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Agricultural Safety Education: Formative Assessment of a Curriculum Integration Strategy

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Abstract

The purpose of this study was to assess an agricultural tractor and machinery safety curriculum for teacher training that focused on hands-on integration activities to assist with training youth in machinery safety skills. Teachers attended a single ten-hour summer training seminar hosted in Montana, South Dakota, or Utah during 2017. Teachers completed the National Tractor and Machinery Safe Operation (NSTMOP) exam to measure their existing knowledge prior to beginning the training. Upon seminar completion, teachers took an NSTMOP post-test to measure their knowledge gain of agricultural safety practices and hazard recognition associated with machinery and tractors. A total of 116 teachers completed the training. Fifty-three participants (45.7%) identified as female, and 63 (54.3%) identified as male. The average participant was 35 years old (SD = 11.3) and had 9.5 years of teaching experience (SD = 9.2). The average NSTMOP pre-test score was 35.2 out of 48 (SD = 3.3), and the average NSTMOP post-test score was 40.3 out of 48 (SD = 4.1). Participants' scores increased by ten percentage points. A paired-samples t-test was used to determine statistical significance. The difference between pre-test and post-test was significant ($t(109) = 11.9$, $p < 0.001$). Open responses indicated continuation of hands-on activities that focused on "how to teach" skills training that is relevant to the students. Teachers suggested developing new activities each year with a rotation of topics for upcoming seminars. Research is needed to determine the training's influence on the behaviors of young workers in agriculture.

Keywords

Education; Machinery; Safety; Tractors; Training

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Introduction

Youth workers (ages 14 to 18) in agriculture are highly vulnerable to agricultural machinery hazards (Hard and Myers, 2006). Agricultural tractors and machinery account for 23% of fatal injuries to youth nationally (BLS, 2013). Youth injuries and fatalities in production agriculture are a significant public health concern (NIOSH, 2014). During 2014, an estimated 2,270 injuries (95% CI [1890, 2650]) occurred to youth less than 20 years old on farm operations in the western region of the U.S. (NIOSH, 2014). Between 2003 and 2012, there were 17 occupational fatalities to youth ages 13 to 19 working in agricultural production in Utah, Montana, South Dakota, Colorado, and Idaho (BLS, 2013). It is likely that many injuries and illnesses may be underreported in private agricultural workplaces because there is no comprehensive surveillance system. Reducing the number of agricultural injuries to youth will continue to be difficult, especially in light of the exemptions to OSHA safety standards provided under the Fair Labor Standards Act (Garvey et al., 2008; Browning et al., 2001). Regulatory exemptions also include public school agricultural education students under the age of 16 working in a production-based supervised agricultural experience as well as youth working for their parents.

Research has shown that safety is often developed early through a process called “farm apprentice” in which students or children develop perceptions of how to farm safely via mentor observation and modeling (Sanderson et al., 2010). This observational learning and modeling of mentors makes secondary agriculture teachers’ knowledge and practices of tractor safety vitally important. However, research in Wyoming documented that agriculture teachers needed professional development in agricultural machinery and technology safety (McKim and Saucier, 2011). The highest need for agricultural safety professional development among a national sample of teachers was in teaching students how to safely perform tractor operations (Lawver et al., 2016). These teachers’ perceptions of their professional development needs are likely due to a lack of knowledge or their perception of being unprepared to deliver content-specific youth training for reducing agricultural machinery injury risks. Many university-level teacher preparation programs lack technical agricultural safety training as part of their undergraduate certification (Burris et al., 2005). Developing the technical safety skills of school-based agriculture teachers may help establish safety models for development of students’ safety behaviors (Schwebel and Pickett, 2012). Students may learn how to engage in safe behaviors in agriculture by modeling their teachers’ behaviors. Therefore, teachers’ professional development is critically important to ensure that students develop appropriate safety practices for production agriculture.

A multilevel community prevention strategy that integrates an established safety training curriculum and student leadership organizations, such as the National FFA (formerly Future Farmers of America), has been recommended to reduce childhood agricultural injuries associated with agricultural tractors and machinery (Hard and Myers, 2006; Jepsen, 2012; Myers, 2002; NIOSH, 2014; Sanderson et al., 2010). The National FFA presents a significant opportunity to provide safety training to youth working in agriculture. Over 653,000 students nationwide are estimated to be enrolled in over 8,500 school-based agriculture programs, with most of these students participating in supervised agricultural work experiences (FFA, 2018). During these supervised agricultural work experiences, students engage in production agricultural work alongside parents, co-workers, or supervisors. Students' exposure to agricultural hazards during supervised agricultural work experiences may increase as supervisors become busy with their own farm work. Research is limited for determining if a collaborative and multilevel community program can reduce the hazards for youth working in production agriculture.

