

**Building Teachers, Not Just Projects: A High School Modeled Course & Laboratory for
Pre-Service Agriculture Teachers**

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Introduction/Need for Innovation or Idea

Inadequate preparation limits preservice teachers' learning and confidence, which may ultimately reduce the quality of instruction they provide to future students (Granberry et al., 2025). Limited access to authentic STEM training also restricts teachers' ability to design engaging and meaningful STEM experiences for their students (Zhou et al., 2023). Hands-on STEM experiences are critical for developing 21st-century competencies, including problem-solving, critical thinking, and technical skills directly related to workforce readiness (Jane, 2016). To address these gaps, innovative teaching strategies that move beyond basic skill practice are needed to immerse preservice teachers in real-world, project-based experiences that reflect the full scope of experiential instruction. Agricultural Mechanics courses are a cornerstone of School-Based Agricultural Education (SBAE), with thousands of projects completed each year through both in-class activities and Supervised Agricultural Experiences, demonstrating the pathway's popularity and strong engagement in hands-on technical work (Doss et al., 2019). However, many SBAE teachers enter the profession with limited agricultural mechanics experience, with some reporting minimal exposure to the subject during their secondary education (Anderson et al., 2023). Similar gaps in preparation are evident at the postsecondary level (Clark et al., 2021). Collectively, the limited preparation and experience reported across educational levels indicate a significant shortage of hands-on experience in agricultural mechanics and highlight the need for innovative instructional approaches that provide authentic, project-based STEM learning opportunities. While agricultural mechanics coursework exists across many programs, these experiences often emphasize discrete skill development rather than comprehensive, project-based applications that require preservice teachers to independently plan, manage, and complete agricultural mechanics projects. This gap limits their preparedness to confidently teach and facilitate authentic agricultural mechanics experiences in their future classrooms.

How It Works

Enrollment was limited to preservice SBAE students who had completed an agricultural mechanics and engineering course sequence. This prerequisite, established based on practitioner feedback, ensured students possessed the foundational skills needed for advanced project-based work. Students completed projects modeled after a youth Agricultural Mechanics Show similar to those conducted in Texas, including judging criteria and showmanship components. The show-based format provided a realistic evaluation framework while fostering problem-solving, critical thinking, and confidence. The course emphasized the full fabrication process, from conceptual planning and material procurement to construction and final presentation, exposing students to both the technical and professional aspects of agricultural mechanics. The course was structured to bridge the gap between skill practice and authentic application. Through a comprehensive project, students applied prior learning in a hands-on context, strengthening problem-solving abilities, building confidence in the shop environment, and developing competencies needed to guide project completion and presentations as future agricultural mechanics teachers. The experience concluded with a public project showcase held on the college campus.

Costs

While agricultural mechanics laboratories require ongoing investment in facilities, equipment, and maintenance, course implementation did not require substantial additional expenditures beyond existing program infrastructure and faculty support. Aside from routine shop maintenance, most project-related costs were offset through student contributions or external funding from individuals or organizations commissioning projects. The cost-sharing model supported authentic, hands-on learning experiences while minimizing additional financial burden on the program.

Results to Date/Implications

Preliminary observations indicate that students benefited from the course's authentic, project-based structure. Daily reflections after hands-on activities fostered critical thinking, self-awareness, and skill development. Collaboration across projects enhanced teamwork and peer learning, as students shared strategies and problem-solving approaches throughout fabrication. Participants gained a clear understanding of supervising and executing a project from planning to showmanship, aligned with the agricultural mechanics show format used in the course. Early evidence suggests this experiential approach increased interest in agricultural mechanics careers. Consistent with Kolb's Experiential Learning Model, students engaged in hands-on experiences that promoted reflection, collaboration, and real-world application of skills (Kolb, 2015). Participation also appeared to boost self-efficacy, particularly in managing complex fabrication tasks independently. Immersive, hands-on experiences reinforced technical skills while increasing confidence and motivation to pursue teaching and STEM pathways in agricultural mechanics.

Future Plans

Building on the success of the initial course, future iterations will expand opportunities for students to engage with the broader community through agricultural mechanics projects. Partnerships with local farms, agricultural organizations, and industry stakeholders will provide authentic, real-world contexts while reinforcing the connection between STEM learning and workforce readiness. Securing funding to support project materials and fabrication costs will ensure students have access to high-quality, hands-on learning experiences. A set of predefined projects that the university can support across multiple courses will be developed to minimize financial burden if community needs cannot be identified or funded. Examples may include lamb stands, livestock pens, small utility trailers, and other agriculturally focused projects, providing a consistent framework for skill development while allowing flexibility for student creativity. These plans aim to create a sustainable, scalable model of agricultural mechanics education that enhances technical skills, self-efficacy, and career preparedness, while contributing to both the local agricultural community and the university. These future developments will continue to be grounded in Kolb's Experiential Learning Model, emphasizing cycles of concrete experience, reflection, and application. By incorporating community-based projects, students will engage in more complex experiential learning opportunities that extend beyond the classroom and reinforce skill development through authentic contexts (Kolb, 2015).

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