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Agriculture Safety Training Effectiveness

Emphasizing Safety Now to Impact the Future

by Dr. Gaea Hock

As I reflected on what to write for my editor comments, I took several social media breaks to enjoy all the innovative ways FFA chapters were celebrating National FFA week. One of the more popular activities many chapters use during the week is "Drive your Tractor to School." I enjoyed seeing my friends and former students post the variety of tractors being driven to school that week. In my own community, the daughter of one of our friends drove her tractor into town.

As more and more posts were made, I wondered how many of the schools taught tractor safety before the event. As the week progressed, I was happy to read a post from Caleb Hickman, agricultural education teacher in Utica, Ohio. He stated:

> *"Today has been one of my favorite days of teaching! Tractor safety is something I'm very passionate about. I taught the kids about rollovers, rollover bars, PTOs, and the dangers surrounding farm equipment. International Society for Agricultural Safety & Health, NIOSH National Institute for Occupational Safety and Health, and the Southeast Center have taught me everything I need to know to promote tractor safety. I hope my students enjoyed this lesson!"*

I am not sure how many other programs are teaching tractor safety prior to celebrating "Drive Your Tractor to School" day, but hope those lessons are built into the days/weeks prior to that activity.

When I shared with colleagues the theme for this issue of the magazine, they proceeded to tell me stories of injuries and deaths in rural communities. I too know of several accidents that resulted in major injury and even death. It is unfortunate that we all have a story to share regarding loss of life or limb in the agriculture industry.

Hanna Miller, Chapman FFA member, was one of the many students who drove their tractor to school during National FFA Week.

As a parent to two small humans, farm safety is on my mind each time we go out to feed cows, take their dad a field meal, or climb on the equipment. As we enjoy our lifestyle, I am constantly watching for hazards and alerting them to be careful. I know those conversations will continue as they become more engaged in our farming operation. I want to do all I can to make my kids aware of the dangers and to not take them for granted.

This issue of the magazine focuses on ways we can help promote and require safe practices in agricultural industries, the agricultural mechanics shop, and other agricultural settings. As teachers, we are not only educating our students about the industry, but also creating and reinforcing positive behaviors that will influence them for years to come. What we do now can literally save their lives someday in the future.

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Editor Comments

Theme Editor Comments

Theme Articles

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It's Never Too Early to Think Safe!

by Dr. Haley Rosson

According to the most recent *2022 Fact Sheet - Childhood Agricultural Injuries*, published by the National Children's Center for Rural and Agricultural Health and Safety, "agriculture had the leading number of occupational fatalities across industries for youth age 17 and younger from 2011-2020" (p. 1). The Childhood Agricultural Injury Survey (CAIS), conducted by the National Institute for Occupational Health and Safety (NIOSH) in collaboration with the U.S. Department of Agriculture - National Agricultural Statistics Service (USDA-NASS), reported that 893,000 youth lived on farms in 2014, with more than half working on the farm. This same survey indicated a staggering statistic: a child dies in agriculture-related incidents almost every three days. The question we must now ask ourselves is why is this continually happening? What factors are present within the agricultural industry that incite these sobering statistics?

Beginning during my tenure as a county Extension agent in Oklahoma, I began to notice multiple instances of machinery-related (ATV/UTV, tractor) injuries, and even fatalities, amongst our youth. Knowing this, I jumped at the chance to participate in an ATV safety training, offered through Oklahoma State Extension by licensed instructors with the ATV Safety Institute (ASI). I then began hosting several ATV RiderCourse trainings, a four-hour interactive course where participants practice basic riding skills in a controlled environment under the supervision of a licensed ASI instructor (ASI, 2021). I later had the opportunity to become trained as an ASI instructor myself and still currently teach the course (even students in my graduate-level Change Theory course complete the training!). Through both the RiderCourse trainings, as well as school-based assembly and Farm Safety training days, I was always floored at how many students raised their hands when asked, "Have you or someone you know ever been injured on an ATV?" For some, it was almost a point of pride and machismo to admit to having rolled an ATV or to never wearing a helmet.

As several of my colleagues highlight in this edition of *The Agricultural Education Magazine*, many safety-related habits, behaviors, and attitudes have been ingrained in us from an early age and are often learned through observation. As a kid growing up in rural, northeastern New Mexico, the thought of wearing a helmet or other safety gear while riding our family ATV was non-existent (disregarding the fact that I was often carrying passengers, driving

> By instilling youth with the ownership and empowerment of knowledge pertaining to safe environments and behaviors, perhaps we can influence "the way Grandpa's always done it" and reexamine "what we're really teaching them."

on the highway, and operating an adult-sized machine - yes, I was breaking what I now know are ALL the golden rules of ATV safety). While I was fortunate to never be injured while operating our ATV, like the kids I quizzed as an Extension agent, I too knew many youth (and adults!) within my community who had been severely injured. I imagine now, perhaps the untold impact of what a safety training, such as the ASI RiderCourse training or a Farm Safety Day, might have had on myself and other youth. Perhaps we would have been able to not only recognize potential hazards within our homes and farms, but also been able to draw our parents' and other adults' attention to these hazards. By instilling youth with the ownership and empowerment of knowledge pertaining to safe environments and behaviors, perhaps we can influence "the way Grandpa's always done it" and reexamine "what we're really teaching them" (see articles, "That's How Grandpa Did It: Breaking Unsafe Generational Farming Habits" and "What are You Really Teaching Them?")

While the focus of this edition is primarily "agriculture" safety training effectiveness, we can examine "safety" through myriad additional lenses. Currently, within West Virginia Extension, we have devoted an entire working group within the 4-H and Youth Development unit to the examination of youth safety, and are examining no less than eight overarching sub-areas of safety (food safety, farm safety, fire safety, ATV/UTV/other motorized vehicles safety, shooting sports safety, pipeline safety, water safety, and cyber/personal safety). Additionally, our group is currently in the process of revising a previously-implemented Extension curriculum, where families attended informational dinner sessions focused on a variety of safety topics, then using a risk-mapping journal, identified and cataloged safety hazards present on their family farm/ranch. Mini-grants were then awarded to families to correct the identified hazards. What an incredible opportunity for youth to take the initiative to implement positive behavior change!

Our contributing authors have presented excellent examples of how we can address the many areas of agriculture-related safety trainings, including hearing loss prevention (see "That's Not What I Heard" article); ATV and UTV safety (see "ATV Safety Knowledge and Skills are Critical for All Riders" article); brain injury prevention (see "Save Your Brain: Equipping Agriculture Teachers with Resources to Promote Brain Injury Prevention" article); Occupational Safety and Health Administration (OSHA) certificate courses (see "OSHA and Ag in the Classroom" article); and the utilization of virtual reality to simulate real-life scenarios (see "Using Virtual Reality to Improve Agricultural Safety Training Effectiveness in Agricultural Education" article). I hope this collection of articles stimulates your thinking and encourages you to think critically about how we can model and implement safe practices in the formal, non-formal, and informal learning environments.

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"That's How Grandpa Did it": Breaking Unsafe Generational Farm Practices

by Dr. Preston Byrd & Dr. Stacy Vincent

As a child growing up around our parents and grandparents, we observe their actions and learn how they do various things. On a farm, children learn from the simple observations of their parents, such as tractor operations, handling of livestock, constructing a fence, and so on. I know I learned a lot of the farming practices I currently use from the observations of my father and great uncle. Unfortunately, some learned/adopted practices are not reflective of safety and are rather acts of chance and risk. For nearly 30 years, the National Agriculture Safety Database continues to document farm accidents and fatalities. Of the hundreds of incidents reported, many were associated with acts that were adopted by previous family members. Personally, I had a family member roll a tractor over three times and another rolled his lawn mower all because they were imitating the practices of their forefathers.

As agricultural educators, one of our main priorities is the safety of students in our classroom and laboratories as we prepare them to become productive, safe citizens. Many agricultural education programs offer courses that engage students in dangerous equipment such as table saws, miter saws, bandsaws, welders, and flammable gasses. As educators, we must instill proper safety instruction in our students so that we can trust them in our laboratories to learn new skills; however, this is difficult if they bring poor behaviors adapted through a lifetime of familial and environmental surroundings.

