Using Technical Skill Microworkshops to Develop Agricultural Mechanics Self-Efficacy in College of Agriculture Students

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Introduction

Despite the importance of agricultural mechanics content, undergraduate students have indicated a perceived lack of related knowledge and experiences (Burris et al., 2010; Granberry et al., 2021; Hainline et al., 2018; Tummons et al., 2017). However, students have expressed an interest in gaining agricultural mechanics experience, and skill-based coursework has been shown to positively impact undergraduate students' understanding of agricultural mechanics concepts as well as increase their self-efficacy related to the content (Blackburn et al., 2015; Granberry et al., 2021; Leiby et al., 2013). Similarly, researchers have called for undergraduate students to complete additional skill development in agricultural mechanics beyond the current coursework (Blackburn et al., 2015; Byrd et al., 2015; Saucier & McKim, 2011). Bandura's (1977) Theory of Self-Efficacy identifies four primary sources of self-efficacy judgments, the most influential of which are performance accomplishments or the opportunity to successfully perform the tasks for which self-efficacy is in question (Bandura, 1994). This innovative idea seeks to provide College of Agriculture students opportunities to engage in performance accomplishments and develop self-efficacy in agricultural mechanics outside of typical coursework.

How It Works

To implement this idea, the Louisiana State University Department of Agricultural and Extension Education and Evaluation partnered with the LSU College of Agriculture to offer the workshop to students participating in the LSU Agriculture Residential College (ARC) program. The ARC is a living-learning community of first-year students in the College of Agriculture designed to develop leadership, communication, and hands-on skills. Participation in the ARC allows students to engage in special programs throughout their residency, which provided appropriate alignment to pilot the workshops that constitute this innovative idea.

The workshops are designed to meet a two-hour format, focusing on providing mastery experiences for students in a specific set of technical competencies. The first 40 minutes of the workshop is designed for demonstrative instruction, emphasizing the safe use of the tools and equipment associated with the workshop. In the initial workshop implemented, the purpose was to provide experience with carpentry skills associated with measuring and marking, using a table saw, using a compound miter saw, and using an air nailer. Near the conclusion of the 40-minute instructional phase, students are provided with a model of a small project and introduced to the concept of creating a cut list. In the case of the initial workshop, the project was a small decorative planter. For the remaining hour and twenty minutes of the workshop, students are guided through an experiential laboratory activity during which they create the project using the tools and equipment around which the workshop is designed. Throughout the laboratory phase of the workshop, students are encouraged to engage with the workshop facilitators by asking questions and demonstrating their understanding of the proper use of tools and equipment. For the initial carpentry workshop, students displayed their ability to use measuring devices, safely cut their materials to the parameters of their cut list, and fasten their materials together with the air nailer to create a completed project. At the conclusion of the workshop, students are asked to reflect on the applications of what they have learned, provided information about further skill

development opportunities in AEEE 2003: *Introduction to Agricultural Mechanics*, and allowed to take their project home.

Results to Date

The first micro skill-builder workshop, focusing on carpentry competencies, was offered to ARC students during the first half of the Spring 2022 semester. Workshop attendees were 15 College of Agriculture students, most of whom were female, and represented a diverse group of agricultural degree programs and ethnicities. Further, 80% of the students attending the workshop indicated no prior experience with agricultural mechanics or the tools and equipment associated with the project. Prior to the beginning of the workshop, attendees expressed nervousness about using power tools and excitement to engage in new experiences. These concerns are similar to the findings of Granberry et al. (2021), who reported female undergraduate agricultural education majors experienced nervousness about agricultural mechanics but had a positive outlook on their ability to learn the content. Following the workshop, the students indicated they felt more confident in their ability to perform the skills associated with the workshop and were interested in completing more complex future projects. Many of the attendees discussed their interest in enrolling in AEEE 2003: *Introduction to Agricultural Mechanics* in the future.

