

**Teacher-perceived Availability of Curriculum to Teach Electricity**

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## Introduction

Curriculum is essential in developing a standard throughout education, it allows teachers to have a set plan for a course which is crucial to running an organized class (Wyse & Manyukhina, 2024). Curriculum is ever-changing and constantly needs adaptation to remain relevant to the modern world (Aydin et al., 2017). Having a foundation that outlines the knowledge and skills pertaining to a course allows for organization, resulting in a more efficient course (Wyse & Manyukhina, 2024). Many issues exist with current curriculum are evident including a lack of preparation, constant change, and a lack of funding (Aydin et al., 2017; Nevenglosky et al., 2019). Courses in Career and Technical Education (CTE), specifically agricultural education courses, achieving a proper curriculum is more difficult due to the broad span of intricate topics covered (Norris et al., 2024). Providing teaching materials with proper training at professional development workshops allow School-Based Agricultural Education (SBAE) teachers to establish a more prepared lesson plan with thought out curriculum to use in future classes (Bowling et al., 2024; Rada & Smalley, 2025).

## Theoretical framework

Guskey's model of teacher change serves as the theoretical framework for this study (1986). Gueskey's model highlights the effect that professional development has on educators by exploring the later changes that are evident in the classroom through noticeable change such as curriculum, lesson plans and teaching method. This framework allows us to explore the connection that SBAE teachers experience after participating in professional development. We can explore this through examining change in the SBAE teachers stated availability of curriculum before and after completing an electricity-focused workshop.

## Purpose and objectives

This study was part of a more extensive research project relating to the teaching and learning of electricity; its purpose was multifaced and the goal of this study was to develop an understanding of the participating teacher's perception of the availability of curriculum to teach electricity. The following objectives were established to achieve this purpose: Identify teachers' availability of curriculum to teach 1). Electrical safety and tool usage; 2). Electrical switches and receptacles; 3). Making electrical connections; and 4). Electrical testing. This research aligns with the National Research Values outlined by the American Association of Agricultural Education (AAAE), which emphasize fostering positive youth development through agriculture, food, and natural resources (AFNR) systems. By connecting to these research values, the study aims to influence SBAE teachers to utilize available resources to improve educational outcomes.

## Methods

A 12-hour electricity workshop was held at [STATE] University with twenty SBAE Teachers per year over a four-year spam (n=80). Researchers determined that a pre-test vs post-test would effectively determine the impact of this educational training. Participants who attended the workshop were asked about their perceived availability of curriculum specific to alternating current (AC) electrical skills. During the workshop, the participants received one set of electrical tools, electrical devices, wiring board, and an electronic copy of electrical laboratory activities developed by the instructor. The participants also received a desk top copy of the Agricultural Technical Systems and Mechanics (Koel et al., 2019) textbook that included a section on electricity. To reduce survey fatigue, a paper-based questionnaire was developed.

Electrical constructs and skills were developed using Koels (2019) *Agricultural Technical Systems and Mechanics* and Rockies' (2019) *Residential Wiring and Smart Home Technology* textbooks. Prior to the workshop, the questionnaire was reviewed by a panel of five experienced SBAE teachers (Rasty & Anderson, 2017; Shultz et al., 2014). A post hoc reliability analysis was conducted on the pre-test instrument to determine its reliability. Based on George and Mallery's (2003) recommendations, three of the four constructs were deemed *excellent* for reliability

### Results

Upon workshop completion, our participants' perceptions of the available curriculum at their respective schools increased in all four constructs (see Table 1). *Safety and tool usage* saw the greatest increase in Mean Difference (MD) score for tools and equipment to teach electricity (MD=1.71) while *Making Electrical Connections* saw the lowest increase (MD=1.56). All four constructs were rated as no/very little curriculum available to teach electricity prior to the workshop and all four constructs were rated as good after the workshop. A single-tailed t-test was conducted to determine if there was a statistically significant change. All three constructs were statistically significant based on their p-values and all four had a large effect size.

Table 1

*Construct Scores of Curriculum Available to Teach Alternating Current Electrical Skills*

Construct	Pre		Post		MD	<i>t</i>	<i>p</i>	<i>df</i>	Cohen's <i>d</i>
	M	SD	M	SD					
Electrical Safety & Tools	1.73	1.03	3.44	1.12	1.71	10.36	"<.001"	78	1.47
Switches & Receptacles	1.68	0.99	3.36	1.25	1.67	9.62	"<.001"	75	1.52
Electrical Connections	1.59	0.93	3.16	1.26	1.56	9.58	"<.001"	76	1.43
Electrical Testing	1.48	0.85	3.10	1.38	1.61	9.55	"<.001"	77	1.49

*Scale: 1 = None/Very Poor; 2 = Little; 3 = Good; 4 = Above Average; 5 = Excellent. MD = Mean Difference (pre-post); Cohen's d:  $\geq 0.8$  = large effect*

### Conclusions and Recommendations

This study aimed to determine the impact of an electricity workshop on SBAE teachers' perception of curriculum available to teach electricity. Our findings indicated that the electrical workshop had a positive impact on the teacher's availability of curriculum to teach the four constructs presented. At the beginning of the workshop SBAE teachers identified that they had very little to no curriculum. However, after the workshop the SBA teachers indicated that they had good amount of access of curriculum to teach electricity. This then correlates with Norris et al. (2024) which evaluated the importance of STEM integration into AFNR pathways. Moving forward we recommend assessing the SBA E teachers' perception after they have returned to their secondary institutions and completed a year of instruction. This would allow us to gain a more in-depth understanding of the overall effects that our workshop had on the teacher's availability of curriculum before and after professional development.

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