechanics, home and/or community development, and crop production. In these SAEs, students often engaged in tasks associated with ATV/UTV operation, tractor operation, and assisting tractor operation as part of their SAE. Pate et al. (2016) found a disparity between required safe work habits and the types of hazardous tasks students should be allowed to complete alone while participating in SAE activities. Most teachers in this study agreed to allow students to operate equipment and machinery alone. However, while students may exhibit greater confidence in operating procedures because of safety training, this does not always translate to a reduction of unsafe behaviors (Carraba et al., 2000).

NIOSH (2002) noted that "[t]he effectiveness of tractor safety training programs has not been adequately evaluated nationwide." Jepsen (2012) reported the impact of the TMC program is linked to implementation efforts of community-based instructors and emphasized that program evaluation efforts are daunting due to a variety of community-based implementation factors. There is a significant need for research examining safety training experiences and workplace behaviors among youth working in agriculture, as the availability of data directly from this group is limited. With only a handful of research studies prior to 2013 (Carraba et al., 2000; Jepsen, 2012; Wilkinson et al., 1993), a closer and more thorough examination of youth tractor and machinery safety training outcomes is needed.

A unique data source to examine safety training and workplace exposures has been identified through students' SAE reflection journaling. The Agricultural Experience Tracker (AET) is an online data management system tool for managing time and financial resources associated with SAEs. Since July 2022, the AET has had over 600,000 students nationwide access the platform (AET, 2023). Within the AET platform, participants have the opportunity to complete an agricultural safety knowledge exam as well as document experiential learning (journaling) related to the Agriculture, Food, and Natural Resources (AFNR) Curriculum safety standards identified by the Safety in Agriculture for Youth Curriculum Clearinghouse (Fetzer, 2022). Recent research has focused on "train the trainer" approaches to increase safety knowledge and awareness of secondary agriculture teachers and subsequent students (Perry et al., 2020). This research culminated in recommendations that additional research should focus on the effects of youth background and safety measures performed as part of SAEs (Pate et al., 2019; Perry et al., 2020).

# Purpose and Objectives

Recognizing the lack of research to document agricultural youth application of safety training within work-based learning experiences, the purpose of this project was to assess high school agricultural education youth work-based learning experiences related to safety. Specific objectives included:

1. Qualitatively describe students' production-based agricultural experiences.
2. Describe students' safety reporting using SAE reflection journal entries.
3. Determine the association between teacher participation and student safety journaling.

# Materials and Methods

## Sample

The target population consisted of high school agricultural education youth from Montana, Utah, and South Dakota. Specific inclusion criteria were that students must have utilization of the AET agricultural journal feature between the dates of 2017 and 2022, which resulted in 2,257 student cases. Teachers and students were assigned a unique case identification number for data analysis. For students with multiple journal entries during a specific year, entries were aggregated so that the qualitative content of multiple entries was analyzed under one statement. For example, a student who completed three journal entries in 2017-2018 was counted as one entry for analysis for that year. Students are allowed to repeat their participation in an SAE for multiple years during their high school enrollment. Entries entered by the same student for different years were counted separately. For example, a student would enter a journal entry in 2018 and then enter a new entry for their SAE in 2020 and would be counted as two entries. After reviewing and documenting students who submitted an SAE journal entry during multiple years, a total of 416 student cases were identified who had made a journal entry for multiple years between 2017 and 2022. The final count of unique individual student cases was 1,841 from 2017 through 2022.

## Teacher Training

The Agricultural Safety Education Initiative was first conducted in the summer of 2017 and organized around the National Safe Tractor and Machinery Operations Program (NSTMOP) Curriculum (Pate et al., 2019). Training was offered each summer, with the final offering ending in 2021. Each seminar focused training activities on a specific safety theme. The safety themes each year were as follows:

- 2017 – tractor stability and roll-over protection
- 2018 – all-terrain/utility vehicle stability and operation for agricultural tasks
- 2019 – hitching/backing tractors and agricultural implement connections
- 2020 – power take-off guarding and safe operation
- 2021 – agricultural equipment transport on rural roadways and safe trailering practices

A combination of video conferencing and in-person training workshops was offered to school-based agriculture teachers in Montana, Utah, and South Dakota. Zoom webinar workshops were held with teachers during the COVID-19 pandemic. A total of 11 in-person training workshops were offered to teachers. Four online Zoom webinar workshops were held with teachers during the COVID-19 pandemic. A total of 28 teachers attended four or more workshop offerings. In-person workshops were offered to 176 unique teachers over the course of five years. The agricultural machinery safety curriculum continues to be provided via online training and video tutorials on The Agricultural Experience Tracker (www.theaet.com).

