Research Poster

Differences in Safety Instruction Confidence among School-based Agricultural Education Teachers by Gender

Amy M. Leman, University of Illinois at Urbana-Champaign
bunselme@illinois.edu

Josie M. Rudolphi, University of Illinois at Urbana-Champaign
josier@illinois.edu

Salah F. Isa, University of Illinois at Urbana-Champaign
salah01@illinois.edu

Contact for Authors:
139 Bevier Hall
905 S. Goodwin Ave.
Urbana, IL 61801
217.300.6561

Introduction

The model of instruction for school-based agricultural education (SBAE) includes experiential and project-based opportunities, often in the form of laboratories and shop environments where students practice their skills. However, the introduction of experiential opportunities using tools and equipment can also increase the risk of injuries.

While teachers support lab safety in general, they may not fully implement safety training and are not always familiar with safety guidelines (Dyer and Andreason, 1999). Safety topics are consistently at the top of professional development needs lists of SBAE teachers and pre-service teachers instructing agricultural mechanics (Chumbley, 2015; Saucier et al., 2014; Shultz et al., 2014; Wells et al., 2021). In one of few studies of SBAE accidents, Hard (1989) reported a majority of accidents related to welding and woodworking.

In recent years, female license-eligible graduates outnumber males three to one (Foster et al., 2019). Pre-service female students have expressed concerns related to safety when teaching agricultural mechanics (Tummons et al., 2017). Hubert et al. (2003) reported that female teachers reported stronger perceptions about the importance of safety compared to male teachers. Further research on gender differences could lead to a better understanding of the nuances of safety practices in agricultural mechanics.

Theoretical Model

The Health Belief Model (HBM) is a behavioral theory to guide health promotion and injury prevention (Glanz et al., 2015). The HBM proposes that individuals are more likely to adopt injury prevention or health promotion behaviors if they are (1) susceptible to the condition, (2) the condition is serious, (3) the benefits outweigh the barriers, and (4) they are confident they can carry out the recommended treatment (Evans, 2008). The HBM has been adapted for nutrition education, risk-related behaviors, and safety-related behaviors (Glanz et al., 2015)

This study adapts the HBM for SBAE teacher safety-related behavior. Following the model, SBAE teachers will implement safety procedures if they (1) feel susceptible to safety risks, (2) the risks are perceived as serious, (3) the benefits outweigh the barriers, and (4) they are confident they can implement the required safety plan.

The following research objectives guided this study:

1. Describe how SBAE teachers perceive the frequency and severity of safety risks in their courses utilizing welding and woodworking techniques.
2. Determine the confidence of SBAE teachers to teach welding and woodworking safety.
3. Compare the experiences of male and female teachers in relation to their perceptions of the frequency and severity of risks as well as their confidence in teaching safety topics.
4. Determine perceived barriers for both male and female SBAE teachers to include the teaching of safety practices in courses utilizing welding and woodworking techniques.

Methodology

The researchers utilized survey research to understand the experiences of SBAE teachers during courses utilizing welding and woodworking techniques. A questionnaire was developed as part of a larger study to identify SBAE accident rates and safety protocols among SBAE teachers. To establish if teachers included safety instruction, participants who self-identified as teaching the topics of welding and/or woodworking were given a list of specific equipment used in these areas. For each item, participants were asked if they taught item-specific safety skills and their level of confidence in teaching. In addition, participants were asked how susceptible students were to injuries and the perceived severity of these injuries for both welding and woodworking. The survey was tested with a university teacher licensure instructor and a current

SBAE teacher. The questionnaire was created on the Qualtrics XM© survey development platform and distributed by email to SBAE teachers from two midwestern states using state directory email lists (n=969). Teachers that chose to complete the survey were sent a $10 Amazon e-gift card.

Results

A total of 185 teachers completed the survey, equaling a 19% return rate. Of those responses, 51 (45.9%) identified as male, 60 (54.1%) identified as female, and 74 either preferred not to answer or left the question blank. Of those identifying gender, 35 (51.5%) male and 33 (48.5%) female teachers reported teaching welding topics in a course, and 30 (50.8%) males and 29 (49.2%) females reported teaching woodworking topics in a course.

Safety Risks

No significant gender difference existed between the mean responses for perceived susceptibility to injury with welding and woodworking topics. However male teachers were slightly more likely to report that students were susceptible to injuries and perceived the potential injuries as more severe in comparison to the mean female response.

