Research Poster

Agricultural Mechanics and Preservice Teacher Development: A Retrospective Evaluation

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Introduction

Technical skills play a vital role in the success of early career teachers; however, many new teachers lack technical experience (Albritton & Roberts, 2020). School-based agricultural education (SBAE) programs require teachers to operate agricultural mechanics-based programs, but it has been commonly noticed that preservice teachers are not prepared to meet this competency (Burris et al., 2005; Trickett et al., 2023).Undergraduate agricultural mechanics courses play a pivotal role in the preparation of SBAE teachers (Saucier & Langley, 2015). Prior research shows that students are less willing to teach skills in which they lack confidence (McKibben et al., 2022).

Theoretical Framework

Bandura (1977) defined self-efficacy as an "individual's perception of their ability to perform or accomplish a task or activity" (as cited by Granberry et al., 2022, p. 46). Self-efficacy has been found to be a significant factor in overall success within teaching (Bandura, 1995; McKim & Velez, 2017). Doss et al. (2025) referred to self-efficacy as being a major component of program design. Bandura's (1977) model is broken into several sources: a) performance accomplishments, b) vicarious experiences, c) verbal and social persuasion, and d) physiological and emotional states. These four sources play a role in one's behavior and performance (Bandura, 1977).

Methodology

With a change in instructors of the Introduction to Agricultural Mechanics course at Louisiana State University, this study sought to inform course structure and instructional method decisions for the following academic year. This was a descriptive survey given to preservice teachers enrolled in Introduction to Agricultural Mechanics course (*N=16*). To achieve this goal, this survey was performed in the last week of the semester on the final exam date. One fundamental limitation within research is nonresponse rate (Ary et al., 2019). Of the 16 students enrolled, nine participants (56.25%) completed the full survey.

This study used a retrospective survey instrument adapted from a previous work by Rankin and Smith (2022) and includes Power, Structural, and Technical Systems Standards from the Agricultural, Forestry, and Natural Resources (AFNR) Standards specifically focusing on structural, electrical, and small engine-based skills (The National Council for Agricultural Education Standards, 2018). This instrument contained 10 skills from each of the instructional units as well as 18 demographic questions. The students were asked to participate in an optional survey through *Qualtrics* distributed by printed QR code and email follow up requests via Moodle. Participants were asked to rate their level of self-efficacy regarding agricultural mechanics skills both prior to and after the course using a five-point Likert scale (1= *Very low self-efficac*y, 2= *Low self-efficacy*, 3= *Neutral*, 4= *High self-efficacy*, 5= *Very high self-efficacy*). They were also asked to rate their level of motivation to teach the selected skills both prior to and after the course using a five-point Likert scale (1= *Very low motivation*, 2= *Low motivation*, 3= *Neutral*, 4= *High motivation*, 5= *Very high motivation*). Data collected in this process were analyzed using Microsoft Excel and SPSS 31st edition. The data were analyzed using descriptive statistics including means and standard deviations.

Findings

The first instructional unit assessed was structural skills, which included competencies ranging from project planning to demonstrating construction skills. The overall mean of self-efficacy structural skills prior to this course was *M*= 3.10. The overall means of self-efficacy in structural skills following enrollment in this course was *M*= 3.77. The participants felt least competent demonstrating construction skills (*M* =2.44). The structural skill with the largest difference in self-efficacy was the demonstration of proper safety practices and procedures. Our findings show that the participants' motivation to teach structural skills also increased. The overall structural motivation to teach mean prior to this course was *M*=2.80. Following this course, the motivation to teach structural skills increased to an overall mean of *M*=3.69.

The second instructional unit assessed was electrical skills which included competencies ranging from designing electrical diagrams to diagnosing and repairing electrical control systems. The overall mean of self-efficacy prior to this course was *M*= 2.17. The overall self-efficacy following this course was *M*= 3.60. The skill that participants had the lowest self-efficacy in prior to this course was tied between *installing electrical control systems* and *diagnosing and repairing the needs of electrical control systems* (*M*= 1.67). Both skills showed a positive difference in self-efficacy following this course. The overall mean of motivation to teach electrical skills prior to this course was *M*=2.67. Following this course, the mean increased to *M*=3.62.

The third instructional unit assessed was small engine skills which included competencies ranging from identifying components of a small engine to the disassembly and assembly of a small engine. The overall self-efficacy prior to this course in this unit was *M*=2.19. Following this course, the overall self-efficacy mean was *M*=3.22. The skill that the students exhibited the least self-efficacy prior to the course was *comparing and contrasting a two-cycle vs four cycle engine* (*M*= 1.89). The overall mean of motivation to teach small engine skills prior to this course was M=2.25 with the overall mean increasing to M=3.24 after the course.

Conclusion, Implications, and Recommendations

Overall, the highest area of growth in self-efficacy and motivation was the structural skills unit. The second highest was in the electrical skills concentration. Finally, the participants' lowest component both prior to and following this course was the small engines component. The students also rated this component lowest in motivation to teach. One limitation to this study was the number of participants. This study was based on one class at this institution. Results are not generalizable but can be used to draw conclusions for this course, such as investigating the skills with lower ratings and altering the activities of instruction to meet the students' needs. From this study, we did notice a significant rise in preservice teachers' motivation to teach agricultural mechanics related skills. There was also a significant increase in self-efficacy, however; further research is needed to determine the role that lab skills self-efficacy plays in their motivation to teach. The course content and instruction did improve the participants' self-efficacy and motivation to teach skills in the areas of small gas engines, structures, and agricultural electricity. Lastly, we recommend conducting longitudinal research to track changes among participants in multiple cohorts.

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