The Relationship Between the Quality of Post-Secondary Electricity Training of School-Based Agricultural Education Teachers and Perceived Importance to Teach Electricity

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Introduction

School-Based Agricultural Education (SBAE) aims to train students to be workforce-ready by introducing them to hands-on learning that reflects industry practices (Wells et al., 2013). A study done by Kotrlik and Drueckhammer (1987) showed that teachers believed occupational experience programs and agricultural mechanics were the two most important elements to ensure quality and retention for program success. Burris et al. (2005) identified the importance of several agricultural mechanics competencies. The study showed that all competencies were identified as somewhat important to important, including the competency grouping of electricity (Burris et al., 2005). Additionally, Gent et al. (2024) established a relationship between the quality and quantity of post-secondary training received in electrical skills, with all scoring some to none. This identifies the need for additional post-secondary professional development opportunities within the electrical training competencies to better prepare SBAE teachers to teach electrical concepts (Gent et al., 2024).

Theoretical and Conceptual Framework

The theoretical framework guiding this study is Ajzen's (1991) Theory of Planned Behavior—an extension to Fishbein and Ajzen's (1975) Theory of Reasoned Action. Ajzen suggests that a person's behavioral attitude, environmental subjective norms, and perceived behavioral controls influence their behavioral intention, resulting in the performance of an actual behavior. The Wells et al.'s (2021) The Agricultural Teacher Education and Agricultural Industry Partnership Model (see Figure 2) was conceptually used to guide our study. The model provided a framework for the development of teachers that focuses on teaching and learning, laboratory management, and content knowledge being established through teacher education programs and the agricultural industry.

Purpose and Objectives

The purpose of this study was to evaluate the relationship between the quality of post-secondary training before and after an electricity workshop on SBAE teachers' perceived level of importance to teach electricity within the SBAE curriculum. 1) Evaluate the relationship between the quality of post-secondary training before and after an electricity workshop on SBAE teachers' perceived level of importance to teach electrical safety and tools. 2) Evaluate the relationship between the quality of post-secondary training before and after an electricity workshop on SBAE teachers' perceived level of importance to teach the installation and operation of electrical switches and receptacles. 3) Evaluate the relationship between the quality of post-secondary training before and after an electricity workshop on SBAE teachers' perceived level of importance to teach how to make electrical connections. 4) Evaluate the relationship between the quality of post-secondary training before and after an electricity workshop on SBAE teachers' perceived level of importance to teach electrical testing methods.

Methods

To measure the objectives of this study, data were collected prior to and after a workshop focused on electricity. A paper-based questionnaire was developed using a literature review of survey instruments by Rasty and Anderson (2017), Anderson et al. (2023), Anderson and

Paulsen (2023), and Shultz et al. (2014). The questionnaire collected demographic data and included instructions for the study. The electrical skills and constructs assessed were informed by Koels (2019) *Agricultural Technical Systems and Mechanics* and Rockis (2019) *Residential Wiring and Smart Home Technology* textbooks. A post hoc reliability analysis was conducted on the pretest instrument from the first year, as a pilot test was not performed prior to the first [WORKSHOP]. According to George and Mallery's (2003) reliability criteria, all four of the constructs were rated *excellent* for reliability.

Results

Each skill was correlated within the corresponding skill area rather than across skill areas. For example, the importance to teach electrical safety in SBAE was correlated to the perceived quality of electrical safety training received at the post-secondary level. The data displayed in Table 1 depicts the relationship between the electrical skills in which respondents rated the perceived importance to teach in SBAE, and the quality of training received at the post-secondary level. Four of the seven electrical safety and tool skills had a significant negative correlation that would be considered weak (Davis, 1971).

Table 1
Spearman Rho Correlations between Importance to teach in School-Based Agricultural Education and Quality of Post-Secondary Training for Electrical Safety and Tools.

	Importance		*Quality*			
Electrical Safety and Tools	*M*	*SD*	*M*	*SD*	r_s	Davis Score
Identifying electrical safety organizations	4.38	0.93	1.87	1.20	-.242*	Weak
Using safety label codes and colors	4.56	0.86	1.88	1.22	-.076	Very Weak
Using approved personal protective equipment	4.76	0.73	2.09	1.46	-.314*	Moderate
Using electrical hand tools	4.59	0.79	2.05	1.40	-.362*	Moderate
Using a test light	4.44	0.86	1.92	1.32	-.229*	Weak
Using a receptacle tester	4.49	0.84	1.93	1.33	-.262*	Weak
Using a digital multimeter	4.56	0.82	1.97	1.38	-.270*	Weak

Note. *$p < .05$. Importance (5 = extremely important, 4 = very important, 3 = moderately important, 2 = somewhat important, and 1 = no importance). Quality (5 = exceptional, 4 = highly effective, 3 = proficient, 2 = little, and 1 = unsatisfactory).

Conclusions and Recommendations

There was a negative statistical relationship between the importance to teach electricity and the quality of post-secondary education received by the participants. Therefore, we can conclude that the participants recognized the importance of teaching electricity and sought out additional professional development despite the lack of quality training received during their teacher preparation program. We recommend that teacher education programs review course offerings to ensure SBAE teachers are receiving quality instruction in electricity at the post-secondary level.

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