Lawver et al. (2016) identified teacher preparation in agricultural safety as a significant professional development need. Roberts and Dyer (2004) identified the development of supervised agricultural experience opportunities as one of the highest training needs for secondary school agriculture instructors. Sparks and Loucks-Horsley (1989, 1990) suggested four models of teacher professional development: (1) individually guided development, which allows independent study developed by the teacher based on interests and needs; (2) observation and assessment activities, which include peer feedback on teaching practices; (3) training, which is the typical model for teacher professional development with a large number of participants per trainer and provides an economical method for transferring knowledge and skills; and (4) inquiry-based professional development, which focuses on action research or problem solving. Traditionally, the training model is most often used in agricultural education (Duncan et al., 2006). There is a significant need for effective community-based agricultural safety and health youth training, as the effectiveness of regulatory interventions in agriculture is limited due to the exemptions provided under the Fair Labor Standards Act. This study was conducted using the traditional training model as well as inquiry-based professional development.

Purpose and Objectives

The purpose of this study was to assess a community-based agricultural machinery safety seminar for teacher training that focused on hands-on integration activities to assist with training youth in machinery safety skills. The following research objectives guided this study:

1. Describe selected demographic characteristics of school-based agriculture teachers who participated in the training program.
2. Determine the effect of a professional development program in agricultural safety education on teachers' knowledge of tractor and machinery safe operation.
3. Describe seminar improvements as perceived by participating teachers.

Hypothesis

H_0: There will be no significant difference in school-based agriculture teachers' tractor and machinery safety test scores between pre-test and post-test upon completion of the agricultural safety education seminar.

H_1: There will be a significant positive increase in school-based agriculture teachers' tractor and machinery safety test scores between pre-test and post-test upon completion of the agricultural safety education seminar.

Methods

Sample

School-based agriculture teachers were recruited in Montana, South Dakota, and Utah to participate in a ten-hour summer teacher training seminar. Each state host site advertised the workshop through existing teacher communication channels such as e-mail listservs. Recruitment e-mails were sent through e-mail used by teacher professional associations and state FFA associations. Teachers were asked to pre-register online prior to attending the seminar. Enrollment for the seminar was set at 50 teachers for each state training site. Teachers were asked to register for the workshop on a voluntary basis. Teachers participated based on a “first-come, first-serve” basis. Workshops were limited to the first 50 participants registered.

Teachers were provided refreshments and lunch during the seminar. Safety materials and supplies were provided to participating teachers. These included tractor PTO safety guards, warning labels, personal protective equipment, and supervisor safety toolboxes.

Flash drives loaded with the seminar curriculum were provided to teachers. Additional participation incentives included professional development credit toward licensure, and safety educational resources for use with students. The human subjects research protocol was reviewed and approved under Utah State University’s Institutional Review Board protocol 7689. Informed consent forms were provided to teachers. There were 116 teachers who agreed to participate in the program.

Training Curriculum

The National Safe Tractor and Machinery Operations Program (NSTMOP) materials and the Safety in Agriculture for Youth Supervised Agricultural Experiences Risk Assessment Resource Guide were used to develop the seminar curriculum. The seminar training theme was tractor operation fundamentals, with the title “Putting Tractor Safety in Motion” and focusing on tractor stability, preventing rollovers, and rollover protection structures (ROPS) with seat belts. Seminar learning goals were to train teachers on the use of ROPS and seat belts as well as inspection and installation of safety equipment on tractors. A lesson plan was developed that included two large group activities and a rotation between three small group hands-on station modules. A university teacher educator from each state was trained to present the seminar and provided lesson plans to deliver the seminar. Seminars occurred separately and were hosted at different times during the summer of 2017.

Teachers began by completing a large group activity discussing the hazardous occupations order in agriculture and the work tasks allowable for youth to complete. Following the large group activity, teachers were randomly assigned to one of three small groups for the hands-on station modules. Teachers spent two hours at each small group module. Teachers rotated through each of the hands-on station modules, which included:

NIOSH CROPS construction for a Ford 8N tractor: This hands-on module reviewed the NIOSH construction guidelines and SAE J2194/ASABE engineering standards. Teachers were assigned to small groups of three to four to complete a bill of materials based on the

NIOSH cost-effective ROPS (CROPS) plans. Exact materials meeting steel A572 Grade 50 plate or A36 minimum yield of 50, as well as appropriate grades of hardware, were provided to each group to practice the CROPS construction steps. Seat belt installation and other technical requirements were discussed with each group. Inquiry-led discussion was used to engage teachers in liability concerns of CROPS as a student-led SAE project. Teachers were recommended have students and employers seek professionally engineered OEM ROPS. The CROPS were discussed as an alternative laboratory activity to review safety engineering standards and construction liability with students.

