Exploring the Relationship Between Agricultural Education Teachers' Perceived Ability and Importance To Teach Electricity

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Introduction

An essential part of School-Based Agricultural Education (SBAE) is agricultural mechanics, it includes areas such as welding, construction, engineering, and electricity. (Hainline, 2019; Wells, 2021). Teaching electricity requires instructors to gain constant knowledge and instructional confidence for effectiveness (Saucier et al., 2012). Previous research shows that SBAE teachers acknowledge the importance of teaching electricity but often lack the ability to teach it. (Shultz 2014; Wells 2021). Educators' abilities to teach content and perceived importance of the contact can affect students' quality of learning the material (Bray-Clark & Bates 2003; Gorter & Swan, 2018). This study analyzes the relationship between teachers perceived importance to teach electricity with their ability to teach electricity based on a workshop, where one and a half-day was focused on electricity. Hands-on workshops and training programs can enhance teachers' confidence and ability to educate students and provide quality instruction (Cannon et al 2020; Wells 2021).

Theoretical/Conceptual Framework

This research is guided by Bandura's self-efficacy theory. This theory explains self-efficacy as a key internal motivational process. This process can be affected by personal and environmental variables which influence outcomes of choices, effort, persistence, and achievement (Bandura, 1977). The theory explains how self-efficacy beliefs are defined as people's perceptions of their capability to execute the actions necessary to achieve a desired goal (Bandura, 1977). This framework was used to shape this study because it describes how importance is influenced by one's capabilities.

Purpose and Objectives

The purpose of this study was to explore the relationship between SBAE teachers' perceived importance to teach electricity and their ability to teach electricity before and after participation in a professional development workshop. The following objectives were developed: 1. Explore the relationship between SBAE teachers' perceived importance and their ability to teach electrical safety and tools. 2. Explore the relationship between SBAE teachers' importance and their ability to teach the installation and operation of electrical switches and receptacles. 3.Explore the relationship between SBAE teachers' importance and their ability to teach making electrical connections. 4. Evaluate the relationship between SBAE teachers' importance and their ability to teach electrical testing methods.

Methods

This study explored the relationship between SBAE teachers' perceptions of the importance of teaching electricity skills and their ability to teach those skills measured before and after an electricity workshop. A professional development workshop was held for ten days and included training for 80 SBAE teachers. Part of a larger study, this research focused on the one and a half day dedicated to electricity. A mass email was sent through the American Association of Agricultural Education (AAAE) and the National Association of Agricultural Education (NAAE) which included all information related to the workshop. The applicants were required to submit information about their teaching experience and respond to three reflective

questions. The applicants were reviewed and 20 SBAE teachers were chosen to attend the workshop based on their need for training, and the number of agricultural mechanics courses they will be responsible for teaching in upcoming school year. 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). Using a five-point Likert scale, attendees rated the importance of teaching 28 electrical skills from four constructs: *electrical safety and tools*, *electrical switches and receptacles, making electrical connections*, and *electrical testing*. Prior to the workshop, a group of five agricultural Education teacher educators with experience in electricity reviewed the questionnaires to ensure the correct use of terminology and establishment of content and face validity (Rasty & Anderson, 2017; Shultz et al., 2014).

Results

There is no statistical relationship between the ability to teach before attending the workshop and importance to teach electricity prior to and after attending the workshop. There was no statistical relationship between the participants ability after attending the workshop and the importance to teach prior to attending the workshop. There was a statistical relationship between the importance and ability to teach electricity after participating in the workshop.

Table 1

Spearman Rho Correlations between Importance to teach in School Based Agricultural Education and Ability to Teach in School Based Agricultural Education for Electrical Testing.

	Pre-Importance		*Post Importance*	
Electrical Testing	*Pre Ability*	*Post Ability*	*Pre Ability*	*Post Ability*
Continuity testing	.132	.046	.023	.428*
Polarity testing	.117	.000	-.010	.383*
Voltage testing	.140	.102	.032	.443*
Current testing	.168	.060	.057	.392*
Resistance testing	.000	.030	-.031	.372*

Note. *$p < .05$.

Conclusion/Recommendations

We can conclude that there is no relationship between the importance to teach electricity and the ability to teach prior to attending the workshop. We can conclude the teachers viewed the content as important but lacked the ability to teach the content and participated in a summer workshop. There was a statistically significant relationship between the ability to teach and the importance to teach electricity after completing the workshop. We recommend creating more opportunities for SBAE teachers to get experiential learning opportunities aligned to the skills assessed in this study. We recommend further training aligned to electrical testing and troubleshooting. We recommend follow-up research to identify what the participants actual taught after completing the workshop and reporting their ability to teach electricity.

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