Research Poster

Examining Early Career Ag Teachers Knowledge and Beliefs of Key SAE for All Principles

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HEARING Rooted in SAFETY: Unearthing PPE Practices in Horticulture

Introduction/Need for Research

School-Based Agricultural Education (SBAE) programs have long involved students in instructional settings that present elevated safety concerns (Dyer & Andreasen, 1999; Langley et al., 2018; Saucier et al., 2014). These settings often require the use of powered tools and equipment, where the risk of injury or long-term harm can be mitigated through the consistent use of personal protective equipment (PPE). While significant attention has been given to developing a safety culture in agricultural mechanics instruction (Chumbley et al., 2018; Rudolphi & Retallick, 2015; Ullrich et al., 2002), other content areas such as horticulture have received comparatively less focus. Tools frequently used in greenhouse, nursery, and landscape settings often generate sound levels that meet or exceed the 85 dB exposure limit recommended by NIOSH (2018). Without targeted safety instruction, students and teachers in these environments may not recognize the need for hearing protection or may fail to use it consistently. Although recent work has begun to examine hearing safety in agricultural education (Hancock et al., 2023; Langley et al., 2018), much of the research has centered on traditional shop-based settings. As SBAE programs offer a broader range of hands-on experiences, there is a growing need to understand how hearing protection practices are addressed across varied instructional contexts. The Horticulture Short Course, hosted at Stephen F. Austin State University developed for SBAE instructors teaching horticulture, provided a unique opportunity to assess the current state of hearing safety within horticulture-focused instruction. By investigating instructor attitudes, PPE usage, and motivational factors, this study aims to identify potential shortcomings in implementation and contribute to the development of broader, more inclusive safety practices across SBAE programs.

Conceptual or Theoretical Framework

The Theory of Planned Behavior (Ajzen, 1991) was selected as the conceptual framework for this study. The theory suggests that an individual's intention to perform a behavior is influenced by their attitude toward the behavior, perceived social norms, and their perceived behavioral control. These three factors were used to explore how SBAE teachers perceive and approach the use of hearing protection in horticulture-focused instructional settings. By identifying the motivations behind personal and student PPE use, the framework helps explain the presence or absence of safety behaviors in environments not traditionally associated with high-risk exposure.

Methodology

This study was conducted during the [Short Course], a regional professional development workshop developed for Horticulture SBAE teachers. A total of 11 participants completed a researcher-developed instrument focused on safety practices & culture building off of previous studies (Hancock et al., 2023, Hancock & McKibben, 2024). The instrument included four primary components: (1) reported use of hearing protection across six horticulture-relevant tools, (2) expectations for student PPE use, (3) the decibel threshold at which participants would begin wearing hearing protection, and (4) a rank-order of eight motivating factors for promoting student safety. Demographic questions were included to contextualize responses. Tools examined in the survey were selected for their relevance to horticulture instruction (*Gas Push Mower, Electric Push Mower, Chain Saw, Powered Hand Drill, Powered Miter Saw, Handheld Circular Saw*). Responses were analyzed using descriptive statistics to determine trends in PPE use, safety motivation, and threshold alignment with hearing safety recommendations.

Results/Findings

A total of 11 short course participants participated in the hearing safety study conducted during the [Short Course]. Of these, nine respondents provided usable data regarding their personal decibel threshold for wearing hearing protection with eight indicting a threshold outside of "Always." The average reported threshold of the eight calculatable thresholds was 88.75 dB, which is only slightly above the 85 dB limit recommended by NIOSH (2018). Compared to thresholds found in previous research ([Blinded]) involving student populations, this value suggests a stronger alignment with national recommendations and may indicate improved awareness of auditory risks among this group of SBAE teachers. Despite this closer alignment with national standards, actual reported use of hearing protection remained notably low. None of the six tools listed in the survey had reported hearing protection use above 25%. The *Powered Hand Drill* had a 0% usage rate among all 11 respondents, despite being among the more frequently used tools and regularly producing sound levels above the recommended threshold. Similarly, the *Electric Push Mower* also showed a 0% reported PPE use rate among the seven participants who indicated recent usage. These findings highlight the continued gap between knowledge or belief about appropriate thresholds and actual safety behavior. When asked about expectations for student PPE use, similar trends were observed. The *Powered Hand Drill* again received the lowest rating, with nine (90%) of participants indicating that they did not expect or require their students to wear hearing protection while using the tool. Both gas and electric push lawn mowers had non-expectation rates of 75% ($n = 3$). Tools with historically higher perceived risk, such as chainsaws and handheld circular saws, showed a more balanced response. The chainsaw had an even split, with 3 (50%) participants expecting or not expecting hearing protection. The handheld circular saw showed a slight majority in favor of requiring PPE (57%, $n = 4$) compared to those who did not (43%, $n = 3$). These results suggest that teachers may rely on perceived tool risk or traditional safety assumptions rather than measurable decibel output when determining student PPE expectations. Seven participants completed the ranking of motivational factors related to promoting student safety. "Keep Students Safe" emerged as the top-ranked factor ($M = 2.00$, $SD = 2.45$), aligning with previous research that emphasizes a student-centered approach to safety promotion. The lowest ranked items were "Conserve Materials" ($M = 6.29$, $SD = 2.55$) and "Keep Equipment Safe" ($M = 6.00$, $SD = 1.41$). The remaining five factors clustered within a narrow band of 1.14 average rank points ($M = 3.57$; $M = 4.71$), suggesting general agreement among participants regarding the ranking of the items.

Implications/Recommendations/Impact on Profession

This study highlights a gap between awareness of hearing safety standards and the actual use of PPE across SBAE programs. Although the participant thresholds were more closely aligned with NIOSH recommendations than in previous studies, hearing protection was rarely worn or required, particularly with tools like the *Powered Hand Drill* which is often pushed beyond the recommended threshold for hearing protection use. Motivational rankings emphasized student safety, suggesting that professional development focused on student well-being may be most impactful. As SBAE programs continue to offer diverse hands-on learning experiences, safety instruction must reflect the range of tools and environments students encounter. A stronger focus on tool-specific risks and consistent use of hearing protection across all instructional settings may help close existing gaps and strengthen the overall safety culture. If hearing safety is going to take root in horticulture, planting seeds today is the first step toward lasting growth.

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