Penn State Extension's mini-tilt table construction: This hands-on module included review of tractor stability and applied physics. Newton's laws of motion, center of gravity, and centripetal force were demonstrated using a video. Elements impacting the risk of a tractor rollover were discussed with the teachers, who were then given a bill of materials and supplies to create a mini-tilt table to demonstrate center of gravity and the stability baseline of a scale-model tractor. Inquiry-based discussion was led on developing build plans and supplies to construct a mini-tilt table. Mini-tilt tables were designed to document angles of operation and tractor rollover risks. Each teacher constructed a mini-tilt table for subsequent use with students. Each teacher was provided electronic files of the bill of materials and construction lesson plans for use with students.

On-farm tractor risk assessment: During this hands-on module, teachers were transported to a local site to assess various tractors for potential rollover and other injury risks.

Teachers were led through an inquiry-based discussion on how to assess youth tractor operations for injury risks. The Safety in Agriculture for Youth (SAY) Supervised Agricultural Experience (SAE) Risk Assessment Document developed by Utah State University was presented as a tool to facilitate hazard assessment for youth tractor operations. Teachers were asked to assess the tractor for maintenance and operating features as well as operator safety. Teachers were asked to focus on rollover protection and seat belt availability. Other items assessed included preventive maintenance and pre-operating checks.

After completing the small group modules, teachers were brought back together to conclude the seminar with a final large group activity, followed by completion of the post-test. The final large group activity included how to research ROPs retrofit options using the Kentucky ROPS guide and National ROPs Rebate Program. During this activity, teachers were instructed how to assess their students for appropriate tractor work tasks using the Agricultural Youth Work Guidelines, formerly known as the North American Guidelines for Children's Agricultural Tasks.

Instrumentation

A paper-based instrument was used to collect test results and demographic information from participants. A pre-test of 50 multiple-choice and true/false NSTMOP exam questions was randomly generated from the Penn State University NSTMOP instructor curriculum resources. The post-test was constructed using the pre-test items with re-ordered questions and answer choices to limit participants' sensitization to the instrument. One point was recorded for each correct answer. Prior to beginning the seminar, teachers at each training site completed the written NSTMOP exam to establish their pre-seminar knowledge of tractor and machinery operation safety. The instrument items were developed by experts and were evaluated to be content and face valid (Garvey et al., 2008). The instrument items are used for student certification nationally and were deemed reliable. The standard minimum passing score for the written NSTMOP exam is 70% or higher.

Upon review of item analysis, two items were removed from the pre-test analysis and two items were removed from the post-test analysis. These items were removed due to negative point-biserial correlations. The maximum possible score for the pre-test and for the post-test was 48. Post-hoc reliability analysis of the pre-test yielded an alpha coefficient of 0.36. Post-hoc reliability analysis of the post-test yielded an alpha coefficient of 0.68. Participant guessing increases the random error in instrument measurement (Burton, 2001). Participants who answered more difficult questions correctly but answered easier questions incorrectly may indicate guessing on the pre-test. Low reliability for the pre-test indicates an increase in random error, as participants may not have been familiar with the test item content and therefore guessed. Higher reliability of the post-test is a better indication of the true score variance as determined by the alpha coefficient.

Analysis

Test scores and demographic variables were entered into SPSS version 25. This software package was used to analyze the data. Descriptive statistics for participating teachers' demographics included frequency, percentage, mean, and standard deviation. Means and standard deviations were reported for participants' tests scores. A paired-samples t-test was used to determine if there was a statistically significant difference between participants' pre-test and post-test scores. An independent-samples t-test was used to determine if there was a statistically significant difference in exam scores between males and females. Normality of the data was checked for pre-test and post-test scores by plotting a histogram and overlaying the normal curve using SPSS. This process determined that the assumption of normality was met. Pearson correlation was used to determine if demographic variables were significantly correlated with test scores. Chi-squared tests of association were used to identify associations between demographic variables and pass/fail test scores.

Results

Teachers completed the pre-test and post-tests to assess their tractor and machinery operation safety knowledge. There were 50 participating teachers from Montana (fig. 1), 33 teachers from South Dakota (fig. 2), and 33 teachers from Utah (fig. 3). Teachers represented a geographical region of 45 Montana postal districts, 33 South Dakota postal districts, and 23 Utah postal districts.

Fifty-three (47.3%) participants identified as female, and 59 participants (52.7%) identified as male. Four participants chose not to indicate their gender. Table 1 provides the distribution of participating teachers' gender by state. Table 2 provides the mean age and years of teaching experience for each state. The average participant was 35 years old (SD = 11.3) and had 9.5 years of teaching experience (SD = 9.2).

The average NSTMOP pre-test score was 35.2 out of 48 (SD = 3.3). The average NSTMOP post-test score was 40.3 out of 48 (SD = 4.1). Table 3 provides the mean scores for the pre-test and post-test by state. The overall difference between the pre-test and post-test was statistically significant ($t(109) = 11.9$, $p < 0.001$). The difference between the pre-test and post-test was also significant for each state. Table 4 provides the questions that were most frequently answered incorrectly by the participating teachers.