There are several ways to provide safety instruction within secondary agricultural education programs. The most popular is by completing safety demonstrations and assessments. Fortunately, a team of scholars recently finished a nine-year study of finding a new approach to changing safety behaviors among Gen Z learners. The area assessed was in relation to a specific agriculture sector where family upbringings have major influence in daily operations - tractor driving and the event of tractor rollovers. Our selection of this was because of the prominent number of fatalities occurring each year among teenage youth (Hoy, 2009).

The Apprenticeship of Observation addresses the behaviors created that relate to how one may see and hear things when they are growing up (Lortie, 1975, Schafbuch et al., 2016, Vincent et al., 2019). Parents and employers are seen as trusted mentors that help motivate youths' morals, values, and behaviors (Vincent et al., 2019; Wentzel, 2002). On the farm, these children are watching the safety behaviors and practices of the mentor, which the students then model themselves (Baker et al., 2001, Schafbuch et al., 2016, Vincent et al., 2019). These subjective norms that are consistently demonstrated to the child creates an adopted behavior that is perceived as "normal" (Lortie, 1975).

Our tested approach to addressing Apprenticeship of Observation was through a 4-step approach. The approach has assisted in long-term attitude and behavior changes that combat the subjective norms. The

Secondary agriculture students with their completed CROPS projects.

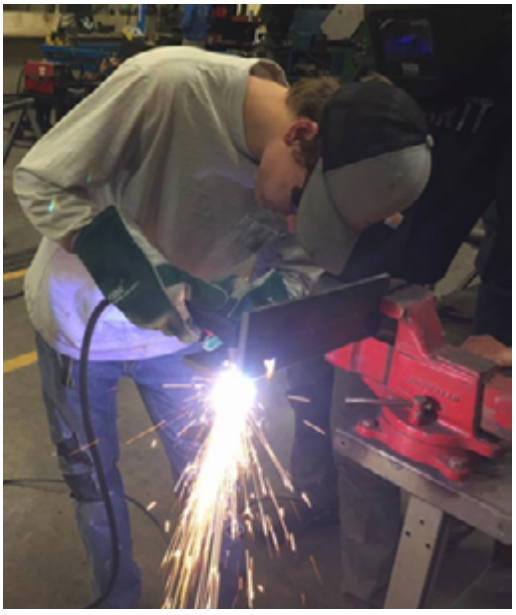
four-step process consisted of 1) a youth/adult partnership teaching methodology; 2) a cross-content curriculum; 3) an experiential learning activity; and 4) a series of community/youth engagement activities. The model was implemented across 10-states. With revisions being made each year, the students reported a positive significance that grew each year in students' behaviors, attitudes, and behavioral intentions – even if they never grew up on a farm.

The teacher's relationship with their student is crucial in changing a long-lived adopted behavior. A youth-adult partnership is described as a collaborative learning environment where the youth and adult share control and responsibility of what is being learned (Mitra, 2008, Schafbuch et al., 2016, Vincent et al., 2019). Agricultural educators are in a unique position where they are a constant role model for most of their students since they see them in class and in their FFA chapter activities; therefore this youth-adult partnership is usually already developed in most cases. As agriculture teachers and the students foster this relationship, students can become more engaged in their learning because the teachers serve as a positive mentor, mechanism for feedback, and emotional support (Lortie, 1975, Schafbuch et al., 2016, Vincent et al., 2019). Through this relationship, the students can slowly learn more about injury prevention and be better equipped to share their new knowledge with their parents (Reed et al., 2008).

Secondly, we introduce a safety curriculum that is taught by the agriculture teachers, where we include some intentional activities so that the need for safety is made apparent through real-world experiences. The teachers are highly encouraged to find a local emergency services personnel that has dealt with tractor rollover accidents to come in and explain the consequences of not following proper safety precautions. The teachers are also tasked with finding a farmer within their community that has an older tractor that doesn't have a Rollover Protective System (ROPS) installed on their tractor to come visit their class as well. Following the safety curriculum, the teacher and students fabricate a Cost-effective Rollover Protective Structure (CROPS) in their laboratory for the same farmer who spoke to the class. By having students help someone in their community become safer on their tractor and potentially saving a life helps the students further break through the unsafe generational practices they have learned.

As a result of this method of safety intervention, we have seen several changes take place in youths' safety behaviors. On a summative assessment of the curriculum taught, the students did gain knowledge related to tractor safety and rollover accidents. This is encouraging because having the knowledge of what is and is not safe helps create a more prepared youth. Through the completion of the experiential learning activity, building of the CROPS, and community/youth engagement opportunities, students gained the skills of creating a positive influence in their own community. The other community/youth engagement activities that programs utilized were working with their local newspapers to share their story of helping a local farmer in need. Others showcased their local farmer and project at their FFA banquet to highlight what their students have done to create a change in safety behavior within their community.

(LEFT) Secondary agriculture student fabricating an axel bracket for their CROPS project.
(RIGHT) Secondary agriculture students and owner of the tractor with their completed CROPS project.



Through these activities, we did see a positive shift in safety practices in the students that participated in this study. One situation that did occur several times was students making the conscious choice to adopt safer tractor operating practices; however, their father still wanted it done their way, even if it was not the safest way to do it. The same students went on to say that even though they could not change how their parents do things on their farm, they would make sure things were done safely on their own farm in the future. In a few other cases, as part of one of their agriculture courses, students were required to operate machinery such as tractors, zero-turn mowers, and utility task vehicles (UTV). Students requested installing safety devices such as a ROPS and seat belts on their equipment before they would use it because of the safety concerns while operating them. Therefore, positive changes in safety behaviors did occur, even if not all the students had made the conscious decision to adopt safer practices.

Even though students did have a positive change in safety behaviors there is still more to do to ensure that safer farm practices get transferred from the youth-adult partnership between student and agriculture teacher back to the farm. The agricultural educator needs to continue to foster and install the safe farm practices in their program so students can continue to learn how to be safer in their farm practices. We also believe that having a curriculum with the intentional activities that highlight the real-world consequences of not following safe operating procedures by individuals who have directly dealt with them is important. Furthermore, passing along the safer operating procedures to someone in their community and potentially saving someone from injury or even death helps cement how important safe farm practices are to follow.

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OSHA and AG in the Classroom

by Dr. Dee Jepsen

Youth are the future, and the future of agriculture relies upon these young workers. Keeping students safe as they develop workforce skills is a critical area to be addressed. It does not matter if the students work on a family farm, participate in a Supervised Agricultural Experience (SAE) or internship, or go into an agricultural-related business. Worksite safety is important.

State Departments of Education have made a commitment to safety education by encouraging certificate courses be offered as part of the students' classroom experience. Industry-recognized credentials are available from multiple organizations to add value to the students' skills while earning their academic credits. The Occupational Safety and Health Administration (OSHA) 10-Hour and 30-Hour certificates are examples of such value-added trainings (OSHA, 2023).

What is an OSHA-recognized certificate

OSHA recommends employees participate in workplace safety training for their respective industry they are employed. The two most common OSHA Training Programs are General Industry and Construction. Under each Program, participants can receive 10- or 30- hours of training. The OSHA 10-Hour General Industry training is appropriate for entry-level workers to educate workers to predict, prevent, identify, and stop possible common worksite hazards. The OSHA 30-Hour General Industry program is geared towards supervisors who need more advanced training about safety and health hazards on the job.

The OSHA Outreach Training Program does not eliminate the employer's obligation to provide worksite training. This voluntary program helps familiarize workers with workplace standards, as well as safety and health hazards common to their worksite, as well as inform workers of their rights, employer responsibilities, and how to file a complaint.

