Determining the Impact of a Small Gas Engine Workshop on the Importance to Teach

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Introduction

Teacher educators have indicated that teaching agricultural mechanics, including small gas engines, is important. Therefore, there is a need for sufficient preparation for school-based agricultural education (SBAE) teachers in agricultural mechanics (Burris et al., 2005). Comparably, Granberry et al. (2023) found that the majority of pre-service teachers across the United States have some agricultural mechanics training available to them during their preparation program in SBAE. Rasty and Anderson (2025) identified 102 skills in agricultural mechanics that are deemed important to teach in the future. Rasty and Anderson (2025) suggested that to change the views of SBAE teachers on specific skills, industry professionals should provide insight into the skills needed in the workforce. Shultz et al. (2014) determined that small gas engine safety was considered one of the ten most important skills to be taught in agricultural mechanics.

Theoretical Framework

The Experiential Learning Theory (ELT) was used to guide this study. Kolb and Kolb (2006) suggest learning plays a major role in the development of humans and the way someone learns can determine their growth personally. The first step in the learning cycle in ELT is Concrete Experience, or the step where the learner is actively listening and engaged (Kolb, 2014). This step is seen in the classroom where the participants are actively learning about small gas engines. The second step of the learning cycle in ELT is Reflective Observation and Interpretation where the learner can build upon what they have learned (Kolb, 2014). This step is seen as participants reflect on the classroom component on small gas engine training and applying concepts in the laboratory using hands-on learning with small gas engines. The third step of the learning cycle in ELT is Abstract Conceptualization where learners are interpreting what they have learned and experienced (Kolb, 2014). This step is seen where participants disassemble and reassemble a four-stroke engine on the last day with little to no help. The fourth and final step of the learning cycle in ELT is Active Experimentation where learners can apply what they have learned (Kolb, 2014). This is seen with the pre- and post-test that the participants completed before and after the small gas engine workshop, and the participants completed online exams through Briggs & Stratton online curriculum site.

Purpose and Objectives

The purpose of this study is to determine the impact of a small gas engine workshop on the importance to teach small gas engines to students from SBAE teachers' perspectives. This study aligns with the value *Advancing Public Knowledge of AFNR Systems* from the American Association of Agricultural Education (AAAE) research values. This value examines curriculum in secondary programs from the design stage to the evaluation stage (AAAE, 2023). Therefore, ensuring that there is adequate curriculum to help educators provide important knowledge to secondary students. Our objectives for this study were to determine what impact was made on SBAE teachers' perceptions of importance to teach small gas engines: 1) inspection and testing, 2) repair, and 3) theories and safety.

Methodology

This study was used to determine the impact of a small gas engine workshop on SBAE teachers perceived importance to teach small gas engines. This training was conducted over the first three days of a 10-day agricultural mechanics workshop replicated over four years. An industry-based workshop provided the tools, equipment, curriculum, and instructors for the small gas engine training. A paper-based survey was created to conduct a pre- and post-test focused on three constructs: 1) inspection and testing, 2) repair, and 3) theories and safety. The tests were reviewed for face and content validity by industry trainers and teacher educators with small gas engine expertise and revised. A total of 81 participants attended these workshops and were asked to fill out the test prior to and after the training where they rated 50 small gas engines skills.

Results/Findings

Based on the pre-test, SBAE teachers rated inspection and testing as very important, while repair and theory/safety were rated extremely important. There was a positive change in the mean difference scores from the pre-test and post-test for all three constructs. The change in the mean differences resulted in all three constructs being rated extremely important in the post-test. The inspection and testing construct had the lowest pre-test and post-test scores (Pre-3.97, Post-4.38), but it also showed the greatest change in mean difference (MD = 0.41). The theory and safety construct had the highest mean scores in both the pre-test and post-test scores (Pre-M = 4.49, Post-M = 4.84). A single-tailed t-test was conducted to determine if there was a statistically significant change, all three constructs were statistically significant and all three had a medium effect size (d = 0.484 – 0.692).

Table 1
Grand Mean Scores of Importance to Teach Small Gas Engines

Construct	Pre-Test		Post-Test			t	p	df	Cohen's d
Small Gas Engine	M	SD	M	SD	MD				
Inspection/Testing	3.97	0.59	4.38	0.40	0.41	7.00	*<.001	68	0.515
Repair	4.35	0.58	4.67	0.38	0.33	4.55	*<.001	57	0.484
Theory/Safety	4.49	0.73	4.84	0.32	0.36	4.71	*<.001	78	0.692

Note: 1 = No Importance; 2 = Somewhat Important; 3 = Moderately Important; 4 = Very Important; 5 = Extremely Important; MD = Mean Difference (pre-post).

Conclusions/Implications/Recommendations

The purpose of this study was to determine the impact of a small gas engine workshop on SBAE teachers' perceived importance to teach small gas engines based on three constructs: 1) inspection and testing, 2) repair, and 3) theory and safety. It can be concluded that SBAE teachers' experience in a small gas engine workshop positively impacted their perceived importance of teaching small gas engines, with statistically significant changes in all three constructs and 45 of the 50 skills. Therefore, our results suggest that attending supplemental training enables teachers to gain a deeper understanding of what is important to teach in small gas engines. Our findings support those of Granberry et al. (2023), who indicated that supplementary training has impacted what teachers consider important to teach. Clark et al. (2021) suggested that educators who received low levels of training in a given subject area at the post-secondary level may avoid instructing in that subject.

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