Small but significant positive correlations were found between teachers' age and pre-test score ($r(104) = 0.23$, $p = 0.020$) and between teachers' years of teaching experience and pre-test score ($r(106) = 0.22$, $p = 0.022$). These correlations indicate that older, more experienced teachers tended to score slightly higher on the pre-test score than younger, less experienced teachers. There was no significant correlation between teachers' age or teaching experience with post-test scores.

A 2 × 2 chi-squared analysis was used to determine the association between gender and pass/fail test scores for both the pre-test and post-test. Pass/fail was defined as correctly answering at least 34 out of 48 questions. Ten (16.9%) of 59 male teachers and 21 (39.6%) of 53 female teachers failed the pre-test. For the post-test, three (5.4%) of 56 males and three (5.7%) of 53 females failed. There was a significant association between gender and pre-test pass/fail score ($\chi^2(1) = 7.17$, $p = 0.007$, $\phi = 0.253$). In the pre-test analysis, no cells had expected cell counts less than five. In the post-test analysis, two cells had expected cell counts less than five. This was due to the low number of individual who failed the post-test (i.e., scored less than 70% correct). When expected cell counts are less than five, Fishers' exact test is recommended. The results of Fisher's exact test showed no significant association between gender and post-test pass/fail score ($p = 0.634$).

Male teachers scored an average of 36 out of 48 on the pre-test (SD = 3.3). Female teachers scored an average of 34 out of 48 on the pre-test (SD = 3.0). An independent-samples t-test was used to determine if the differences in pre-test scores between males and females were significant. The assumption of equal variances was met for both the pre-test and post-test scores using Levene's test for equality of variances. Males scored significantly higher on the pre-test than females ($t(110) = 3.43$, $p = 0.001$). There was no significant difference in post-test scores between males and females ($t(107) = 1.07$, $p = 0.288$). Male teachers reported an average age of 38 years (SD = 12.0), while female teachers reported an average age of 32 years (SD = 9.7). Male teachers reported an average of 12 years of teaching experience (SD = 10.3), while female teachers reported an average of 7 years of teaching experience (SD = 7.3).

Teachers were asked what would keep them coming back to safety trainings. Open responses were grouped based on thematic categories. These categories were identified as applicable learning activities, professional development, practical instructional strategy, and engaging students to perform safely. Table 5 provides the thematic categories and associated teacher comments.

Limitations, Conclusions, and Discussion

A limitation of this study was the use of convenience sampling for teacher participation. Generalizations of the conclusions from this study should be made with caution. Teachers' pre-test scores indicated some general knowledge of tractor and machinery operation safety in that their average pre-test score was 70%. However, 72.6% (n = 82) of participating teachers scored the minimum NSTMOP requirement on the pre-test, which raises additional research questions concerning tractor and machinery safety preparation within university teacher preparation programs as well as in-service professional development programs. South Dakota teachers, on average, scored higher on the post-test than Montana and Utah teachers. Differences in seminar host trainer personality and delivery as well as questioning technique during teacher breakout sessions could not be accounted for, as each state held their seminar independently based on teacher availability and convenience of site location. While the open-response results indicate that the teachers viewed the hands-on training professional development positively, the seminar delivery may have affected technical knowledge gains differently between states.

Teachers' age and years of experience had a small but significant correlation with teachers' pre-test scores. Utah teachers, on average, reported less teaching experience than Montana or South Dakota teachers. Older, more experienced teachers may have participated previously in some form of agricultural safety and health instruction as part of their professional development experiences. This preparation may have included a college course or informal safety training experience with other teachers and could have positively influenced their pre-test scores. As teachers gain experience, their overall safety knowledge is expected to be slightly higher than that of teachers with less experience.

Pre-test scores were significantly different between males and females. Female participants scored significantly lower on the pre-test. This was significantly associated with the pass/fail rate on the pre-test and could have been influenced by the age and amount of teaching experience of female teachers in this study. Female teachers reported less experience and younger age compared to male teachers. The reason for the difference in pre-test scores between male and female teachers is unknown but could be linked to their experience with tractor and machinery operation. More research is needed to assess teachers' prior educational experiences and agricultural work experiences with tractor and machinery operations.

Upon completion of the post-test, 94.5% (n = 104) of participating teachers scored the minimum NSTMOP student written test requirement of answering 70% or more questions correctly. These test scores indicate a statistically significant increase in knowledge gained about tractor and machinery safety. Therefore, we reject the null hypothesis that there would be no significant difference between teachers' pre-test and post-test scores upon completion of the seminar. We retain the alternative hypothesis that teachers' test scores would significantly increase upon completion of the seminar.

