An Evaluation of School-Based Agricultural Education Teacher's Ability to Teach Electricity

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Introduction

School-Based Agricultural Education (SBAE) teachers should be prepared to effectively communicate and deliver an agricultural mechanics curriculum (Burris, et al 2005). However, before SBAE teachers can teach these skills properly and safely to their students, they must first undergo the necessary professional development to gain and/or improve their agricultural mechanics skills (McKim & Saucier, 2011). As recommended by Hainline and Wells (2019) SBAE teachers need to seek additional agricultural mechanics skills support via professional development opportunities. As concluded by Saucier et al. (2014), the needs of SBAE teachers should be considered when creating a professional development workshop for agricultural mechanics. Not only do these programs need to be created but they need to be offered frequently for teachers to maintain their self-perceived ability to teach, stay up to date on Occupational Safety and Health Administration (OSHA) standards, and ensure they are keeping themselves and their students safe when teaching agricultural mechanics topics.

Theoretical Framework

Kolb's Experiential Learning Theory was used to guide our study; this framework is a four-step process representing and characterizing how people learn through experience. These steps include 1) concrete experience, 2) reflective observation, 3) abstract conceptualization, and 4) active experimentation (Murrell & Claxton, 1987). This theory most accurately aligns with our study because of the format of the camp activities SBAE teachers experience during the workshop.

Purpose and Objectives

Our study aligns with the American Association of Agricultural Education (AAAE) research value of advancing public knowledge of agriculture, food, and natural resources (AFNR) systems. The purpose of this study was to explore the impact of an electricity workshop on participants' ability to teach electricity. To accomplish and guide this purpose, the following objectives were established: 1) Identify teachers' ability to teach electrical safety and tool usage. 2) Identify teachers' ability to teach electrical switches and receptacles. 3) Identify teachers' ability to teach making electrical connections. 4) Identify teachers' ability to teach electrical testing.

Methods

This study consisted of 80 SBAE teachers attending a ten-day agricultural education professional development workshop. The workshop is intended to accept the teachers with the least amount of agricultural mechanics training who will be teaching the most agricultural mechanics classes in the upcoming school year. This helps the SBAE teachers learn and become confident with their ability to teach different electricity topics while allowing researchers to observe and run data on the changes in perception. Specifically, the electricity component of the workshop lasted a day and a half. A pre-test was given at the beginning and a post-test was given at the end of the electricity component of the workshop. These paper-based surveys provided the most effective route to observe whether the electrical workshop benefits the SBAE teachers in attendance. The survey consisted of four electrical constructs with a total of thirty-two skills, in relation to a change in perception of ability to teach.

Results

The table below represents the mean scores in each of the four constructs of the electricity workshop and how the perceptions of each SBAE teacher's abilities to teach them have changed from before the workshop to after. Electrical switches and receptacles saw the greatest change in mean difference (+2.06) from the pre and post-test and highest post-workshop mean score (3.88). All four constructs saw positive changes in construct mean scores, with Electrical Testing having the lowest pre (1.40) and post-workshop (3.28) mean scores.

Table 1

Grand Means Scores of Abilities to Teach Electricity Skills

	Pre-Workshop		Post-Workshop		
Electrical Construct	*M*	*SD*	*M*	*SD*	*MD*
Electrical Safety and Tools	2.12	0.97	3.65	1.15	1.53
Switches and Receptacles	1.82	1.00	3.88	0.80	2.06
Making Electrical Connections	1.65	0.85	3.48	0.90	1.83
Electrical Testing	1.40	0.71	3.28	1.13	1.88

Note. 1 = No Ability; 2 = Some Ability; 3 = Moderate Ability; 4 = Above Average Ability; 5 = Excellent Ability

Conclusion/Recommendations

As one can see the mean differences between pre-workshop and post-workshop in each of the four constructs had a positive effect on SBAE teacher's ability to teach electricity. However, electrical testing maintained the lowest score before and after the workshop but had the second-highest mean difference. The data suggests that SBAE teachers benefited from learning how to teach electrical testing, but more training is likely needed. This could be achieved by extending the time allocated to teaching electricity constructs and incorporating more electrical testing training into the curriculum. Electrical safety and tools had the lowest growth of the four constructs. This illustrates that we should continue to find ways to improve SBAE teachers' ability to teach safety and tools. Safety is a foundational construct so teachers must be confident in their ability to teach and maintain safety in their laboratory. Given that live electricity will be introduced as part of the training, proper safety standards must be prioritized for the safety of the SBAE teachers and their students.

As a profession, we are obligated to ensure that educators are properly trained and confident in their ability to teach electricity. We can achieve that by creating more professional development workshops that are hands-on to effectively teach these skills to more educators who need additional training. Further research should be conducted to identify what training the participants need to rank themselves as possessing excellent ability to teach each of the electrical constructs. Additionally, research should be conducted after the SBAE teachers who participated in the workshops have had the opportunity to teach electricity to their students. The participants can easily rate themselves on their perceived ability to teach the electrical constructs but their self-efficacy could be altered after they have taught their students.

References

Burris, S., Robinson, J. S., & Terry, J. (2005). Preparation of pre-service teachers in agricultural mechanics. *Journal of Agricultural Education*, *46*(3), 23–34. https://doi.org/10.5032/jae.2005.03023

Hainline, M. S., & Wells, T. (2019). Identifying the agricultural mechanics knowledge and skills needed by Iowa school-based agricultural education teachers. *Journal of Agricultural Education*, *60*(1), 59–79. https://doi.org/10.5032/jae.2019.01059

McKim, B. R., & Saucier, P. R. (2011). Agricultural mechanics laboratory management professional development needs of Wyoming secondary agriculture teachers. *Journal of Agricultural Education*, *52*(3), 75–86. https://doi.org/10.5032/jae.2011.03075

Murrell, P. H., & Claxton, C. S. (1987). Experiential learning theory as a guide for effective teaching. *Counselor Education and Supervision*, *27*(1), 4–14. https://doi.org/10.1002/j.1556-6978.1987.tb00735.x

Saucier, P. R., Vincent, S. K., & Anderson, R. G. (2014). Laboratory safety needs of Kentucky school-based agricultural mechanics teachers. *Journal of Agricultural Education*, *55*(2), 184–200. https://doi.org/10.5032/jae.2014.02184