The OSHA training programs are not considered a certification, they are a certificate of training. The difference is worth noting. A certificate program is based on student attendance, not necessarily demonstration of achievement or mastery of course learning objectives. Short assessments are offered to keep students engaged in the learning, and check for some level of understanding. A professional certification program issues credentials to students who meet prescribed and standardized criteria and requires continuing professional development hours to maintain their certification.

Online OSHA courses may include a student assessment to ensure the student is engaging in the topic and completes the required segments before advancing to the next topic. Most online tests are non-proctored and used as a checks and balances process on behalf of the online agency.

At the current time, OSHA cards do not expire. The certificate is good for a lifetime, with no additional professional development coursework needed. However, some employers, unions, or state jurisdictions may require workers to participate in additional training based on their workplace protocols.

Does OSHA apply to farm settings

Some questions may be raised about the value of OSHA training in agricultural operations. As career and technical programs in agriculture prepare students for work in the agricultural industry, it is appropriate to include safety and health training as part of the workforce preparation. It is true that some agricultural operations may be exempt if they fall under the small farm exemption, yet many agricultural businesses are not exempt.

To clarify this exemption, it is necessary to define the federal OSHA Appropriations Act. This Act exempts small farm operations from enforcement of all rules, regulations, standards or orders under the Occupational Safety and Health Act. A farming operation is exempt from OSHA activities if the employer has ten or fewer non-family employees and does not maintain a temporary labor camp within the year.

However, there are some activities that occur on farms that are not OSHA-exempt. These gray areas can include food manufacturing processes, such as when apples grown on the farm are pressed into cider, or grain grown on the farm is milled into flour and served as baked goods. In these situations, OSHA considers the activities to be food manufacturing, not farming. According to OSHA's interpretation, food manufacturing operations are not exempt, even if they occur on a farm (OSHA, 2014).

Safety by the Numbers

Production agriculture in the United States is a diverse industry, with just over two million farm or ranch operations, producing nearly $4 billion in food products ranging from crops to livestock (USDA-NASS, 2017). An estimated 97% of these U.S. agricultural operations are categorized as family-managed and have approximately 900,000 youth. From

this total youth population, it is estimated that 51% are performing work on their resident farms, and another 265,600 are non-residents hired to work in an agricultural operation (NIOSH, 2019). In 2020, youth under the age of 25 represented 11.7% of the total workforce (NIOSH, 2022).

Within agriculture, young workers experience a disproportionate number of serious work-related injuries compared to their adult counterparts (DOL-BLS, 2016). Recent data show 48% of all fatal injuries to agricultural youth exceed summations all other industries report. The rate of work-related injuries treated in emergency rooms for young workers, ages 15-24, was 1.5 times greater than the rate for workers 25 years of age and older (NIOSH, 2022).

OSHA and AG Curriculum

The OSU *OSHA and AG* program was developed at The Ohio State University in 2006, as part of an academic course preparing students for an agricultural career. The course is based on the requirements of the OSHA General Industry 10-hr course, with a combination of required and elective topics. Some electives were modified from the Construction Industry standards, where additional training is needed by agricultural workers when working from heights or performing trenching and excavation tasks. At the time of its development, the *OSHA and AG* course was unique to other OSHA 10-hr programs in that it was specifically designed for the agricultural workplace.

In the recent past, the *OSHA in AG* course has gained popularity in the high school classroom. The course is offered in-person as an instructor-led session and requires student attendance. There are obvious restraints to teaching OSHA 10-hour coursework within the public school system, especially with regards to time allotted to school class periods and attendance logistics. OSHA oversees class size and restricts in-person classrooms to 40 students. Managing these logistics is not impossible, but takes careful preparation and timing on behalf of the OSHA trainer. Since 2015, OSHA online learning platforms have increased in popularity for larger classrooms and provides flexibility for teachers to assign students to coursework outside of class hours or as remote learning sessions.

There is an initiative to increase the capacity of *OSHA and AG* course offerings around the U.S. However, in order to do so, it will require building a cadre of instructors in various geographic regions familiar with agricultural workplaces and the workforce preparation needs of the Ag-science classroom. When additional instructors are available to offer OSHA authorized courses in their area, there is then an increase to the overall capacity to offer agricultural occupational training as classroom, instructor-led OSHA and agricultural courses.

Qualifications of an OSHA Outreach Trainer

Does OSHA safety training sound like a teaching opportunity for you? Whether safety training is a career or just a side source of income, there are opportunities for educators to become authorized OSHA Outreach Trainers.

The qualifications are two-part, with separate prerequisites for experience and training. The prerequisites are:

1. **Experience**. Have five years of general industry safety experience in a trade. A college degree in occupational safety and health, a Certified Safety Professional (CSP), or Certified Industrial Hygienist (CIH) designation may be substituted for two years of industry experience. Obtain guidance on meeting this requirement at the OSHA Training Institute (OTI) Education Center.
2. **Training**. Complete OSHA Course #511, Occupational Safety and Health Standards for General Industry. This course addressess OSHA policies, procedures, and standards, as well as general industry safety and health principles. A comprehensive test is required to document course completion.

3. After the prerequisites have been fulfilled, the next step is to complete an OSHA Outreach Trainer Course in General Industry, Course #501. This program provides emphasis on required topics taught in the 10- and 30-hour programs, as well as those that are the most hazardous. Course participants must demonstrate effective instructional approaches and the effective use of visual aids and handouts. Persons successfully completing this course will receive an "Authorized General Industry Trainer Card." Additional details are available at: https://www.osha.gov/training/outreach

Summary

Regardless of the training format, OSHA training programs have the potential to prepare students to recognize workplace hazards and increase their awareness of safety and health practices. Agricultural educators play an important role in establishing a culture of safety in these young workers by offering safety courses and instilling safe work behaviors early in the learners' career development. Because youth often lack the cognitive, physical, and psychological ability to recognize and react appropriately to occupational dangers, it is important for young workers to receive additional training to recognize and mitigate hazards. Beyond the economic impact of a safe and healthy workforce to sustain the agricultural industry, a healthy workforce is also important to the workers' quality of life.

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OSHA and AG Evaluation Project

A study will be conducted within Agriscience classrooms to measure students' knowledge after participation in instructor-led and on-line training programs. Teachers will elect into an OSHA 10-hr course whereby their students receive training with an OSHA Outreach trainer (an in-class instructor-led program) or an online platform. Students' knowledge will be measured at pre-test, post-test, and 6-month post-test intervals. An additional evaluation of teachers will identify the benefits and limitations of offering OSHA General Industry training to teen audiences. This data can guide formative improvements to content, provide direction for future course expansion, and offer insight to the value placed on safety training programs in agriscience classrooms.

For more information about this study, or to enroll your classroom, please contact Dr. Dee Jepson (Jepsen.4@osu.edu).

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Save your Brain: Equipping Agriculture Teachers with Resources to Promote Brain Injury Prevention

by Emily Doosing & Karen Funkenbusch

Nothing seems to shake a rural community like the death of a student. In November of 2021, Emily Doosing's heart broke as she walked into the gymnasium of the school district where she graduated a decade before. A blue corduroy jacket hung next to a picture of a smiling young girl who would never again compete in a Career Development Event (CDE) or receive a proficiency award but had once been an up-and-coming FFA star. It seemed impossible that this community could lose such a special young person, but then again in March 2022, they lost another. A third young person was left with a life-altering traumatic brain injury (TBI) that put him in a coma for weeks. The memory of seeing a winding line of grief-stricken youth in FFA official dress honoring their fallen classmate and friend will forever be burnt into Emily's mind. Her initial shock and sadness quickly became a call to action.

After teaching Agricultural Education for a period, Emily decided to go back to college. She earned a Master's in Human Development and began working as a 4-H Youth Specialist for the University of Missouri in the rural area where she had grown up. The loss of two youth and the critical injury sustained by a third youth in her hometown prompted Emily to shift her focus away from the stiff competition of the upcoming fairs and reflect on the thing that mattered most to her: making sure the students in her community were safe, healthy, and able to grow up to be contributing members of the community. Out of the tragedies that happened, Emily began to work with her colleagues, Karen Funkenbusch at the University of Missouri, and Maureen Cunningham from the Brain Injury Association of Missouri to develop the 4-H Save Your Brain curriculum.

