

**Electrical SBAE Teachers' Perceived Importance of Their Knowledge and Ability to Teach
Electricity After Post-Secondary Training**

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Introduction

School-Based Agricultural Education (SBAE) teachers are responsible for delivering instruction across a broad range of agricultural mechanics topics, including electricity. These content areas require both conceptual understanding and the ability to facilitate safe, hands-on laboratory instruction. As agricultural mechanics continues to evolve with technological advancements, expectations placed on SBAE teachers have increased in technical areas such as electrical systems. Effective electricity instruction requires knowledge of foundational concepts and the ability to apply those concepts in practical settings while maintaining safe learning environments. The purpose of this study is to examine whether participation in an electricity-focused professional development workshop improves SBAE teachers' electricity content knowledge and to determine whether that knowledge is related to their perceived ability to teach electricity. Specifically, this study seeks to examine the extent to which increases in technical knowledge contribute to increased instructional confidence following targeted training. Research indicates that many SBAE teachers enter the profession with limited formal training in agricultural mechanics and frequently rely on experiential learning or professional development to build technical competencies (Wells et al., 2021). These deficiencies may limit instructional effectiveness and reduce teachers' willingness to implement laboratory-based learning activities.

In technical content areas such as electricity, where safety and precision are critical, insufficient preparation may have implications for both instructional quality and student outcomes. Professional development has been identified as a key mechanism for addressing these gaps, particularly when training opportunities provide targeted, hands-on experiences (McKim & Saucier, 2011). Research has demonstrated that focused professional development can improve teachers' technical competencies and increase confidence in delivering instruction (McKim & Saucier, 2011). Additionally, Rada and Smalley (2025) found that SBAE teachers view professional development as essential for career growth, particularly when it addresses specific instructional needs.

Theoretical Framework

This relationship is further supported by Human Capital Theory and self-efficacy theory. Human Capital Theory suggests that investment in professional development enhances individual skills and competencies, which in turn improve productivity and performance (Becker 1962). Increasing a teacher's technical knowledge through targeted electricity training represents an investment in human capital that should lead to improved instructional outcomes. Additionally, Bandura's theory of self-efficacy posits that individuals who believe in their capability to perform a task are more likely to engage in that task effectively (Bandura & Adams, 1977).

Methods

The purpose of this study was to use a quantitative correlation design with a pretest-posttest approach to evaluate the relationship between the quality of post-secondary training before and after an electricity workshop on SBAE teachers' perceived level of importance of having electricity-related tools necessary for skill development within the SBAE curriculum. This research aligns with the American Association of Agricultural Education's *National Research Values* related to advancing public knowledge of agriculture, food, and natural resources (AFNR) systems (AAAE, 2023) by providing instruction to help individuals make informed decisions and prepare them for skilled agricultural work. By connecting to the *National*

Research Values, this study evaluates whether the quality of postsecondary training has an impact on the perceived level on tool acquisition and access among SBAE teachers.

Results

The majority of workshop participants were *female* ($f = 49$, 61%) and identified as *white/non-Hispanic* ($f = 70$, 88%). Most held at least a bachelor's degree ($f = 50$, 63%) and most participants were primarily between the ages of *20-25 age group* ($f = 33$, 41%) and *26-30 years old* ($f = 19$, 24%). A large portion of the participants had completed a university based *traditional teaching certification* ($f = 58$, 73%) and taught *agriculture* in the secondary level ($f = 72$, 90%) with a majority working in *rural schools* ($f = 45$, 56%). As shown in Table 1, Spearman rho correlations between knowledge and ability to teach electrical connections demonstrated positive relationships across all measured skills. Pre-knowledge and pre-ability correlations ranged from $r = .698$ to $r = .879$, while post-knowledge and post-ability correlations ranged from $r = .851$ to $r = .901$. Skills measured included properly grounding equipment, making electrical pigtail splices, soldering splices, and wiring circuit breakers.

Table 1

Spearman Rho Correlations Between Knowledge and Ability to Teach Electrical Connections in School Based Agricultural Education.

Connections	Pre- Knowledge		Post-Knowledge	
	Pre Ability	Post Ability	Pre Ability	Post Ability
Properly grounding equipment	.868*	.446*	.404*	.855*
Making electrical pigtail splices	.879*	.318*	.291*	.851*
Soldering splices	.698*	.415*	.449*	.901*
Wiring circuit breakers	.735*	.388*	.458*	.875*

Note. * $p < .05$

Conclusion

The findings of this study suggest that positive relationships exist between SBAE teachers' perceived knowledge of electricity and their perceived ability to teach electricity-related skills across the four constructs examined: electrical safety and tools, switches and receptacles, making electrical connections, and electrical testing. These results support Human Capital Theory (Becker, 1962) and self-efficacy theory (Bandura & Adams, 1977), indicating that investments in professional development may strengthen both technical competence and instructional confidence. Given that many participants reported limited prior experience teaching electricity and relatively few post-secondary agricultural mechanics credit hours, the workshop appears to have provided valuable opportunities to develop knowledge and teaching capacity. Based on these findings, ongoing professional development in agricultural mechanics should be encouraged and potentially required for SBAE teachers to remain current with evolving industry standards, emerging technologies, and safety practices. As agricultural mechanics continues to advance, teachers must continually update their technical knowledge to ensure students receive relevant, accurate, and industry-aligned instruction. Future research should examine the longterm impacts of professional development on classroom implementation and student outcomes, as well as explore similar relationships within other agricultural mechanics content areas.

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