Research

An Examination of Agricultural Mechanics Laboratory Safety Conditions in Texas: Perceptions from Texas Agricultural, Food, and Natural Resource (AFNR) Teachers who Supervised Students Competing in the 2018 San Antonio Junior Agricultural Mechanics Project Show

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Introduction

Agricultural mechanics courses have been a significant part of the agricultural education curriculum since its inception and are popular across the United States (Anderson, Velez, & Anderson, 2014). The agricultural mechanics classroom and laboratory offer unique experiences for many students, providing real-world engagement in the context of a safe learning environment (Langley & Kitchel, 2015). Moreover, safety in the agriculture mechanics laboratory is a major concern for teachers, students, parents, and administration (Clay, 2017). Therefore, the implementation of adequate safety methods and practices is essential to agricultural mechanics laboratories. Johnson, Schumacher, and Stewart (1990) conducted a study to identify the agricultural mechanics laboratory management needs of in-service agricultural education teachers in Missouri. One of the areas they found to have the highest need for professional development was laboratory safety. A more recent study conducted by Saucier and McKim (2011), assessed student teachers in Texas and concluded that safety in the laboratory required a need for additional professional development. Researchers further noted that frequency and severity of accidents that occur in the agricultural mechanics laboratory can be reduced when these facilities are managed by educators who are competent in the area of laboratory safety and facility management (McKim & Saucier, 2011). To ensure that agricultural mechanics laboratories remain a safe place for student educational enrichment, it is critical that professional development opportunities be offered for teachers who instruct students in these specialized educational facilities (McKim & Saucier).

Theoretical Framework

To guide this study, the Theory of Planned Behavior (TPB; Ajzen, 1991) was utilized. In an effort to update the Theory of Reasoned Action (TRA), Ajzen (1985; 1991) hypothesized that attitudes often fail to exhibit strong correlations with behavior because of the large number of factors that potentially prevent the attitude from being converted to behavior. Therefore, he developed the concept of *intention*, as a link between attitude and behavior, to strengthen the relationship. This model was limited in its explanatory power, however, Ajzen (1991) extended it by including *perceived behavior control* to account for internal and external constraints on behavior (Fogarty & Shaw, 2010). The TPB is based on the proposition that an individual's behavior is a direct function of the behavior intention with behavioral intentions being shaped by attitudes, subjective norms, and thus, shaping perceived behavioral control (Fogarty & Shaw). Moreover, TPB suggests that an individual's intentions, or attitude, and exposure to subjective norms and perceived behavioral control (internal and external), play a role in the behavior they will present in a given situation. Fogarty and Shaw (2010) examined how safety climate and TPB can lead towards a prediction of unsafe behavior. Huang, Ho, Smith, and Chen (2006) also found that a measure of safety control has close parallels with the notion of perceived behavioral control and can assist in mediating the effect of a safety climate on self-reported injuries.

Methods

A sub-study of this census was to determine the safety conditions of agricultural mechanics laboratories that Texas AFNR teachers who supervised students that competed in the 2018 San Antonio Junior Agricultural Mechanics Project Show taught in and their personal, professional, and program demographics. The following research questions guided this study: (1) What are the personal, professional, and program demographic characteristics of Texas Agricultural, Food, and Natural Resource teachers, who supervised students who competed in the 2018 San Antonio Junior Agricultural Mechanics Project Show? (2) What are safety conditions of the agricultural mechanics laboratories in which these teachers instruct students? The population for this study were all Texas AFNR teachers who supervised students who competed in the 2018 San Antonio Junior Agricultural Mechanics Project Show and who attended a show meeting. Prior to this show, a panel of experts ($n = 5$) with experience in agricultural education and agricultural mechanics, were used to evaluate the instrument for face and content validity. Based upon their suggestions, the instrument was revised and a pilot test ($n = 17$) was then conducted to ensure reliability. A reliability analysis was conducted and the instrument was deemed reliable (Ary, Jacobs, & Sorenson, 2010). All teachers present at the show meeting were presented with this booklet style questionnaire and 120 usable responses were collected. However, results from this study should be limited to only the participants who provided data.

Results

Teachers indicated that they taught with an overall average departmental budget of $25,689.80 (SD = 29,401.83), had an average agricultural mechanics budget of $10,009.78 (SD = 12,733.08), and taught in a laboratory that was approximately 4,500 ft² ($M = 4,477.39$ ft²; SD = 5,476.35) in size with the majority of these laboratories being older than 16 years ($f = 62$; 51.7%). Their average budgets for Personal Protection Equipment were $3,505.45 (SD = 5,892.12), Consumables were $4,558.43 (SD = 6,993.29), and for Tools and Equipment were $4,263.16 (SD = 7,849.68). Teachers also indicated that the agricultural mechanics laboratory was either in need of minor repair ($f = 28$; 23.3%) or they were older, but still functional laboratories ($f = 28$; 23.3%). Handtools in these laboratories were 1 – 5 years of age (35.8%; $f = 43$), handheld powertools were 1 – 5 years of age (46.7%; $f = 56$), and stationary powertools were 6 – 10 years of age (31.7%; $f = 38$). Additionally, these teachers have taught for over 10 years ($M = 10.46$; SD = 10.20) with the greatest amount of respondents earning a salary between $56,000 - $60,000 per year. Additionally, the majority of teachers were male ($f = 96$; 80.0%), of white ethnicity ($f = 103$; 85.8%), had an average age of 37 years ($M = 37.10$; SD = 11.61). Other results will be reported more in-depth on the poster.

Conclusions, Implications, and Recommendations

Respondents were mostly male, white, middle-aged, and mid-career who taught in older, but functional agricultural mechanics laboratories with ample teaching budgets. Additionally, teachers indicated that only a few minor and major accidents that occurred in the previous academic year. Implicative questions suggest: How safe are laboratories in reality? Are teachers' perceptions of safety augmented by any internal or external factors? Should safety inspections exist for schools? Recommendations suggest that teacher educators and in-service providers understand the actual safety conditions of agricultural mechanics laboratories across the U.S. and the equipment teachers are instructing with. This is in-order better prepare educators by offering an industry skill-based, STEM related, and rigorous undergraduate teacher education program and high quality, and impactful continuing education workshops for existing teachers.

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