## Student SAE Programming

A supervised agricultural experience safety award program was launched in 2018 with Montana, Utah, and South Dakota teachers. Each year, project leaders collected applications from students for the SAE safety awards. Awards were presented during each state FFA conference as part of SAE recognition efforts. A total of 26 student submissions of the SAE risk assessment form were collected. A total of eight SAE Safety Awards were presented during state FFA conferences for Montana, Utah, and South Dakota.

**AET Data Collection**

Due to the use of pre-existing de-identified data, a non-human subjects determination certificate was submitted and approved under South Dakota State University Institutional Review protocol # 11426. An AET data request was submitted for de-identified student journal entries tagged under the AFNR standard Power, Structural, and Technical Systems performance indicators:

- AFNR 01.02: Apply physical science and engineering principles to design, implement, and improve safe and efficient mechanical systems in AFNR situations, and
- AFNR 02.02 Operate machinery and equipment while observing all safety precautions in AFNR settings.

Journal entries were pulled by year (2017−2018, 2018−2019, 2019−2020, 2020−2021, 2021−2022). Student journal entries were written text-based entries. Written entries were qualitatively reviewed to identify production-based experiences. Each entry was coded by NASS commodity codes to describe the type of production-based agricultural experiences. For production-based experiences, entries were grouped by themes, which included "Machinery," "Livestock," or "Crop/Plant." A secondary code was used for journal entries that did not align with a NASS commodity code. Categories coded for non-production entries were "machinery related," "livestock related," "non-agricultural business related," or "crop/plant related." Coding themes were based on the activities described by students.

Each entry was coded for the following variables:

- (yes/no) teacher participation in a safety training workshop
- (yes/no) student mention safety in their journal entries
- (yes/no) agricultural machinery (e.g., forklift, skid-steer, tractor, rake, baler)
- (yes/no) livestock (e.g., cattle/beef/calves, swine/pigs, horses, sheep/lambs, turkeys/poultry)

Any journal entry coded for safety received an additional coding for:

- (yes/no) safety basics
- (yes/no) agricultural hazards
- (yes/no) tractor
- (yes/no) connecting implements
- (yes/no) materials handling equipment

# Results/Findings

Table 1 provides a summary of the sample characteristic results from the qualitative analysis. There were 28 teachers who participated in the training program between project years four and five. A total of 2,257 student journal entries were reviewed between 2017 and 2022. The highest proportion of unique journal entries ($n$ = 1,841) were represented by Utah (47.4%, $f$ = 872). As a limitation, this could be a function of teacher adoption within each state. AET is not required to be used by states for student record keeping but provides a seamless integration with students' FFA degree and proficiency applications. Results are organized by research objective.

**Qualitatively Describe Students' Production-Based Agricultural Experiences**

The characteristics of AET student journal entries provided general insights into the projects that students were completing as part of their projects. A limitation of this study is students self-selected the AFNR curriculum standard to align with their journal entry.

**Table 1. Characteristics of AET Student Journal Entries between 2017 and 2022.**

| | | *f* | % |
|---|---|---|---|
| Distribution of Unique Students by State (n = 1,841) | Montana | 604 | 32.8 |
| | Utah | 872 | 47.4 |
| | South Dakota | 365 | 19.8 |
| Agricultural Production Work Experience Cases (n = 2,257) | Yes | 444 | 19.7 |
| | No | 1813 | 80.3 |
| Unique Students whose Teacher Participated in Training (n =1,841) | Yes | 760 | 41.3 |
| | No | 1081 | 58.7 |
| Distribution of Teachers[a] trained by State | Montana | 16 | 57.1 |
| | Utah | 7 | 25.0 |
| | South Dakota | 5 | 17.9 |

[a] Teachers who participated four to five years in the training program.

Only journal entries that were categorized as Power, Structural, and Technical Systems performance indicators were included:

- AFNR 01.02: "Apply physical science and engineering principles to design, implement, and improve safe and efficient mechanical systems in AFNR situations," or
- AFNR 02.02: "Operate machinery and equipment while observing all safety precautions in AFNR settings."