The University of Missouri Extension created the *Save Your Brain* curriculum (https://extension.missouri.edu/publications/lg820) in a joint effort with the Brain Injury Association of Missouri and the Missouri AgrAbility Program with grant funding provided by the United States Department of Agriculture National Institute of Food and Agriculture (USDA NIFA) to promote prevention of brain injuries in rural, agricultural communities. The *Save Your Brain* curriculum provides a teacher's facilitator guide and other resources to teach general awareness of traumatic brain injury and ways students can protect themselves from TBI.

The Save Your Brain curriculum was created to promote prevention of brain injuries in rural, agricultural communities.

Lesson Title	Description	Learning Objective
Save Your Brain	Brief overview of what TBI	Students will be able to define TBI
Save Your Brain on the Farm	Safety related to livestock handling and farming	Students will demonstrate spatial awareness and how it can prevent injury on the farm
Save Your Brain in Sports	Safety related to sports and recreation, including horseback riding	Students will demonstrate understanding of the importance of helmets in sports and recreation
Save Your Brain Around the House	Safety regarding household hazards	Students will problem-solve ways to mitigate risk of falls
Save Your Brain on the Go	Safety related to the operation of automobiles, UTV/ATV, and tractors	Students will identify common causes of motor vehicle accidents
Befriending a TBI Survivor	Promotion of respect for individuals with disabilities	Students will understand the importance of befriending individuals with disabilities, including TBI

Table 1. The six lessons in the *Save Your Brain* curriculum.

The curriculum is ideally delivered to audiences ages 8-18 years of age. While the curriculum can certainly be tailored to a variety of audiences, it is best delivered to rural youth or youth with agricultural backgrounds because several of the lessons are specific to youth who live, work, or are exposed to farming and agricultural practices. The *Save Your Brain* curriculum consists of six, one-hour lessons (see Table 1).

The curriculum is free and accessible to teachers and volunteers after they attend a free training course through the University of Missouri Extension. The training includes an overview of the lessons, a demonstration of at least one activity from the curriculum, and a copy of the curriculum to deliver the program. The training uses a train-the-trainer format, in which the University of Missouri Extension professional trains teachers and volunteers who subsequently train students to be leaders and deliver the lessons to their student peers. The teachers and adult volunteers provide support to teens delivering the curriculum. The curriculum should only be taught by teens who have been trained and are supervised carefully by teachers or volunteers who have been trained in the delivery of the curriculum given that the topic can be sensitive in nature.

The *Save Your Brain* curriculum can be taught as a unit, but it can also be woven into a number of other units being taught by agricultural educators. For example, the *Save Your Brain on the Farm* lesson could be taught in the context of a livestock les-

Table 2. Resources for agricultural educators on brain injury prevention.

Resources for Educators	https://www.crisoregon.org/Page/111
Save Your Brain Curriculum	https://extension.missouri.edu/publications/lg820
CDC Heads Up to Schools	https://www.cdc.gov/headsup/schools/index.html?fbclid=IwAR2e0ewyAelgN-BafnCMFd7oIvrScqMdZZhbcrqRDkhY7cXec4REju0-uATk
Brain Injury Association of America	https://www.biausa.org/public-affairs/media/concussion-awareness-infographics?fbclid=IwAR07wbLYUJwGNMKdUM9WvrizeC09WiF61SOi8TkUTNlqMyqdEu-JVbNpwdfI
Traumatic Brain Injury Links	https://www.crisoregon.org/Page/111
TBI Guides & Tools	https://www.crisoregon.org/Page/111
Concussion & Return to School	https://www.crisoregon.org/Page/111

son, and the *Save Your Brain on the Go* lesson could be taught in coordination with a lesson on tractor operation. Ag teachers should work with the University of Missouri Extension profession who trains them to identify the best delivery format.

The *Save Your Brain* curriculum has been successfully implemented in several classrooms. Professionals with the University of Missouri Extension have already trained fourteen adult volunteers, including teachers, representing five rural Missouri counties. These adults have, in turn, trained eighteen teenagers who serve as "Save Your Brain Ambassadors." These ambassadors have served as safety advocates and educated their peers on the importance of making safe choices.

March is Brain Injury Awareness Month. In memory of those blue-jacket wearing students who have left this world too soon and in honor of those who have continued to wear the blue jacket with brain injuries, agricultural educators should be challenged by this article to spark conversations with their students to get them thinking about how to make safer choices. In addition to the *Save Your Brain* curriculum, there are numerous resources agricultural educators can use to weave brain injury prevention into their lessons (see Table 2). If incorporating brain injury prevention education into the agriculture classroom sometime during the month of March prevents even one brain injury, isn't it worth the time and effort to do so?

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That's Not What I Heard!

by Garrett Hancock & Dr. Jason McKibben

Agricultural education has done a great job on specific aspects of safety culture. Walk into any classroom or laboratory and students will be able to identify at least one necessary Personal Protective Equipment (PPE), safety glasses. Be it due to years of culture working its way into the classroom, the use of memes, or those gross eye pictures during safety instruction, there has been a collective agreement to wear and promote the use of safety glasses. One safety area that we have fallen short of is near our eyes, yet is often overlooked: our hearing. Due to recent discussions on how future educators should be taught and what safety areas we are potentially neglecting, this one area surprisingly rose to attention.

> "Determine how easy it is for students to make the "safe decision." If we are trying to get them in a habit, safety should be the easiest option."

The Safety Concern

This past October in Indianapolis, a group of "old" ag teachers and professors sat around a table in the Blue-Ribbon Pavilion during the National FFA Ag Mech CDE, chatting about the year's contest and the different iterations of the contest we have put our students through while getting ready for the event. As the stories got going and the truth got stretched (as we are want to do), one commonality was shared across the group. The stories of the mishaps and misunderstandings in the laboratory grew longer, and everyone at the table started to lean in. I would love to say it's because of how good we are at telling stories, (they were sitting at the edge of their seats), but our group began to raise their voices and turn their heads to face their "good ear" to the speaker.

Everyone at the table had safety glasses at the ready and was wearing closed-toed shoes, long-sleeved nonflammable shirts, and long pants. Even the one long-haired guy had his hair pulled back tight. However, not one of us at the table had any form of hearing protection. As the different forms of "What did you just say?" and "Huh" arose, so did the interest of the group in terms of their safety concerns. With such a direct concern for specific safety measures in other ways, why has hearing safety seemingly fallen through the cracks? Hearing safety is not something that is new to agricultural educators. In fact, it is widely understood and joked about, that hearing loss is common in agriculture. How many individuals do we all know that use some form of hearing aid due to their hearing loss caused by the noise levels inherent to agriculture? While this number is often high, safety lessons in schools rarely discuss the hazards associated with high and/or consistent harmful noise.

Issues at Ear

While there is evidence that shows trends in the use of specific PPE, there is a disconnect when it comes to protecting one's hearing. If you were to walk through your laboratory today, how many different forms of PPE would you find? How many of these different PPE are being used by students? How many of these PPE are you utilizing during instruction? The answers to these questions may not be as positive as we would like to admit. While there will most likely be PPE being used in the form of proper clothing and eye protection, are our students and we ourselves practicing what should be done in a real-world workspace?

With an understanding that it is in the best interest of us and all our students to encourage and promote use of the correct PPE, how do we teach our students to use proper hearing protection while in the laboratory? We believe this boils down to three key areas: 1) understanding/concern, 2) access/proximity, and 3) establishing a culture of safety.

Understanding of the Concern

It is hard to explain to someone why they would need to wear hearing protection if they do not first know the consequences of hearing loss. Hearing loss is an invisible disability, and there are often little to no signifiers if someone suffers from it. It takes time to cause damage, and once we realize the damage is done, it's way too late. This poses a challenge as it is difficult to practically motivate yourself, let alone the students, especially when the cultural norms are to "turn the volume to 11" in our daily life. It is not uncommon to know what song someone is listening to in the car

beside you at a light or who is on their phone at the coffee shop due to how loud they have their volume. The red/yellow volume indicator on your phone appears to be more of a challenge than a warning to many.