Confidence in Teaching Safety Topics

A majority of teachers reported teaching safety skills for the equipment used in their courses. However, significant differences did exist between male and female teachers in their confidence to teach safety topics for both welding and woodworking. The male mean responses for all 14 safety areas for welding, except for metal lathe safety, and all 18 safety areas for woodworking were significantly higher than the female mean responses.

Barriers to Teaching

Both male and female SBAE teachers identified the same three barriers to teaching safety: time, *availability* of high-quality safety materials, and *access* to high-quality safety materials. More than twice as many females included the barriers of lack of *experience* in teaching safety and lack of *confidence* in teaching safety.

Conclusions and Implications

Both male and female SBAE teachers identify injury risks for welding and woodworking topics. However, female teachers fall below their male counterparts in confidence to teach safety topics. This finding does not lead to the conclusion that female teachers have less safe lab spaces, but it does speak to a need for further research and professional development. As two of the most common barriers to teaching safety are access and availability to safety and health materials, future resources could focus on creating quality safety materials that also address the issue of confidence females express in welding and woodworking skills.

As more females choose to teach school-based agricultural education and agricultural mechanics topics, perhaps a one-size-fits-all approach to professional development and safety education is not the best answer for meeting the needs of teachers and protecting the safety of both teachers and students in laboratory settings. Some of the confidence concerns found by Tummons et al. (2017) in pre-service female teachers carry over into the teaching experience. Female teachers may benefit from experiences targeted at only female audiences. Safety should continue to be a concern for all agricultural laboratory classes. It is important to continue to address resources to fill the gap in appropriate materials and skill development in this area.

References

Chumbley, S. B. (2015). Laboratory safety practices of New Mexico agricultural science teachers. *Journal of Agricultural Systems, Technology, and Management, 26*. 1-13. https://jastm.org/index.php/jastm/article/view/35

Dyer, J. E. & Andreason, R. J. (1999). Safety issues in agricultural education laboratories: A synthesis of research. *Journal of Agricultural Education, 40*(2), 46-54. https://doi.org/10.5032/jae.1999.02046

Evans, D. (2008). Teaching patients to manage their asthma. In M. Castro & M. Kraft (Eds.). *Clinical asthma* (1st ed., pp. 221-228). https://doi.org/10.1016/B978-032304289-5.10056-6

Foster, D. D., Lawver, R. G., Smith, A. R., & Thompson, E. C. (2019). *National Agricultural Education Supply and Demand Study, 2019 Executive Summary.* American Association of Agricultural Education. https://www.naae.org/teachag/NSD2019%20Summary_7.15.20.pdf

Glanz, K., Rimer, B., & Viswanath, K. (2015). *Health behavior: Theory, research, and practice, 5th ed.*. Jossey-Boss.

Hard, D. L. (1989). *Correlates of accidents in Ohio vocational agricultural laboratories.* (Publication No. 9014432) [Doctoral dissertation, The Ohio State University]. ProQuest Dissertations and Theses Global.

Hubert, D., Ullrich, D., Lindner, J., & Murphy, T. (2003). An examination of Texas agriculture teacher safety attitudes based on a personal belief scale from common safety and health practices. *Journal of Agricultural Systems, Technology, and Management, 17*, 1-13. http://www.agedweb.org/WRAEC/2002/Research%20Papers/Hubert%20-%20Ullrich%20-%20et%20al.pdf

Saucier, P. R., Vincent, S. K., & Anderson, R. G. (2014). Laboratory safety needs of Kentucky school-based agricultural mechanics teachers. *Journal of Agricultural Education, 55*(2), 184-200. https://doi.org/10.5032/jae.2014.02184

Shultz, M. J., Anderson, R. G., Shultz, A. M., & Paulsen, T. H. (2014). Importance and capability of teaching agricultural mechanics as perceived by secondary agricultural educators. *Journal of Agricultural Education, 55*(2), 48-65. https://doi.org/10.5032/jae.2014.02048

Tummons, J. D., Langley, G. C., Reed, J. J., & Paul, E. E. (2017). Concerns of female preservice teachers in teaching and supervising the agricultural mechanics laboratory. *Journal of Agricultural Education, 58*(3), 19-36. https://doi.org/10.5032/jae.2017.03019

Wells, T. & Hainline, M. S. (2021). Examining teachers' agricultural mechanics professional development needs: A national study. *Journal of Agricultural Education, 62*(2), 217-238. https://doi.org/10.5032/jae.2021.02217