Open responses indicated that the teachers wanted to continue hands-on activities centrally focused on "how to teach" skills training that is relevant to their secondary students. The effectiveness of this training approach will need to be monitored with additional follow-up examinations to gauge teachers' knowledge retention and implementation over the course of the project. This study used different trainers to host each state seminar, which may have impacted the post-test results. Additional differences in teacher preparation programs within each state, as well as varying levels and types of production agriculture, may have influenced the impact of the training seminar. Most teachers are accustomed to attending workshop-style sessions in which the presenter is an expert who establishes the content and flow of instruction. The inclusion of inquiry and hands-on problem-solving required the teachers in this study to search for answers using data, reflect and formulate solutions, as well as analyze potential student or classroom problems.

Future data collection is needed to determine the impact of facilitating teacher workshops on secondary students' safe work practices and work environments. This will be important to reduce youth work-related injuries caused by agricultural machinery and tractors. As teachers move or retire from the profession, it will be critical to identify training gaps and specific issues to address in future training sessions. Future monitoring of teacher knowledge and student behavior with the integration of geospatial data mapping may serve as an essential evaluation tool to map regional training gaps and safety issues across this population of interest.

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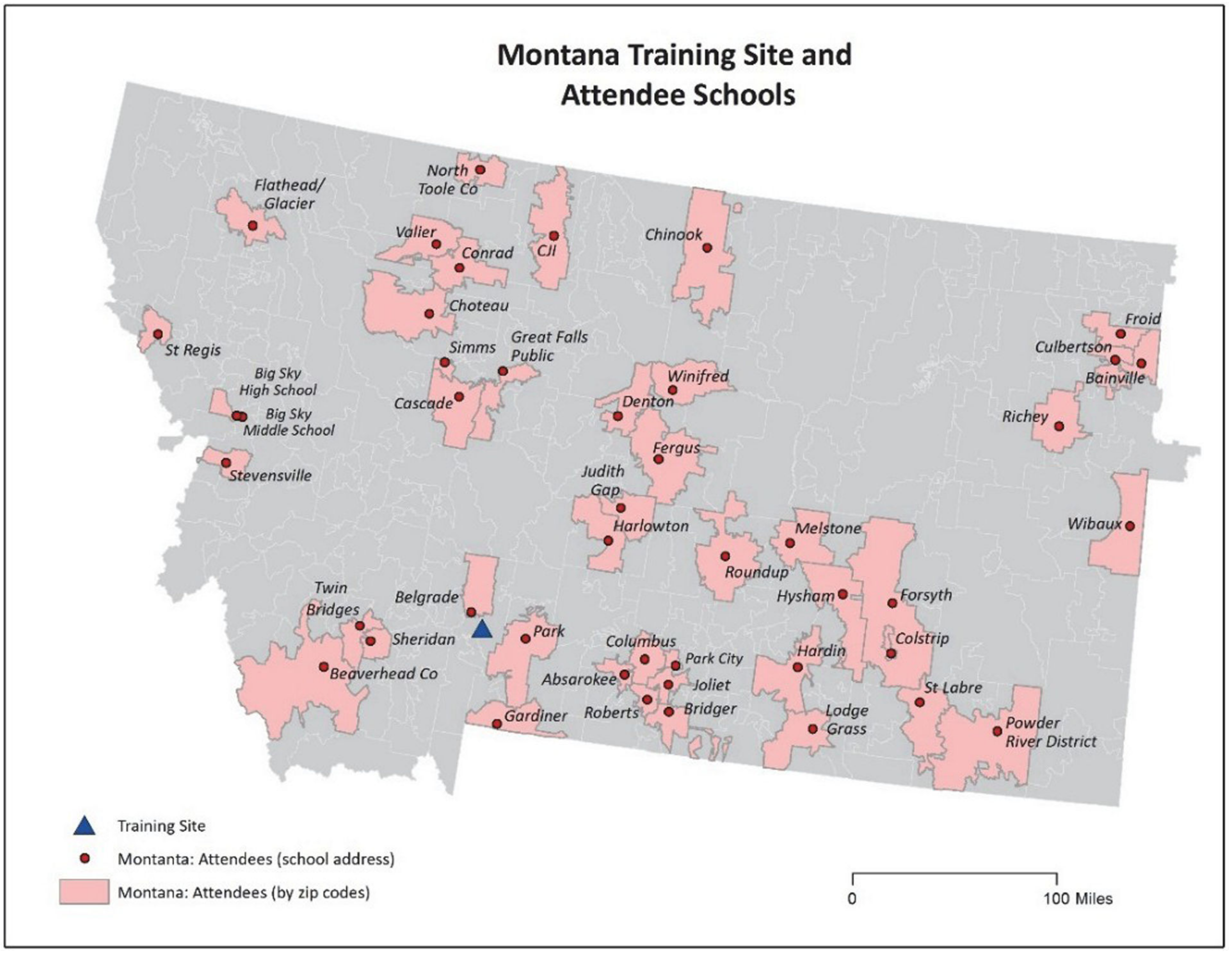

Figure 1.
Map of Montana counties.