Teaching about the potential outcomes from extended exposure to high decibels is becoming more of a necessity. Most other safety is much easier to give urgency to; eye damage slides are common use in safety conversations, burns from welding are easy to understand, table saw blades are easy to point to. However, finding ways to show students what hearing loss "looks" like is all but impossible. There are multiple ways to show loss of sight, limbs, and motor function, but the challenge of teaching hearing is that it needs to be framed in a way to show students what hearing loss sounds like. The challenge for teaching and encouraging hearing safety is the need for students to understand what it's like to live without hearing.

Access and Proximity

Once motivation has been addressed, it is important to have access to proper hearing protection. Students may know that hearing protection is needed, but without PPE being available, there is little incentive to go use it. Having different hearing protection options also allows students to identify what PPE they want and should be wearing in different experiences. By providing an access point for students in the laboratory, you will be building the foundations for an in-depth understanding of the use and need for proper hearing protection.

Access, however, is only one side of the instructional coin. Proximity is key in promoting the actual use. Just like with safety glasses, if hearing protection is not easily found, they will not be worn. PPE should be properly housed near workstations or along a direct path to your laboratory. By locating your PPE in close proximity to the laboratory, it will help promote the use and understanding of when and where PPE is meant to be worn. In short, the easiest thing to do should be the right thing to do.

Culture of Safety

With an understanding of why PPE should be worn and the access to the PPE in proximity to the laboratory, building a strong culture of safety is the final step in promoting lifelong habits. Habits are not formed overnight, and it is important to work with students in building this culture of safety. Having continued discussions on why PPE is important, providing resources on PPE management and use, and using PPE consistently will form habits that will last a lifetime. It is important for students to know that PPE use is not a forced object to be worn; however, there should be little to no tolerance for improper use or behavior in a laboratory setting.

While the work done in a school typically does not expose students to significant long-term decibel output, even in our more active labs, the recreation of a real-world workspace should never be overlooked. The promotion of this safety culture should be focused on establishing lasting habits that will be useful for students well beyond the classroom and laboratory walls and that starts with open dialogue, growth of understanding, and repetitive use of proper PPE.

What We Heard

There is a gap in safety instruction that needs to be addressed. The perceived lack of understanding students have on hearing issues is very concerning. While there are social pressures that are challenging to overcome and troublesome to address, there is still hope. With the strong foundation we have already built with other safety issues, tying hearing to a larger effort may not be as difficult as it first seems. While there are numerous ways to address hearing safety, these few steps will help move the proverbial needle.

The hearing safety knowledge gap first needs to be addressed before meaningful discussions can be had with your students. Take time during a safety unit to dive into ALL potential hazards associated with the tasks and have an open dialogue about the use of PPE to build buy-in on an agreed-upon policy and help increase student awareness.

Determine how easy it is for students to make the "safe decision." If we are trying to get them in a habit, safety should be the easiest option. We need to remove barriers to safe practices. It is not uncommon to provide a class-set of safety glasses, and it's not out of the ordinary to have welding PPE for each station or student. If that is the norm in your lab, it should be the same for hearing protection. This could be as easy as providing disposable earplugs or having a set of earmuffs. Remember, it is important that they are easily accessible and in close proximity to where they need to be worn.

Lastly, encourage and promote a culture of safety throughout your course instruction. This can be done in many different ways. We advocate for continued discussions throughout your lessons on the importance of PPE and safety awareness. A subtle reminder periodically throughout a class session about safety concerns or reasons for proper PPE use can go a long way. We all have to be reminded to keep vigilant about safety (think of all the do not drink and drive billboards); don't expect our students to be any different. To help in the growth of lifelong habits, the adoption of a no-tolerance policy in your workspace may help students remember that a one-hour course has greater connections outside the classroom and laboratory walls.

While these three steps will help set the foundation for proper hearing safety in your classroom and laboratory, it is only useful if there is concrete follow-through. The most important step that has yet to be mentioned is centered on you and your mindset. As the foreman or leader in your program, it is not to be overlooked that you set the tone. While "do as I say" may be a common phrase, it is imperative that the example is shown first by you. Yes, that does mean that there will be the added PPE responsibility, but educators are exposed to higher decibel output longer than the student. If we as instructors are to encourage the use of hearing protection to our students, it is important that we are first wearing ours. Let's change the culture surrounding hearing and not let this issue go unheard.

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ATV Safety Knowledge and Skills are Critical for All Riders

by Dr. Dee Jepsen, Dr. Aaron Yoder, Dr. Salah Issa, Dr. Marsha Salzwedel, Karen Funkenbusch, & Dr. Farzaneh Khorsandi

All-Terrain Vehicles (ATVs) started as recreation vehicles. However, their adaptability and utility to rural and farm settings soon gained popularity as farm-use vehicles. The American National Standards Institute (ANSI) defines an ATV as a vehicle that travels on low-pressure tires, with a seat straddled by the operator and handlebars for steering control.

The Consumer Product Safety Commission (CPSC) reported 14,653 ATV-related fatalities occurring between 1982 and 2016, and in 2016, CPSC estimated 101,200 ATV-related, emergency department-treated injuries in the United States. A separate database for agricultural-related injuries is maintained by the National Children's Center for Rural and Agricultural Health and Safety (NCCRAHS), called Ag Injury News. This media-sourced database tracks the most serious or fatal ATV incidents, and while the data are extremely useful to understand agricultural injuries, they likely underrepresent the incidence and frequency of occurrences, especially in remote areas and various populations. According to Ag Injury News, from 2016 – 2022, a total of 559 injuries from ATV, UTV, Quad bikes and other off-road vehicles were reported. About 60% of the reported ATV-related incidents were fatal, 30% involved youth under the age of 18, and 73% of the victims were male. ATV-related incidents were documented in 44 states, with the majority of incidents occurring in Midwestern states, Texas and California.

To prevent injuries, it's important to understand the relationship between the vehicle, the operator, and the environment. Many factors contribute to personal injury. This article describes a 3-pronged approach to consider how Education, Engineering, and Enforcement can be incorporated into local training programs. Using this approach, these 3-E's are presented as Enforcement of rules and manufacturer's recommendation for ATV use, understanding the Engineered design of the vehicle, and rider Education resources.

Enforcement of age and size recommendations

Manufacturers use age recommendations as a guide for riders to select the appropriate-size ATV, based on the vehicle's size and engine power. Studies report youth under the age 16 do not have the physical strength, cognitive maturity, and mental judgment to operate adult-sized ATVs reliably. Pediatric injury data support these claims.

Age is a good start, but additional fit-testing assures the rider is on the right size machine for their body characteristics. Even adults of smaller stature can benefit from operating an appropriate-sized vehicle. To conduct a fit test, look at these key factors:

1. While standing on the ATV, in a mounted position, measure the clearance between the ATV seat and the inseam of the rider's pants. This measurement should be 3" – 6."
2. While seated on the ATV, riders should be able to reach the handlebars, throttle, and handbrakes, while having a slight bend to their elbow. If riders' arms are stretched straight out, then they won't be able to maintain their grip while steering the machine in extreme left and right turns.

Student participants in the ATV Aware program (https://go.unl.edu/atv-aware). The course incorporates tabletop demonstrations and a full-size ATV riding simulator to demonstrate "active" riding experiences on different slopes in a controlled environment. The riding simulator is used to discuss the importance of Personal Protective Equipment (PPE), riding the right size ATV, marking features like flags, engineering concepts like center of gravity, and engineering controls like a Crush Protection Device (CPD).

3. While seated on the ATV, the riders' feet should comfortably reach the footrest and have the toe strength to operate the foot-controlled brake and gearshift. The upper leg should be slightly horizontal from the hip to the knee.
4. Youth have a limited field of vision compared to adults, which can make it difficult for them to see potential hazards while operating ATVs. Check their range of vision while seated on the ATV.