### *Agricultural Production-Based Work Experiences*

Fewer than a quarter (18.3%, $f = 412$) of all student entries ($n = 2{,}257$) provided enough details to code as agricultural production work experience. Each entry was classified using National Agricultural Statistics Services Production Codes. These codes were collapsed into "Non-Agricultural," "Crop Production," Livestock (Beef/Swine/Goats/Sheep), Orchard or Specialty Crop, Hay/Alfalfa, Poultry, and Equine. Table 2 provides an overview of the descriptive statistics for production experiences entered by students.

Based on the tasks and activities described by students in these production-based experiences, work was coded as "machinery" (71.6%, $f = 295$), "livestock" (17.5%, $f = 72$), or "crop/plant" (10.9%, $f = 45$). Of the 295 production-based work experiences classified as "machinery," over half (58.6%, $f = 173$) were recorded during the 2019−2020 academic year or the 2020−2021 academic year. Summer teacher workshop themes were "hitching/backing tractors and agricultural implement connections" (summer 2019) and "power take-off guarding and safe operation" (summer 2020). Example activities completed by students include moving equipment, equipment repairs, changing implements, planting, loading hay, feeding livestock, equipment maintenance, fabrication/modification for equipment, spraying, and harvesting crops. Examples of student journal entries for production-based projects are provided as follows:

- *My responsibilities continue to grow. I now am servicing the balers and rakes. It makes for a long day when raking in the morning and servicing the equipment and baling in the middle of the night. While I am tired, I am learning a lot.*
- *I drilled in some alfalfa seed in one of our fields.*
- *This week I raked and baled hay all week. I had some bad luck and blew 2 rake tires. My tractor also continued to overheat. I learned to assess machinery to problem solve and learned how to blow out vents and the radiator on the tractor. I also learned how to change a tractor tire and tires on the rake.*
- *Loaded 90 head of cattle into 2 cattle pots, fed cattle, and hauled manure.*

**Table 2. Frequency and Percentages of Production-based Entries ($n$ = 412).**

| Category | *f* | % |
|---|---|---|
| Crop Production | 160 | 38.8 |
| Livestock (Cattle, Swine, Goats, Sheep) | 120 | 29.1 |
| Hay/Alfalfa | 99 | 24.0 |
| Equine | 15 | 3.6 |
| Poultry | 14 | 3.4 |
| Orchard or Specialty Crop | 4 | 1.0 |

### *Non-Agricultural Based Work Experiences*

There were 1,845 (81.7%, $n$ = 2257) entries coded as non-agricultural production due to either limited information given in the student's response or the entry not containing key production terms associated with NASS production codes. These entries were coded using a secondary theme based on activities described by students. The coding themes that emerged were "machinery related" (43.4%, $f$ = 801), "livestock related" (0.2%, $f$ = 3), or "non-agricultural business related" (56.4%, $f$ = 1,040). Examples of student journal entries are provided as follows:

- *Today I tried to get the truck to start so I put a battery jumper on it let it sit and charger for a couple hours trying in between to get it to start. I got it to start at 5:40 then I put everything away and got in the truck and drove it around the feedlot then it died on me and I found out the alternator didn't work in it.*
- *Took the top end of the engine apart and unseized the motor and i cleaned up the heads and the valve train and I hound the cylinders and put new head gaskets on it and New fuel lines and valve cover gaskets and exhaust manifold gaskets*
- *This weekend, my dad and I continued sandblasting and sanding my pickup. He sandblasted the whole outside of the pickup bed, and I did some on the bed, but I also start sandblasting my frame. I will need to sandblast the entire frame to remove surface rust, and then I plan on undercoating my entire frame. This is a big undertaking, but I want to do this right.*
- *Worked in the shop, following all safety rules and precautions.*
- *Learning to … run mills and maintain proper working orders. Cleaning new machines, and greasing gears. We also took three safety tests. [T]he tests consists of horizontal saws, and round belt sanders.*
- *… I reached my goal of taking care of yard maintenance issues like mowing, weed eating, trimming bushes and trees, cleaning up debris and laying out mulch around our shed. I started a mint plant from a very small seedling and maintained it throughout the whole summer and now we use it in our lemonade…. I also learned how to build and fence, mix the cement, problem solve and build a gate for the first time. I also added some praying mantises to our apple tree to protect it from harmful insects. I used a bush trimming power tool for the first time.*

## Describe Students' Safety Reporting Using SAE Reflection Journal Entries

From all 2,257 entries, few (2.1%, $f$ = 47) noted safety as an aspect of their work-based experience. There were nine agriculture production-related entries and 38 non-agricultural production entries that noted safety related activities. Of the 47 journal entries noting safety, two-thirds (68.1%, $f$ = 32) were coded as "Safety Basics" as described under the NSTMOP minimum core content areas (MCCA). Approximately 4.3% ($f$ = 2) addressed "The Tractor" as identified under the NSTMOP MCCA. The NSTMOP MCCA "Materials