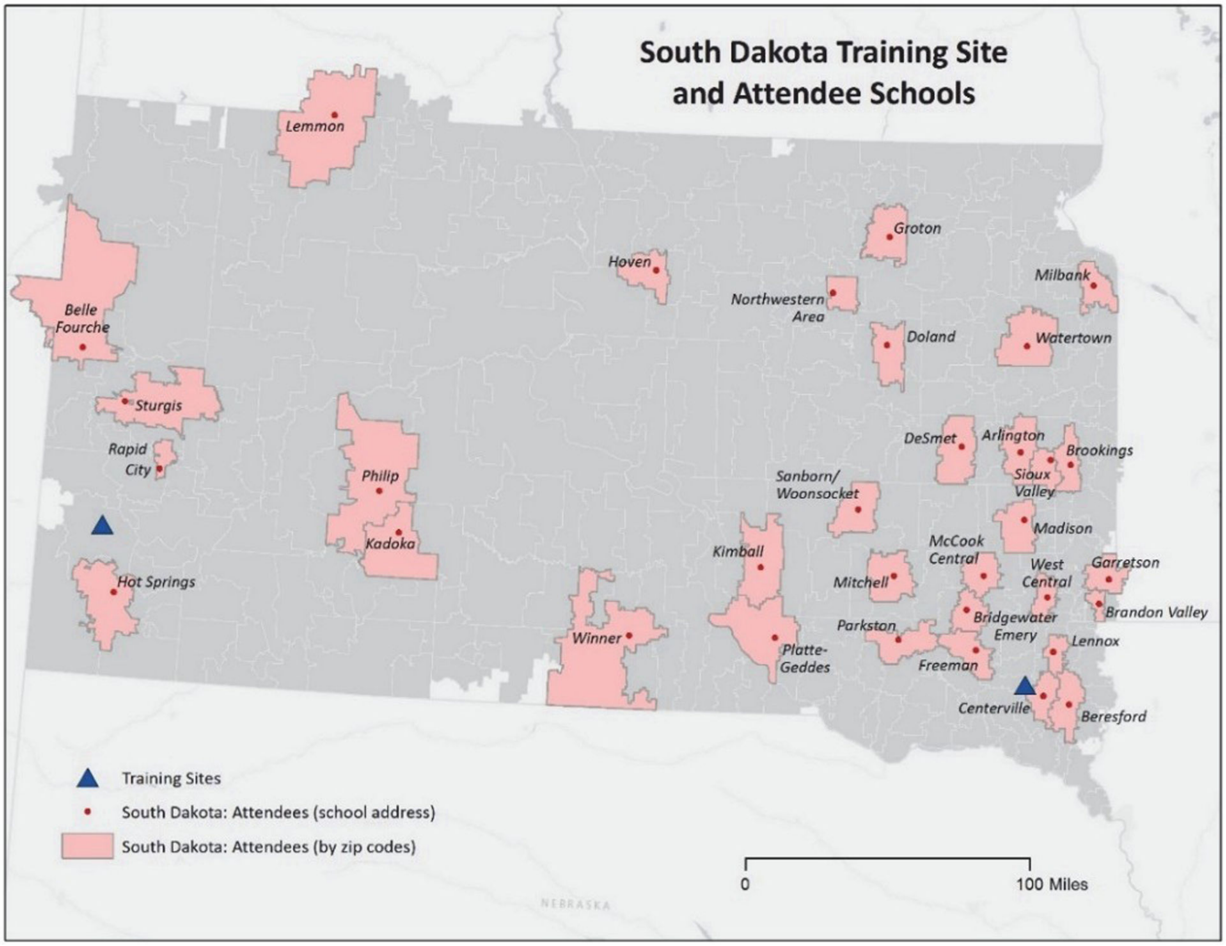

Figure 2.

Map of South Dakota counties.