State laws may require a minimum certification for youth to ride on public land, or be accompanied by a parent or guardian over the age of 18. To know if your state has standards, check with your state parks and recreation department. Other state laws apply to ATV operation, especially when these vehicles are used for hunting or operating after dark.

Understanding the Engineered design of ATVs

ATVs have unique characteristics that differentiate their operation from other utility vehicles, dirt bikes, or tractors. Understanding these features helps the operator understand why the safety recommendations are made.

- ATVs have a high center gravity, a narrow width, and a short wheel base, which makes them prone to rollovers.
- ATVs are designed with either solid rear axles or differential axles, which affects the turning capability of the machine and how riders should shift their weight into the curves.
- Low-pressure tires and high tread allow ATVs to drive on varying terrains. These tires are not designed for pavement, where they cannot dig in to get a grip. This is why ATVs should not be operated on paved roads where they do not have the ability to maintain tire contact with the surface. ATVs have better control when operated alongside paved roads in the grass or dirt.
- One elongated seat – designed to be rider-active, meaning the operator must adjust to the riding environment and shift their weight to make turns and traverse hills over uneven terrains. Neither the seat nor the cargo racks are designed for passengers on 1-seated ATVs. To accommodate passengers, riders should purchase a two-passenger designed ATV from the manufacturer.
- Add-on equipment (i.e., pull-behind mowers, snow blades, and spray tanks) also changes the vehicle's stability. Inexperienced riders should not operate ATVs with additional equipment until they have mastered ATV operation skills.
- ATVs can travel extremely fast. Therefore, speed adjustments can be made to the machine to provide control for the operator.

Education Resources

Most serious ATV injuries occur in the first year of ownership, so it is recommended that youth take a training course to learn about the safe operation of ATVs. Contact a local ATV dealer for information about their available training courses and associated fees, noting that free courses may be available for customers purchasing new vehicles. Two additional organizations offer training. The Rider Education Course, offered through the Specialty Vehicle Institute of America (SVIA), offers a free online certificate course and other training options. The ATV Safety Institute offers both hands-on training and e-courses.

In addition to training courses, curriculum is available for teaching youth about ATV safety in school, such as ATV Aware, ATV Safety in Motion and GEARING UP for Safety (see Table 1). The chart contains more information about available curriculum, as well as supporting resources. The term *Additional Resources* refers to more individualized, originally authored resources and materials that lack one or more of the three elements of a formal curriculum. Both types of materials may be supportive of Agriculture, Food, and Natural Resources (AFNR) Career Cluster Content Standards and can be valuable educational materials for youth ATV safety. While this is not a comprehensive list, these resources are available for self-directed learning and group-led instructors.

Other ATV Safety Points to Teach

Beyond riding skills, many ATV safety programs highlight additional concepts.

- **Personal Protective Equipment.** Operators should always be equipped with the proper personal protective equipment while operating ATVs. These items include long pants to protect from engine burns on the legs, riding goggles, to prevent dirt or dust entering the eyes, boots to protect their feet, and an ATV helmet in case of being ejected from the vehicle.
- **Riding Terrain.** Because ATVs are designed for off-road use, it is important for riders to practice their maneuverability skills to advance their riding ability for different environments. Rider obstacle courses are a fun way to practice skill building in a controlled and supervised setting.
- **Respect for the environment.** "Tread lightly" is a common phrase for ATV riders to consider while riding in the great outdoors. Having respect for nature, packing out what you pack in, and staying on established trails are good examples of environmental stewardship. A service-learning activity could be to establish a trail in your area or adopt a trail to maintain by trimming back branches and clearing debris obstacles.

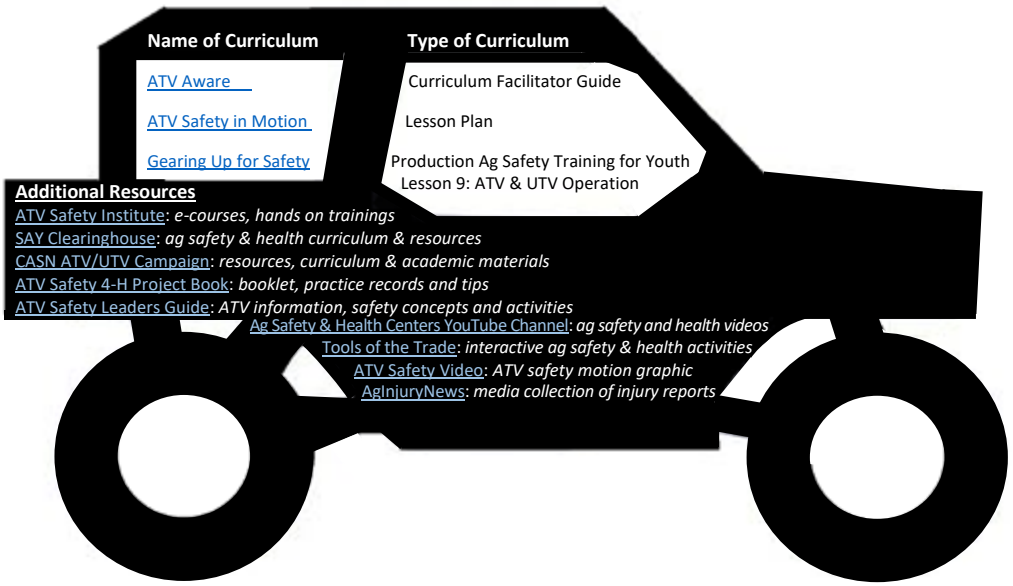
Table 1. ATV safety curriculum and resources for self-directed learning and group-led instruction.

ATV Curriculum and Resources	
Name & Developer	*Content*
Lesson Plans and Curriculum	
ATV Aware *Nebraska Extension, Central States for Ag Safety and Health*	Curriculum facilitator guide, ATV simulator, table top demonstrations, PowerPoint slides, Flip charts, activities, evaluation materials and additional resources.
ATV Safety in Motion	Lesson Plans with guidance for instructors, course materials, small and large group breakout sessions, hands on activities and videos
GEARING UP for Safety *Purdue University*	Lesson 9: ATV & UTV Operation. Lesson plans with graphics, case studies, student activity sheets, testing materials, course layouts, forms and more. Aligned to several states ag education curriculum standards and the AFNR Career Cluster Content Standards.
Additional Resources	
National 4-H Program Books: *ATV Safety 4-H Project Book*	Materials to familiarize participants with the ATV, identify protective gear, and teach riding techniques, safe strategies and safe practices. Includes practice records and tips.
ATV Safety Leader's Guide	Guidance on how to teach young riding skills, implement service-learning projects, involve parents in supervision and education
ATV Safety Institute	Free booklets, hands-on courses, job training, e-learning courses with videos, pictures, checklists and quizzes for youth, teen, adults and supervisors. Certificates awarded upon e-courses completion.
Safety in Agriculture for Youth (SAY) Project *Penn State, Ohio State, Utah State, University of Nebraska*	Clearinghouse for ag safety and health curriculum and resources for teachers. Contains formal curricula and other/supporting resources. Also provides alignment to AFNR Career Cluster Content Standards.
CASN ATV/UTV Campaign *National Children's Center for Rural & Ag Health & Safety*	ATV/UTV safety materials, including curriculum, safety guides, videos, posters, brochures, training and demonstration materials, interactive activities and academic resources.
ATV Safety Video *Ag Health and Safety Alliance,* *Central States Center for Ag Safety & Health*	Motion graphic that illustrates ATV Safety concerns, including injury incidence, cause of injuries, hazards, protective strategies, safety devices and importance of vehicle maintenance.
U.S. Agricultural Safety & Health Centers YouTube Channel	Collection of agricultural safety and health videos created by the NIOSH funded Ag Safety and Health Centers. Topics span a wide variety of ag tasks and all videos are peer reviewed.
Tools of Trade *National Children's Center for Rural & Ag Health & Safety (NCCRAHS)*	Collection of ag safety and health "tools" from a variety of organizations. Each "tool" is an interactive activity designed for "hands-on" learning. Videos, activity components and handouts enable facilitators to create and carry out these activities. A media kit is also available.
AgInjuryNews *National Farm Medicine Center (NFMC) and NCCRAHS*	Searchable collection of over 4000 agricultural related injury reports, with incidents from all 50 states and Canada.
Cultivate Safety Resource Library NCCRAHS & NFMC	Collection of hundreds of fact sheets, reports, guidelines, booklets and other resources focused on agricultural health, safety and well-being. Many are offered in a variety of formats.