Handling" was associated with eight student entries (17.0%). NSTMOP MCCA "Agricultural Hazards" was associated with less than five percent ($f = 2$) of entries noting safety. NSTMOP MCCA "Connecting and Using Implements with the Tractor" was associated with less than five percent ($f = 3$) of entries noting safety. Most journal entries (61.7%, $f = 29$) associated with safety occurred during project year 2020−2021. Examples of student journal entries reporting safety are provided as follows:

- *The past few weeks I spent time helping my dad with harvest. I learned how to change the sickles on the combine header. I learned how to be extra safe because when I was 6 years old I cut my finger off trying to fix the headers.*
- *The professor came out and did h[is] supervised visit. He observed [m]e operating equipment and then I filled out a form regarding safety.*
- *Follow safety procedures as outlined by company safety program and operator manual for forklift. Maintain a current forklift operator's license.*
- *Today I got a lesson on how to drive the tractor safely and harrowed an entire field. He said that each pile of cattle manure is worth about 85 cent[s] of fertilizers. We also briefly discussed how different crops return and take different amount[s] of minerals such as Nitrogen, Carbon, Phosphorus, Calcium 'etcetera'.*
- *I took my OSHA training and learned how to stay safe in the workplace while also operating machinery and other tools*
- *[W]e started are chapter in tractor safety each person rode the little tractor in a course.*

**Determine the Association Between Teacher Participation and Student Safety Journaling**

Teachers who participated in training workshops provided their school's FFA chapter number that linked to students' AET journal entries. Approximately 41.2% ($f = 930$) of the 2,257 student journal entries were associated with a teacher who participated in the Agricultural Safety Education Initiative training workshops.

Of the 930 entries associated with a trained teacher, a total of 12 (1.3%) of those entries were coded as associated with safety. One entry noted the safety of the animals (horses) regarding the reason for fence repair as the primary goal of the project activities.

Twelve journal entries were linked to a participating teacher and included direct references to safety. These entries were coded using the NSTMOP Minimum Core Content Areas (MCCA). Most entries (44.4%, $n = 12$) aligned with the "Materials Handling Equipment" content area, followed by "Safety Basics" (25.0%). Single entries were also coded as "Agricultural Hazards," "The Tractor," and "Connecting and Using Implements with the Tractor." Examples of student journal entries that mention safety and were connected to a trained teacher are provided as follows:

- *Grain was moved into storage by an auger or conveyor. When starting the operation in the morning all equipment is greased and fluids are checked to maximize the life of the equipment. Made grain bin sump covers to prevent grain from plugging sumps. [T]he covers help with safety because a person should not have to get in the grain to unplug the sump.*
- *I learned how to drive the new case 570 bucket loader safely and effectively. I also learned and did the preventative [maintenance].*

There were seven non-agricultural entries that were associated with a teacher who participated in the training program and noted safety. "Safety Basics" (42.9%, $f = 3$) and

"Materials Handling Equipment" (42.9%, $f = 3$) were the most noted in student entries. Only one entry (14.3%) noted "Tractor Safety."

A 2x2 chi-square test of association was used to determine the association between teacher participation and safety entry. For agricultural production entries ($n = 412$), a Fisher's Exact Test was used due to one cell having an expected cell count less than five. There was no statistically significant association between teacher participation and safety ($p = .298$). For non-agricultural entries ($n = 1{,}845$), there was a statistically significant association between teacher participation and safety ($\chi^2$ (1) = 9.010, $p = .003$). There were 31 entries noting safety associated with a teacher who did not participate in the training, while seven entries noting safety were associated with a teacher who did participate in the training.

