

**Identifying the Amount of Post-Secondary Electrical Training Received by School Based
Agricultural Education Teachers**

Jenna Schultz, Kenedy Kornegay, & Dr. Ryan Anderson

Texas State University

Introduction

School-Based Agricultural Education (SBAE) prepares students for the evolving agricultural industry by blending scientific knowledge with hands-on experiences like project-based learning and Supervised Agricultural Experiences (SAEs) (Anderson et al., 2023; Clark et al., 2021). One of the most technically demanding components of SBAE is agricultural mechanics, which includes welding, construction, power systems, and electricity (Clark et al., 2021). Despite its importance, electrical instruction is often underemphasized in teacher preparation programs, leaving many teachers underprepared to deliver this content effectively and safely (Trickett et al., 2023). Research shows that many SBAE teachers lack sufficient postsecondary coursework in electricity, which undermines their confidence and competence in teaching this critical area (Anderson et al., 2023; Clark et al., 2021). As the agricultural industry increasingly relies on advanced electrical systems in areas like precision agriculture and renewable energy, this gap presents a serious challenge (Burriss et al., 2005; Ramsey & Edwards, 2011). Addressing the shortage of electricity-specific training through enhanced curriculum design and targeted professional development is essential to improving teacher preparedness and, ultimately, student readiness for careers in agricultural mechanics (Rudolph & Retallick, 2015; Herren, 2014).

Theoretical/Conceptual Framework

This study is guided by the *Human Capital Theory*, which emphasizes the value of investing in education and training to enhance individual productivity and economic outcomes. Schultz (1961) and Becker (1962) argued that education and skill development are investments in human capital, yielding long-term economic and professional benefits, which are relevant when evaluating technical training in agricultural education. This theory supports the premise that postsecondary training in technical areas like electricity is essential to enhancing SBAE teacher effectiveness and, by extension, workforce development in agriculture.

The *Agriculture Teacher Education and Agricultural Industry Partnership Model* (Wells et al., 2021) provides the conceptual foundation for this study. The model highlights the importance of integrating technical training, classroom management, and ongoing professional development through intentional collaboration between teacher preparation programs and industry partners. This partnership ensures that teachers remain current with evolving agricultural technologies and practices, ultimately improving their competence and preparedness to deliver high-quality instruction in areas like agricultural mechanics and electricity.

Purpose and Objectives

The purpose of this study was to investigate the extent to which SBAE teachers engaged in agricultural mechanics coursework, specifically electricity, during their postsecondary education. This inquiry supports the American Association for Agricultural Education (AAAE, 2023) research priority of expanding public understanding of agriculture, food, and natural resources (AFNR, 2023) systems. This study directly aligns with the AAAE research focus area of “examining curriculum design, development, delivery, and evaluation in elementary, secondary, and post-secondary programs.” To guide the investigation, the following objectives were developed: 1) Determine the quantity of postsecondary coursework completed by teachers in electrical safety and tool use. 2) Determine the quantity of coursework related to teaching electrical switches and receptacles. 3) Determine the quantity of coursework focused on making electrical connections. 4) Determine the quantity of coursework involving electrical testing procedures.

Methods

This study investigated the amount of postsecondary coursework in electricity completed by SBAE teachers, using data from 80 participants in the Agricultural Mechanics Academy (AMA), a 10-day professional development held annually from 2021 to 2024. The AMA included instruction in small gas

engines, electricity (1.5 days), oxyacetylene cutting, and welding. Teachers were nationally recruited based on limited prior training and teaching responsibilities in agricultural mechanics. Participants completed pre- and post-assessments covering 28 electricity-related instructional skills, with coursework quantity rated on a five-point Likert scale. As preservice training did not change during the workshop, coursework data were collected only in the pre-assessment. Instruments were informed by prior research and reviewed by faculty experts to ensure content and face validity. To assess internal consistency, a post hoc Cronbach's alpha analysis was conducted on the first cohort ($n = 20$), with reliability coefficients for the four constructs—electrical safety and tools ($\alpha = 0.973$), switches and receptacles ($\alpha = 0.990$), making electrical connections ($\alpha = 0.970$), and electrical testing ($\alpha = 1.000$)—indicating strong internal reliability across all skill groupings.

Results

Demographic data showed that most participating SBAE teachers were female (61%), white/non-Hispanic (88%), and between 20–30 years old (65%), with a bachelor's degree (63%) and traditional teaching certification (73%). The majority taught agriculture in rural schools (56%) and had limited experience teaching electricity (60%), averaging just 0.68 years of experience. Participants reported completing only 3.49 credit hours in agricultural mechanics during their postsecondary education. Assessment data revealed minimal prior training in alternating current (AC) related electrical skills, with grand mean scores across all four constructs ranging from 1.30 to 1.45, indicating “little to no” training, especially in electrical testing. These findings highlight a significant gap in postsecondary preparation for teaching electricity in SBAE programs.

Table 1

Construct Scores for the Quantity of Post-Secondary Training Received in Electrical Skills

Electrical Construct	M	SD
Electrical Safety and Tools	1.45	0.80
Switches and Receptacles	1.39	0.76
Making Electrical Connections	1.36	0.77
Electrical Testing	1.30	0.72

Note. Scale: 1 = None/Very Poor; 2 = Little; 3 = Good; 4 = Above Average; 5 = Excellent

Conclusion/Recommendations

This study reinforces ongoing concerns in agricultural education about the lack of technical preparation among SBAE teachers, particularly in electricity. Echoing findings by Clark et al. (2021) and Anderson et al. (2023), participants reported minimal postsecondary coursework in agricultural mechanics—averaging just 3.49 credit hours—and nearly 60% had no prior experience teaching electricity. Given the complexity and safety risks associated with electrical instruction, this preparation gap is significant. These findings support prior research (Byrd et al., 2015; Shultz et al., 2014) that links hands-on training to increased instructional readiness. To address these issues, teacher education programs should integrate more structured coursework the hands-on experiences in electricity to ensure baseline competence among preservice teachers. Backed by Human Capital Theory (Becker, 1962; Schultz, 1961), such investments in technical training promise long-term benefits for teacher quality and workforce development. Additionally, expanding access to in-service professional development like AMA—especially at the regional level—and offering incentives for participation could help close preparation gaps. Longitudinal research should be conducted to evaluate how training translates into classroom practice and student learning, ensuring SBAE teachers are well-equipped to meet the demands of technical instruction in modern agriculture.

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