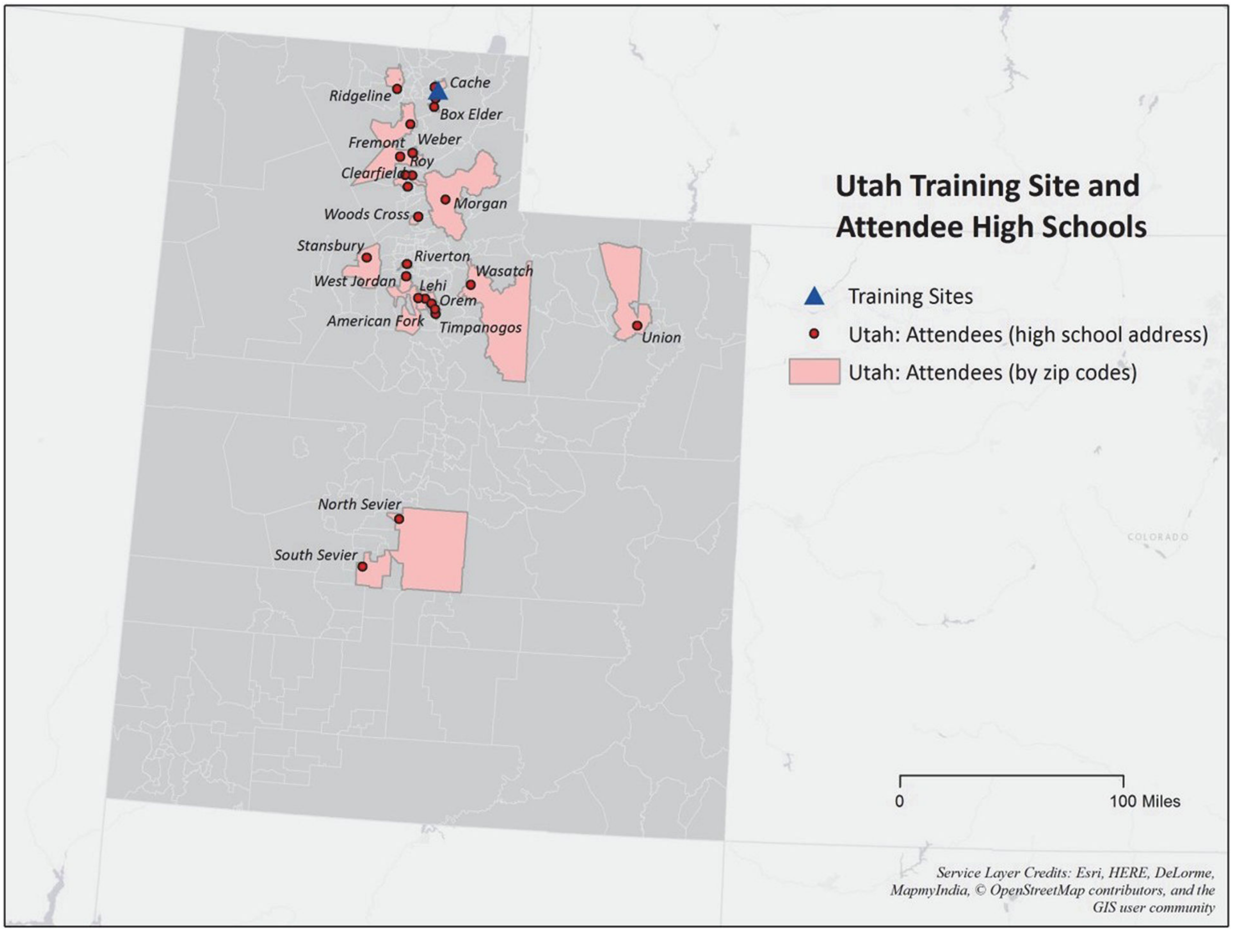

Figure 3.
Map of Utah counties.

Table 1.

Gender distribution of participating teachers by state.[a]

	Montana		South Dakota		Utah		Overall	
	n	**%**	***n***	**%**	***n***	**%**	***n***	**%**
Female	19	40.4	18	56.3	16	48.5	53	52.7
Male	28	59.6	14	43.8	17	51.5	59	47.3

[a]Three participants from Montana and one participant from South Dakota chose not to answer the question.

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Table 2.

Age and teaching experience (in years) of participating teachers.

	Montana		South Dakota		Utah		Overall	
	-	SD	-	SD	-	SD	-	SD
Age	38.2	11.4	34.1	11.3	32.3	10.5	35.4	11.3
Teaching experience	11.5	9.7	10.0	10.1	5.9	6.5	9.5	9.2

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Table 3.

Pre-test and post-test scores of participating teachers.

	Montana[a]		**South Dakota**[b]		**Utah**[c]		**Overall**	
	-	**SD**	-	**SD**	-	**SD**	-	**SD**
Pre-test score	36.3	3.2	34.1	2.3	34.6	3.9	35.2	3.3
Post-test score	39.7	2.9	44.5	1.7	36.8	3.5	40.3	4.1

[a] ($t(45) = 7.1$, $p < 0.001$).

[b] ($t(32) = 22.2$, $p < 0.001$).

[c] ($t(30) = 4.5$, $p < 0.001$).

Table 4.

Post-test questions most frequently answered incorrectly by teachers. Correct answers are shown in bold and italicized.