Summary

Teaching ATV safety can be a fun and rewarding program. Embrace the opportunity to bring an ATV Safety Awareness program to your community and enjoy the benefits of teaching safety skills to young riders.

To read more from these authors about ATV Safety, see their published White Paper, "Agricultural All-Terrain Vehicle Safety." This publication was a result of their USDA-NCERA committee work and contains a comprehensive source of referenced materials. It is available at: https://ag-safety.extension.org/wp-content/uploads/2021/01/ATV-White-Paper-2020-NCERA-197.pdf



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Using Virtual Reality to Improve Agricultural Safety Training Effectiveness in Agricultural Education

by Dr. Justin Pulley & Dr. Dee Jepsen

Agriculture is a vital industry that provides food, fiber, and other essential products for the world's population. However, it is also a high-risk industry, with many potential dangers and hazards that can result in serious injury or death for students. To help minimize these risks, it is essential for students to receive proper safety training. In recent years, virtual reality (VR) technology has emerged as a powerful tool for improving the effectiveness of safety training in a range of industries, including agriculture.

The Benefits of Virtual Reality in Agricultural Safety Training

One of the key benefits of using virtual reality in agricultural safety training is its ability to create immersive and interactive training scenarios that allow students to experience a range of potential hazards in a controlled and safe environment. For example, VR simulations can provide a realistic representation of working with heavy machinery, such as tractors, combines, and other equipment. This allows students to understand the potential dangers of these machines and learn how to avoid them. Additionally, VR simulations allow students to practice operating the equipment in a safe and controlled environment, increasing their confidence and competence in performing their work.

Another benefit of using VR technology in agricultural safety training is its ability to provide real-time feedback. VR simula-

(TOP) A view of the skills test area, where students may practice the skills needed to attach implements. (BOTTOM) An example of the scorecard that students will receive upon completion of the driving course.

(TOP) A view of the driving course. (MIDDLE) A view of the stationary tractor, where students may learn about unsafe areas of a tractor.
(BOTTOM) Hotspots on the stationary tractor review different parts of the tractor.

tions can highlight areas where students are not following proper procedures or are at risk of injury. This allows trainers to provide immediate feedback and guidance to students, helping them to improve their safety practices.

Customization is another key advantage of VR technology in agricultural safety training. Trainers can create customized training scenarios that are tailored to the specific needs of their students and the hazards they face in their working environment. This allows training to be more targeted and relevant, leading to increased effectiveness.

In addition, VR technology can provide a more engaging and interactive learning experience compared to traditional training methods, such as lectures or videos. Students can actively participate in the training, rather than simply observing, which can improve their understanding and retention of the information. Furthermore, VR training can be repeated as many times as necessary, allowing students to practice and refine their skills until they are confident in their ability to work safely.

Challenges and Limitations of Virtual Reality in Agricultural Safety Training

While VR technology offers many benefits for agricultural safety training, there are also a number of challenges and limitations that must be considered. One of the biggest challenges is the cost of VR technology, as well as the resources required to develop and implement VR training programs. VR hardware and

software can be expensive, and the development of customized training scenarios can also be time-consuming and costly.

Another challenge is the need for specialized training for trainers who will be responsible for delivering VR training programs. Trainers must be familiar with the VR technology, as well as with the specific hazards and safety practices relevant to their industry. This requires specialized training, which can be time-consuming and expensive.

In addition, VR technology can also be limited by the need for specialized hardware and software, making it difficult for some students to access the training. For example, students in remote or rural areas may not have access to the necessary hardware, such as VR headsets or computers. This can limit the reach and impact of VR training programs.

The Role of Agricultural Education in Implementing VR Safety Training

Agricultural education plays a critical role in ensuring students receive the training they need to work safely. Agricultural education programs can provide students with the knowledge and skills they need to understand the potential hazards in their working environment, and how to avoid them. By incorporating VR technology into their safety training programs, agricultural education programs can help to further improve the effectiveness of safety training for students.

Example of a Virtual Reality Safety Training

One specific VR experience that can be used to increase effectiveness is a Virtual Safe Tractor Operation Experience made for the Meta Quest and Quest 2. This VR experience is supported by the National Safe Tractor and Machinery Operation Program (NSTMOP), and can be used as a supplemental practice component before students get on the real tractor. It can also be used as a standalone experience paired with other existing curriculums as well. This experience was designed with three different areas in mind:

1. An area to review safety information related to tractor operation.
2. A virtual driving course for students to practice.
3. An area for students to practice the skills related to connecting/disconnecting implements.

The first area of this experience focuses on reinforcing safety knowledge gained by students through classroom or online instruction. Students are able to move around a stationary tractor and interact with “hot spots” that give more information about the safety of the areas. Students may stay in this area as long as needed or until they feel comfortable with the information being presented.

The second area is a virtual driving course, this course is modeled after the NSTMOP certification course. Students must navigate a serpentine path through cones and barrels, demonstrate how to back up, and return to the starting position all while pulling a trailer. Students must complete the course without striking any of the barrels or cones; if they do, they receive points based on severity. The goal is to complete the course with as little to zero points as possible. Scores can be saved to the VR headset to track progress or grade students based on performance.

The third area was designed around the skills needed to attach implements to machinery. Real actions have been animated for students to interact with virtual equipment such as operating the jack to lower the implement down on the hitch, grabbing the PTO shaft and sliding it into place, and placing the hydraulic couplings into the correct hydraulic remotes. Students may also answer questions related to connecting/disconnecting implements.

Teachers who have implemented this safety training experienced increased engagement, more collaboration, reinvigorated interest in an old topic, and a cool new technology to aid them in the classroom. Teachers noticed that students who were not normally engaged or active in class became more engaged when using VR as an educational medium. Students who were more familiar with VR shifted into a mentoring role for students and teachers that were not competent with the technology. This led to more collaboration between the inexperienced and experienced students, while everyone learned more about tractor safety and operation.

Other teachers explained they struggled with teaching tractor and machinery safety because it can be a dry topic that students can lose interest in quickly. Several teachers reported that as soon as they brought the VR headset out, students were notably excited, asking “Oh cool! Is that an Oculus?” The gamification feature added a level of competitiveness that kept students engaged and trying to one-up each other. Some teachers were located in more urban schools and did not have a tractor to practice driving. They thought the experience was valuable as it provided them access to equipment that they do not have.

This VR experience was compared with an in-person traditional tractor safety course, where one class used the VR to practice the course before getting on a real tractor and the other class which did not use the VR to practice. It was determined that there was no difference in passing rates between both classes. This means that using VR to supplement training was just as effective as practicing on the real tractor, in this case.

Ultimately, students reported having a positive experience and would use the training again if possible. Students told their teachers that it was fun, challenging at times, and allowed them to relieve some anxiety around operating machinery. Teachers also said using the experience and the technology was beneficial to their classroom in terms of cultivating engagement, motivation, and a renewed interest in an otherwise dry topic.

This is just one example of a VR agricultural safety experience; additional simulations exist that focus on rollovers, worksite safety, and more. I encourage you to explore these options if you are interested in incorporating VR technology into your curriculum.

For more information about implementing the tractor and machinery VR program mentioned in the article, please reach out to the authors.