# Conclusions/Discussion/Recommendations

This translational pilot project demonstrated the value of training teachers and the capacity to transfer agriculture safety knowledge and skills to their students' work-based learning reflections. Based on these qualitative findings from student journals, more is needed to positively reinforce students to reflect directly on workplace safety skill development. A founding principle of supervised agricultural experiences is the application of skills training in workplace settings outside the classroom. An important component of this relies on community partners for workplace opportunities that will host students in these experiences. With two percent of students' journal entries reflecting a focus on safety practices, we recommend either teachers or state educational departments make safety mentoring by supervisors/parents a core reflection requirement for work-based learning experience in agriculture. In this sample, we note that few supervised agricultural experiences represented production-based activities. This may be a function of lower opportunities for students to participate in production-based experiences due to the decline of farms within the United States (Whitt et al., 2023). The significant association with teachers who did not participate in the training and students' reflection on safety might be influenced by the attitude of the SAE mentor/supervisor. Sanderson et al. (2010) concluded that youth develop as farm apprentices by observational learning and modeling of parents. Sanderson et al. discussed that participants described exposure to hazardous activities but assumed they had the capacity to control the risks and farm safely. More research is needed to assess the impact of supervisors/parents who promote safety skills on students' reflection of safety skill development as part of their SAE programming.

We recognized that the use of virtual classrooms and other technology to share training materials and content could enable the project's impact to reach more students across the United States. As part of the SAE safety award program, the supervised agricultural experience risk assessment tool has been shared with the Department of Education: Agricultural Education Division within Career and Technical Education. Project activities have been shared with State FFA associations for Montana, Utah, and South Dakota. Currently, the National SAE for All initiative hosted by The National Council for Agricultural Education has incorporated the risk assessment documents within student record keeping. These documents have been shared through teacher in-services at local, regional, and national conferences. The SAE safety curriculum materials are hosted on the USDA-NIFA funded Safety in Agriculture for Youth Clearinghouse, which is publicly available through eXtension.org.

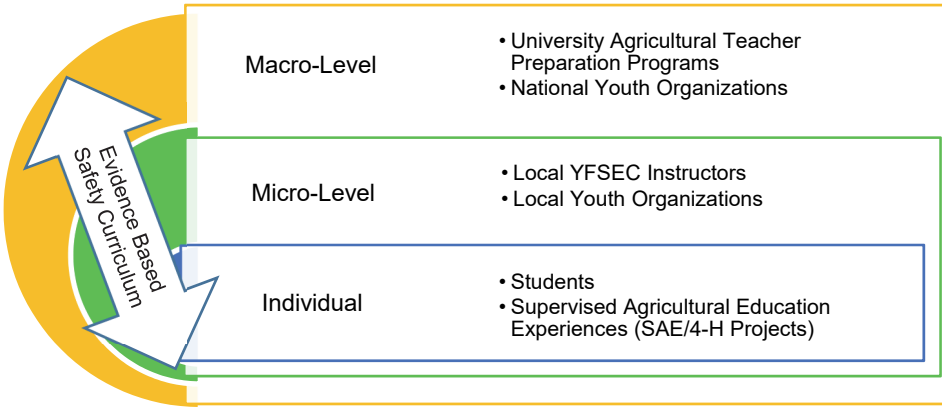


**Figure 1. Agricultural Safety Education Initiative Model.**

As part of the High Plains Intermountain Center for Agricultural Health and Safety Center and the USDA NIFA Youth Farm Safety Education and Certification Program, members of the project team have developed an innovative professional development program to help SBAE teachers improve youth safety knowledge and increase the safety of work environments that employ young agricultural workers. This model (shown in figure 1) utilized social spheres of influence to promote safety improvement through individualized supervised agricultural experiences. A key component of this model is the implementation of evidence-based safety curriculum in each sphere of influence, considering local needs.

The project was delivered through the Agricultural Experience Tracker (AET) online tool to accommodate teachers' needs to deliver student training at a distance. The Agricultural Safety Education Initiative was introduced in the summer of 2017 and organized around the National Safe Tractor and Machinery Operations Program (NSTMOP) Curriculum (Pate et al., 2019). Pate et al. (2019) initially found teachers' ($N$ = 116) average NSTMOP scores increased significantly after participation in the program ($t(109) = 11.9$, $p < 0.001$). This ongoing project has documented that instructors who continued participation in the training program over multiple years showed improvement in their tractor and machinery safety knowledge (Lawver et al., 2024). Over 15,000 students from across the U.S. have participated in the AET online tool. A larger focus should be placed on safety within any type of SAE experience. Safety is a life skill for students, and it should become a focus for any work-based experience. This effort can be facilitated with higher levels of social influence by connecting National FFA with State FFA associations to incentivize active agricultural instructors as well as university teacher preparation programs in preparation on safety skill development. Key assets will be the requirement of safety mentoring from supervisors/parents and student reflection on their safety skill development. We recommend yearly teacher professional development for each state to focus a sustained and sequential effort on student safety skills with sustained community stakeholder partnerships to facilitate a culture of SAE safety.

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