

## Interdisciplinary Examples Using Farm Equipment to Enhance Teaching and Learning

### Introduction

Agricultural machinery continues to evolve and become more technologically based compared to historically mechanically based machinery. This change in functionality has allowed machinery such as tractors, planters, and utility terrain vehicles (UTV) to be used in different ways beyond the typical day-to-day farm operations. This teaching tip explains how programs, outside of traditional agricultural systems and technology programs, can use agricultural equipment to enhance student learning of important concepts by interconnecting disciplines within the agricultural industry. Through the integration of agricultural equipment and technology into courses with other focuses, such as environmental and natural resources or animal sciences, both students and instructors encounter an interdisciplinary and experiential learning approach to teaching and learning. This interdisciplinary approach allows for a shared experience amongst students from a variety of disciplines (McKim et al, 2017) while allowing them to complete the experiential learning cycle (Kolb, 1984) from their individual disciplinary viewpoint. This approach benefits the college and programs as faculty are able to collaborate with other departments within their colleges to access and use equipment, while students are able to share their experiences with other students. Specific examples of this cross disciplinary approach include several lab activities conducted at The Ohio State University ATI in Wooster, Ohio.

### Interdisciplinary Activity Examples

**Agronomics of Planting Systems** This lab is taught in an equipment management class that primarily has agricultural systems management students, but also students enrolled from crop management, agronomy, agricultural education, and horticultural sciences programs. The goal of this activity is to provide opportunities for students to experiment with different planter row unit configurations while connecting agronomic concepts to individual planter components. Students then get to plant a few rows and compare their row unit's performance to those of their peers'.

**Water Management Mapping with Global Positioning System (GPS)** This unit is conducted in a soil and water management course with a primary enrollment of crop management students, but also includes students from agronomy, agricultural systems management, construction management, and environmental and natural resources programs. The goal of this activity is to allow students to create topographic maps that accurately define a land area. They use a Trimble

guidance system in a UTV to create the maps and mark locations of various land features. This aftermarket guidance system can be purchased through Trimble for a variety of vehicles. These maps are later uploaded into Trimble's WM-Drain Farm Drainage Solution software to analyze water flow and develop management solutions. Both the software and guidance system subscriptions are purchased annually by Ohio State.

**Livestock Equipment Operations** This lab is taught in an equipment operations course mostly for animal sciences students, but also some horticultural sciences and agricultural education program students enroll in the course. This activity involves learning the controls of various styles of skid steers and then practicing basic operational tasks including unloading, loading, transporting, scooping, and backing up. The students are assessed with their performance in an obstacle course relating to one style of controls and two operational tasks.

### **Assessment**

Each of these examples uses common equipment found on farms and in postsecondary agricultural systems or mechanics programs; tractors, planters, UTVs, and skid steers. However, many other disciplines use these pieces of machinery in their industries and students need to be familiarized with them prior to the completion of their programs. Many students who have completed these activities have had high levels of engagement as they are learning something new in a very hands-on way.

Though no formal assessment is given with these examples, the knowledge and skill gain of the students is clear through instructor observation. Students who were apprehensive about operating a new piece of equipment can maneuver an obstacle course with confidence. Students who were unfamiliar with planter components and their agronomic function, can hold discussions that challenge the reasoning of decisions. Those who haven't used GPS systems before, are able to create a map and mark locations on an area of land.

Interdisciplinary collaboration can greatly enhance student learning by integrating diverse knowledge and perspectives throughout the experiential learning process. Partnering students from different majors for group activities encourages them to share expertise, communicate across disciplines, and solve complex problems together. Many students report that this dynamic approach deepens their understanding, broadens their perspective, and helps them recognize connections between fields, making learning more engaging and career-relevant. Instructors also benefit by networking with other departments and community organizations, fostering collaborative teaching and research opportunities. To maximize impact, it is essential to diversify examples and case studies, ensuring students can connect activities to their specific career paths and real-world applications.

### **References**

Kolb, D. A. (1984). *Experiential learning: Experience as the source of learning and development*. Prentice-Hall.

McKim, A. J., Greenhaw, L., Redwine, T., McCubbins, OP., & Jagger, C. (2017). Emerging opportunities for interdisciplinary application of experiential learning among colleges and teachers of agriculture. *North American Colleges and Teachers of Agriculture Journal*, 61(4), 310-316.

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