Additional agricultural safety curriculum is available at a national clearinghouse at Safety in Agriculture for Youth at: https://ag-safety.extension.org/safety-in-agriculture-for-youth/

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What Are You Really Teaching Them?

by Dr. Jason McKibben

Tuesday afternoon, around 2:15, a few years ago, my maintenance director/ transportation director/ landscape man/crossing guard/ guy named Stewart popped his head in the back of the shop while my class was working on projects. "Mr. McKibben, I have some trouble and I need your help." Being who he was in this small school district in ranch country Texas, I had one answer, "Of course, what can we do for you?" His next response would send shivers up any ag teacher's back, "It's out here in the pick-up." As a small-town Ag teacher, he could have meant anything from "someone's begonias are yellowing, can you look at them," to "I found this goat growing a fifth leg from its forehead walking around on the highway." Lucky for me, it was something small and quick and nothing that was going to make the Abilene newspapers. Stewart pulled a thin-walled pipe and a stop sign that I recognized well. His crossing guard prop had lost its stop sign and we were only 30 minutes from the kids getting out and walking down to the middle school to catch the bus. I grabbed the pole and sign and told Karlin, one of my senior boys, to pull the Miller wire welder over the table. I took the pipe to the grinder and put a little bit of a bevel on both ends that were to be welded and clamped it up to weld. I grabbed the MIG gun and started tacking away. I got it spotted together and carried it back out to the pickup. As I loaded it up, I told Stewart to bring it back after the buses ran and I would clean it up and put a little paint on it so it didn't rust. He drove away with a wave and once again... AG had saved the day. I felt good. My kids were learning that we are part of a community. That if you have skills and can help, you help your neighbors. That people like Stewart were to be respected and in small towns like ours, everyone has to have value.

The next day in that same class period, the students were welding on their projects. We were weeks from the county ag mech show and it was crunch time. I looked out from the tool room and saw Karlin tacking tie-down brackets on the side of his trailer. I came unglued. "Karlin, what do you think you are doing?" He immediately stopped his work, threw his hands up, exacerbated, and gave me a loud "What?!" He had a small team of sophomores helping him out, they had measured very carefully and marked where each tiedown was to go beforehand. They were clamping the tiedowns on the side using c-clamps and checking multiple times for squareness. They had even fabricated a "go-by" template to make sure each one of the 20 tie downs was centered on the side rail and looked as uniform as possible. He was taking all the steps he should take to make sure it was done right, as I had shown him. He was teaching the younger boys the steps needed so they could take pride when it was done right. He was parroting what was done for him when he was younger. So, when I hollered "KARLIN!!!," in the culture we had developed in my shop, his agitation was warranted. What could I have possibly been mad at... most of the things he and his team were doing were correct. But in the crunch of a rush, he fell down on the safety. What he was doing was tacking the tie downs on by sticking his gun in the joint, covering the end of the gun with a hand, tilting his head to the side, and pulling the trigger. It all goes back to what he was taught and how he was taught. It comes down to the culture I had shown them we operated in. Just like me the day before, he had no helmet and was wearing only one glove.

> "Learning is a function of three things, the behaviors of the student/ learner, the mental factors brought to the table by the learner, and the environment they are learning in."

Albert Bandura, in a famous research project conducted in the 1950s and 60s, gave young kids a clown blow-up in an empty room and let them play with it. They did what most young kids would do at that time. They pushed on it back and forth, they watched it bobble, they even hugged it. They played with it the way they had been shown at home and school to play with toys. When a second round of kids was brought in, an adult went in the room with the kids and began hitting the blow-up. When the kids were left to their own devices to play with "Bobo," as it was called, they began bludgeoning this thing to their little lunatic hearts' content. (If you haven't ever seen it, old black and white video is all over the internet of

these experiments). What Bandura and his colleagues figured out through decades of work was that learning is a function of three things, the behaviors of the student/learner, the mental factors brought to the table by the learner, and the environment they are learning in. They figured out that these three main categories play back and forth to affect each other constantly. As students witness things, they change what they know and how they feel. As they change what they know and how they feel, it in turn changes the way the students see things, and that new view changes the way they interact with the information and environment around them. It goes back and forth in a never ending loop.

In our shops and labs, that means that when we teach our students, we are working with or against the knowledge they bring to the shop, the experiences they have had before, their fears, the emotions they have that day, the shop itself, the equipment they use, and the skills or information we are asking them to learn. But the item we forget about in this equation and the thing that Bandura's early work focuses a lot on is YOU. As the young kids in his Bobo doll experiment showed us, when students encounter things or information, they will use everything they know and have seen to process the "right" way to interact with that information. They will use the context of the environment to process the best way.

When we read Bandura's work, we can see that teachers serve as major parts of the environment for our students' learning. You, the other kids, and the shop/lab itself are all part of that environment. The way they see us interact with things is as important as the information we give them. Our non-verbal actions are just as educative. The adult that walked and hit the bobo doll in front of the students more effectively taught them how to interact with that doll than any verbal instruction could have.

In my story from the beginning of this article, I had gone out of my way to make sure I did all the things I needed to do to produce a good weld. I cleaned the pipe. I beveled the mating surfaces. I lined up and clamped the pieces inline to make sure that even this small and insignificant weld was done to the best of my ability. But, when it came time for the last bit, I fell back on old habits from "get it done" times and didn't put on my gloves or even a welding hood. You better believe the students saw this. The students in my shop out in central Texas, and the ones in yours, learn as much, if not more, from watching you, not only when you are in front of the room demonstrating, but also when you are working on the side or helping students out. They see you duck into a booth without a hood, or hold your hand up to shield your eyes, or tack together items without gloves (let's not even talk about what other safety I was modeling incorrectly with respect to hearing and eye protection...SURE, these are prescription safety glasses without side shields).

I advocate for my new teachers to always have a small project of their own going in the shop. This is twofold. It's great for young teachers to be able to hone their skills in the shop they are teaching in with the tools their kids will be using. But it also is a great way to model what you want your students to be doing. But, remember to always be doing it the way you want them to do it.

Most of us Ag teachers rightfully focus on making sure that our students leave our classes with a healthy amount of information. We make sure they can do the things our community needs them to do and know just enough about agriculture to be able to be informed consumers. We recognize that we often serve as "momma" or "uncle" to many of our kids. That we are the role models for how to be good agriculturists and community members. We see that we are some of the only positive forces in a lot of these kids' lives, but we forget that those eyes and ears are always on us. It's our responsibility and just as important that we are showing them the right way, that we are modeling what they need to be doing, even when there is a crunch time. It's our responsibility to be the leaders we ask our students to be. So, next time you need to tack up something, or grind something, pause and ask, "Is what they are seeing, what I want them to imitate?" or am I about to have to say, "Do as I say, not as I do." This is how we build the culture we want in our shops, a culture of great effort, high quality, and superior safety. As Abraham Lincoln said, "Actions speak louder than words."

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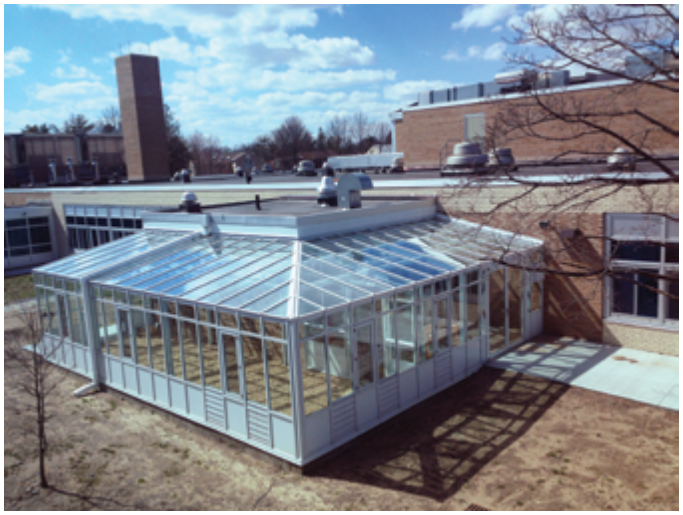

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