Questions	Answer Choice Distribution a (*n*)	b (*n*)	c (*n*)	d (*n*)	Multiple Answers (*n*)
What position should you return a two-pedal direction and speed control to when releasing it?	26	38	2	44	0
a) Park					
b) Stop					
c) First gear					
d) Neutral					
If a farm owner uses only his/her own labor or only family labor, the Occupational Safety and Health Administration has no jurisdiction in that operation.	55	55	0	0	0
a) True					
b) False					
Loads should only be attached to the following:	31	0	56	19	4
a) Three-point hitch					
b) Axle					
c) Drawbar					
d) All of the above					
According to the North American Guidelines for Children's Agricultural Tasks (NAGCAT), what is the recommended minimum age for operating a PTO-powered implement?	0	2	56	52	0
a) There is no minimum age					
b) 12 to 13 years old					
c) 14 to 15 years old					
d) 16+ years old					
Which of the following increases the chance of a runover?	66	7	0	36	1
a) Leaving the tractor seat without first shutting off the tractor					
b) Lack of ROPS and seat belt					
c) No master PTO shield					
d) Driving near an embankment					
According to the North American Guidelines for Children's Agricultural Tasks (NAGCAT), which age group should not operate a medium/large tractor (more than 70 hp)	2	66	16	19	7
a) There is no minimum age					
b) 12 to 13 years old					
c) 14 to 15 years old					
d) 16+ years old					
Nationally, what fraction of all farm work fatalities are tractor-related?	8	32	68	2	0
a) 1/4					
b) 1/2					
c) 1/3					
d) 1/5					
If a mechanical push-pull fuel switch is used, where should this switch be located?	9	6	73	22	0

Questions	Answer Choice Distribution a (*n*)	b (*n*)	c (*n*)	d (*n*)	Multiple Answers (*n*)
a) Within 1 foot of the key switch					
b) Within 8 inches of the key switch					
c) Within 6 inches of the key switch					
d) Within 2 inches of the key switch					
What percentage of tractor-related fatalities are a result of tractor overturns?	1	17	78	14	0
a) 1%					
b) 25%					
c) 50%					
d) 75%					
Youth can harvest trees with a diameter up to:	11	77	21	0	0
a) 2 inches or less					
b) 6 inches					
c) 1 foot					
d) 2 feet					
Throttle controls next to the tractor seat increase engine speed when moved:	10	2	79	19	0
a) Rearward and downward					
b) Rearward and upward					
c) Forward or upward					
d) Forward or downward					
Rear tractor tires may have liquid placed in the inner tube to add weight to the tractor to improve its traction. What liquid is commonly used for this?	5	17	84	4	0
a) Water					
b) Antifreeze					
c) Calcium chloride					
d) Used oil					
When using wheel-type tractors on silage surfaces, do NOT use with slopes greater than:	11	87	8	3	0
a) 2 to 1					
b) 4 to 1					
c) 8 to 1					
d) 16 to 1					
The “point of no return” for a rear tractor overturn is reached in how many seconds?	8	88	10	4	0
a) 0.25					
b) 0.75					
c) 1.5					
d) 3					

Table 5.

Thematic categories for what would keep teachers coming back to safety training.

Thematic Category	Teacher Comments
Applicable learning activities	"New information"
	"New material"
	"Quality"
	"New examples"
	"Keep presenting"
	"Different areas to learn each year"
	"New topics"
	"Additional curriculum and resources"
	"New examples"
	"Keep the content applicable"
	"Curriculum materials"
	"More hands-on learning activities I can use during class"
	"Relevant, useful information with hands-on activities"
	"Activities that can be used"
Professional development	"Continuing education"
	"Credit and information"
	"Learn how to better prepare my facilities and student SAEs for safety"
	"Better shop safety practices"
	"Knowledge for SAE safety to help students"
	"Tips I can give students to be safe on the farm"
	"Better techniques to teach safety with agricultural machinery"
	"Professional development"
	"Learning new skills to teach students"
	"Keep giving me summer agricultural hours"
	"Education to help my students be more safe"
	"Continuing education"
Practical instructional strategy	"Interactive learning"
	"Hands-on activities and take-home curriculum"
	"Variety, more applicable to my classes"
	"Hands-on aspect, loved it, keep it in early July"
	"Better techniques to teach safety with agricultural machinery"
	"Project ideas and plans"
	"New teaching methods and ideas"
	"Learning new skills to teach students"
	"Ideas for classroom safety instruction"
	"Hands-on activities"
Engaging students to perform safely	"A greater understanding of how to teach students to be safe that will prepare them for life, not my class"
	"How to help students have safe SAE experiences"
	"Education to help my students be more safe"

Thematic Category	Teacher Comments
	"Knowledge that I can implement with my students"
	"Helping students, passing on information"
	"Keeping my students safe"
	"To keep kids from getting hurt"
	"How to keep SAEs safe for my students"