Future Plans

Future micro skill-builder workshops focusing on different agricultural mechanics competencies are in development. Research efforts to quantify the effectiveness of these workshops in increasing the self-efficacy of attendees in agricultural mechanics are planned. An agricultural mechanics self-efficacy instrument based on Bandura's (1977) Theory of Self-Efficacy is being designed and will be administered when the workshops are offered to a broader audience of College of Agriculture students. Further, an investigation into the use of these workshops as a recruiting tool for agricultural mechanics-based elective courses is of interest to the authors.

Costs and Resources Needed

The total cost of materials for 15 students to build the small, decorative planter was $172.80 and was provided by the LSU College of Agriculture. Event management, including scheduling, advertising, and registration, was handled by ARC administrators. Faculty and graduate assistants in the LSU Department of Agricultural and Extension Education and Evaluation provided instructional and project design, laboratory facilities, and workshop facilitation. The total time investment for the initial workshop included two hours of preparation and two hours of implementation.

References

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review, 84*(2), 191–215. https://doi.org/10.1016/0146-6402(78)90002-4

Bandura, A. (1994). Self-efficacy. In V. S. Ramachaudran (Ed.), *Encyclopedia of human behavior* (Vol. 4, pp. 71-81). Academic Press. (Reprinted in H. Friedman [Ed.] Encyclopedia of mental health. Academic Press. https://www.uky.edu/~eushe2/Bandura/BanEncy.html

Blackburn, J. J., Robinson, J. S., & Field, H. (2015). Pre-service agriculture teachers' perceived level of readiness in an agricultural mechanics course. *Journal of Agricultural Education, 56*(1), 172–187. https://doi.org/10.5032/jae.2015.01172

Burris, S., McLaughlin, K., McCulloch, A., Brashears, T., & Fraze, S. (2010). A comparison of first and fifth year agriculture teachers on personal teaching efficacy, general teaching efficacy and content efficacy. *Journal of Agricultural Education, 51*(1), 23–31. https://doi.org/10.5032/jae.2010.01022

Byrd, A. P., Anderson, R. G., Paulsen, T. H., & Schultz, M. J. (2015). Does the number of post-secondary agricultural mechanics courses completed affect teacher competence? *Journal of Agricultural Education, 56*(1), 20–31. https://doi.org/10.5032/jae.2015.01020

Granberry, T., Roberts, R., & Blackburn, J.J. (2021, February 8-10) *"A challenge that I'm willing to take on:" The self-efficacy of female undergraduate students in agricultural mechanics* [Paper Presentation]. 2021 Southern Region Conference of the American Association for Agricultural Education, Virtual. http://aaaeonline.org/resources/Documents/Southern%20Region/2021SouthernConference/ProceedingsWithDiscussantRemarks_SR_AAAE_2021.pdf

Hainline, M. S., Sorenson, T. J., & Chumbley, S. B. (2018). Perceived self-efficacy of pre-service agricultural science teachers toward agricultural mechanization. *Journal of Agricultural Systems, Technology, and Management, 29*, 1-14. http://jastm.org/index.php/jastm/article/view/52/58

Leiby, B., Robinson, J. S., & Key, J. (2013). Assessing the impact of a semester-long course in agricultural mechanics on pre-service agricultural education teachers' importance, confidence, and knowledge of welding. *Journal of Agricultural Education, 54*(1), 179–192. https://doi.org/10.5032/jae.2013.01179

Saucier, R., & McKim, B. (2011). Assessing the learning needs of student teachers in Texas regarding management of the agricultural mechanics laboratory: Implications for the professional development of early career teachers in agricultural education. *Journal of Agricultural Education, 52*(4), 24-43. https://doi.org/10.5032/jae.2011.04024

Tummons, J., Langley, G. C., Reed, J., & Paul, E. (2017). Concerns of female pre-service teachers in teaching and supervising the agricultural mechanics laboratory. *Journal of Agricultural Education, 58*(3), 019–036. https://doi.org/10.5032/jae.2017.03019