

Knowing by Doing: Does a Relationship Between the Importance to Teach and Ability to Perform Electrical Skills Exist?

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Introduction

It is a priority to develop prepared, knowledgeable School-Based Agricultural Education (SBAE) teachers who possess not only pedagogical knowledge, but the ability to perform subject-specific skills needed to teach and manage inside a classroom (Wells et al., 2021; Albritton & Roberts, 2020). For this to be effective, SBAE teachers must have a variety of technical skills in the agricultural education curriculum to be evaluated (Traini et al., 2023; Granberry et al., 2023). A variety of these methods and programs in agricultural education develop performance skills for pre-service SBAE teachers include: 1) agricultural courses 2) field experience, and 3) student teaching (Wells et al., 2021). As these preparation methods evolve, newer evaluation systems are stressing the significance on the performative side of agricultural mechanics (Traini et al., 2023). Yet many teacher education programs are not preparing pre-service SBAE teachers to handle these pedagogical approaches effectively (Wells et al., 2021). Applying and evaluating practical delivery in agricultural mechanics can increase the performance and professional development for preservice SBAE teachers (Granberry et al., 2023). Teachers, specifically in agricultural mechanics, must be prepared with learning opportunities for students to gain and apply practical skills for the real world (Wells et al., 2021; Granberry et al., 2023; McKim & Saucier, 2013).

Theoretical Framework

The theoretical framework guiding this study is Becker's (1964) Human Capital Theory (HCT). HCT explains how an individual's knowledge, skills, experiences, and competency collectively increase their overall success in agricultural mechanics (Becker, 1964; Leiby et al., 2013; Little 2003; Bernston et al., 2006). In the context of SBAE, this theory provides a foundation of understanding how a teachers' technical training dictates their classroom performance and professional suitability. Ultimately, this study utilizes HCT to examine if an SBAE teachers' perceived importance of teaching electricity correlates with their ability to perform those tasks.

Purpose and Objectives

The purpose of this study was to evaluate the relationship between the ability to perform electrical skills and SBAE teachers' perceived level of importance to teach within the SBAE curriculum before and after attending a workshop through the following objectives: 1) Determine if a relationship exists between performance and importance to teach electrical safety and tools. 2) Determine if a relationship exists between performance and importance to teach installations and operations of electrical switches and receptacles. 3) Determine if a relationship exists between performance and importance to teach how to make electrical connections. 4) Determine if a relationship exists between performance and importance to teach electrical testing methods.

Methods

This research aimed to investigate the relationship between the ability to perform electricity training workshop on SBAE teachers' perceived level of importance of to teach electricity related skills, including electrical safety, tools, switches and receptacles, electrical connections, and electrical testing. As part of a larger research initiative, this research centered around electricity, with data collected from 80 participants over a 10-day workshop held annually between 2021 and 2024. The workshop included instructions on small-gas engines, electricity, and welding.

Participants used a five-point scale to rate and complete a pre- and post- assessments covering 28 electricity-related skills. To measure these changes, a post hoc Cronbach's alpha analysis was conducted on the first group (n=20), with coefficients for the four constructs - electrical safety and tools ($\alpha=0.891$), switches and receptacles ($\alpha=0.956$), making electrical connections ($\alpha=0.818$), and electrical testing ($\alpha=0.917$)-indicating strong internal reliability across skill groupings.

Results

There were no statistically significant relationships between how well a teacher's electrical testing performance and their perceived importance of those skills prior to training. However, post-workshop data revealed a strong, significantly positive relationship ($p < .05$) across all five skills within the electrical testing construct. This consistent significance across the entire construct shows that an SBAE teacher's ability to perform these tests directly correlates to their perceived importance of teaching them.

Table 1

Spearman Rho Correlations Between Importance to Teach Electrical Testing in School Based Agricultural Education and Ability to Perform Electrical Tests.

<i>Electrical Testing</i>	<i>Pre-Importance</i>		<i>Post Importance</i>	
	<i>Pre Ability</i>	<i>Post Ability</i>	<i>Pre Ability</i>	<i>Post Ability</i>
<i>Continuity testing</i>	.180	.127	.091	.503*
<i>Polarity testing</i>	.190	.096	.064	.438*
<i>Voltage testing</i>	.192	.141	.075	.510*
<i>Current testing</i>	.214	.098	.102	.468*
<i>Resistance testing</i>	.079	.098	.064	.471*

*Note. * $p < .05$*

Conclusions/Recommendations

The teachers had already identified the importance of teaching electricity despite lacking their ability to perform the electrical skills by participating in an extensive professional development training during the summer. We concluded that there was no statistical support for either a positive or negative relationship between importance to teach and ability to perform prior to attending the workshop. However, a significant positive relationship emerged as a result of the training. The electricity workshop significantly improved SBAE teachers' perceptions within the electrical testing construct. These findings align with Granberry et al. (2023) and Toft et al. (2021), which highlighted that experiential programs increase the performance and pedagogical knowledge of SBAE teachers regardless of their prior experience. We recommend additional positive exposure to electrical training early on for SBAE teachers through forms of mini lessons taught in the SBAE teacher preparatory classes or in informal settings like club meetings. We recommend teacher educators develop a YouTube channel focused on tutorial videos aligned with electrical skills that can be shared via social media. Further research is needed to assess the long-term impact of the YouTube channel on the instruction of SBAE teachers. This should include a comparison of the curriculum taught by SBAE teacher prior to and after watching the tutorial videos.

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