

**Learning to Do: Teaching Agricultural Mechanics Projects**

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## **Introduction/Need for Innovation**

Many teachers' perceived confidence of their ability to teach agricultural mechanics is lower than that of the other courses they teach (Byrd et al., 2015). More specifically, Tummons et al. (2017) reported that preservice teachers felt they lacked the preparation to adequately teach agricultural mechanics courses and expressed persistent issues with their agricultural mechanics skill levels, as well as trust in students within dangerous lab environments. Fears and hesitations regarding the instruction of agricultural mechanics are reported more often by female preservice teachers, as they express being very concerned about the safety of their students in the lab (Tummons et al., 2017). Female preservice teachers have also felt they did not have adequate knowledge of agricultural mechanics to guide students in lab activities and avoid injuries (Tummons et al., 2017).

Acknowledging the lack of self-efficacy in teaching agricultural mechanics among preservice teachers, I sought to develop a classroom experience that would help build my students' self-efficacy regarding the instruction of agricultural mechanics. Thus, the Ag Ed Lab Methods Woodworking Workshop idea was conceived. Approaching preservice teacher education with a constructivist, student-centered teaching philosophy, I conceptualized an authentic classroom experience intended to put my students in the role of teacher in the agricultural mechanics lab. I approach much of my teaching with an inquiry-focused style; I allow students to experiment, explore, and sometimes fail. I believe teachers need to be prepared to experience failure in the classroom and thus, it is important to provide preservice teachers with similar experiences prior to entering their own classrooms.

## **How the Innovation Worked**

During the fall of 2023, students in the Ag Ed lab methods course at North Dakota State University were tasked with selecting a simple woodworking project, building the project themselves for practice, and then teaching a group of other campus students how to build the wood project during a no more than 3-hour workshop. The project they chose needed to utilize the following skills (1) measuring; (2) cutting with at least two saws; (3) sanding; (4) utilization of at least two different fasteners; and (5) finishing of some sort (painting, varnishing, staining, etc.). Modeling effective project planning, they drafted a bill of materials, cut list, and scale drawing of the project. As a class, they went to a local hardware store to buy the materials needed to complete the project (as a real-life Ag teacher would be expected to do). Upon assembling their supplies, they were given two lab periods to build prototype(s) of their projects. All of the Ag Ed students had previously taken Ag Mechanics courses, but their skill levels were varied. Allowing them time to build their prototype(s), before being expected to teach others, gave them confidence in their abilities and allowed the lab instructor to review safety expectations with the Ag Ed students.

After building their prototype, the students assumed the role of instructor. They were tasked with planning a workshop to teach others how to build their selected wood project. They were required to recruit students to attend the workshop, order the necessary supplies, and organize all materials and handouts for students. Students were asked to use a budget to set the registration fee for the workshop to ensure the cost of materials could be covered.

Each group scheduled their woodworking workshop on an afternoon in November or December. The lab instructor purchased the materials for the students but the order was put together by the students. On the day of their workshop, the Ag Ed students led their workshop like they would their own classroom. They were solely responsible for organizing the space and materials, leading instruction and demonstrations, and ensuring that all workshop participants followed safety protocols.

### **Results to Date/Implications**

At the conclusion of the fall semester, three woodworking workshops were held on campus for 27 student participants. Thirteen NDSU students were involved in the planning and implementation of the workshops. The NDSU Ag Ed students expressed discomfort, frustration, and fear throughout the planning process leading up to their workshop. However, after the workshop concluded, the vast majority of students expressed gratitude, confidence, and increased self-efficacy in their ability to facilitate learning in a woodworking lab. The students were asked to complete a reflection about their experience. The following are some select quotes from Ag Ed students who planned and led the workshops: “It was an amazing learning experience, and it gave a real sense of teaching in a shop setting.” “This was an eye-opening experience. I have never been able to teach students in a shop setting before and I am grateful that I had this opportunity to do so.”

### **Future plans/advice to others**

Realistically, this method could be used to teach a wide range of Ag Mechanics content areas. I fully intend to utilize this approach again in the future. However, I would recommend the following changes. First, I would assist my students with the process of recruiting students to attend their workshops. Some groups were more successful than others, but I believe having a group of individuals with little to no background in woodworking made the experience more authentic than recruiting their friends who had prior woodworking experience to participate in their workshops. I also think this would alleviate some of the students’ stress in preparing for the workshop. Additionally, I will consider providing the students with a list of project choices to choose from. Giving them infinite choices also led to some unnecessary anxiety in the process. It was also important to work with our facilities team on campus to ensure safety protocols were being followed, such as having participants sign liability waivers.

### **Costs/resources needed**

This project should be set up in a way that pays for itself. The cost of the students’ prototype projects was included in the total budget with the expenses being passed on to the participants. Some groups actually did waste materials and lost money, but it provided a good opportunity for discussion about how to avoid those errors as future teachers. A university instructor should be at each student workshop to assess teaching performance and provide supervision and support.

### References

- Byrd, A. P., Anderson, R. G., & Paulsen, T. H. (2015). Does agricultural mechanics laboratory size affect agricultural education teachers' job satisfaction? *Journal of Agricultural Education*, 56(1), 6-19. <https://doi.org/10.5032/jae.2015.01006>
- Tummons, J. D., Langley, G. C., Reed, J. J., & Paul, E. E. (2017). Concerns of female preservice teachers in teaching and supervising the agricultural mechanics laboratory. *Journal of Agricultural Education*, 58(3), 19-36. <https://doi.org/10.5032/jae.2017.03019>