

**Thinking Inside the Box: Partnering with Veterinary Medicine Faculty to
Develop Low-cost Cattle Palpation Simulator Models**

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Introduction

Agriculture teachers are responsible for teaching diverse agricultural subject matter, such as agricultural mechanics, plant science, and animal science. Within animal science specifically, agriculture teachers are expected to competently perform and teach a range of technical agriculture skills, such as administering vaccinations, caring for live animals, and performing physical examinations (Wells et al., 2023). However, using live animals for teaching and learning purposes continues to become increasingly difficult and sometimes impractical (Hart et al., 2005), especially when considering facility requirements and student safety concerns (Wells et al., 2023). Thus, perhaps using an alternative method (i.e., simulation) to deliver technical agriculture skill instruction to students would be helpful and appropriate.

As a teaching tool, simulation encompasses various mediums, such as virtual reality (Bailenson, 2018) and physical models (Agnew & Shinn, 1990). Further, simulation can be a viable approach for facilitating student learning (Brown & Knobloch, 2022). The appropriate use of simulation can yield practical and effective learning outcomes for students (Bailenson, 2018; Wells & Miller, 2022). In the context of learning new procedures, Agnew and Shinn (1990) found that “simulation activities can provide students with basic knowledge and understanding” (p. 15). From the student perspective, there is value in carefully using simulation for teaching and learning purposes; however, simulation should be used judiciously to supplement, not entirely replace, actual learning experiences (Tiffany & Høglund, 2014; Wells & Miller, 2022).

While the preceding literature indicates that simulation shows potential for use in educational settings, barriers remain. Specifically, the costs associated with simulation acquisition and use remain a primary barrier (Wells & Miller, 2020). High-fidelity simulators can be quite expensive and often require users to spend valuable time learning their functionality to successfully use them. While high-fidelity simulators can offer the most realistic approach for preparing students for the situations they will encounter beyond formal education settings (Chinnugounder et al., 2015), using such simulators may not be possible in budget-constricted contexts, such as Agricultural Education programs in public schools. Thus, perhaps a low-cost approach to simulation use remains a more preferable alternative for agriculture teachers.

How it Works

During the Fall 2023 semester, the lead author began a collaborative partnership with a veterinary medicine faculty member at the Murray State University (MSU), who is the second author of the present abstract. The purpose of this partnership was: (1) to assist the veterinary medicine faculty member with a simulator model construction project that would benefit her Veterinary Technology and Pre-veterinary Medicine students and (2) to provide an opportunity for the lead author’s pre-service agriculture teachers to learn how to construct and use low-cost simulator models to help provide animal science-focused technical agriculture skill instruction in their forthcoming programs. The simulator models in question are designed to provide users with the opportunity to learn cattle palpation techniques before working with live cattle.

To initiate the simulator model construction process, the second author began gathering various low-cost, common household items (e.g., cardboard boxes, bubble wrap, cardboard tubing, etc.) in September 2023. She ultimately gathered enough materials to build several simulator models. In early October 2023, the lead author began soliciting his pre-service agriculture teachers via e-mail to assist with the simulator model construction process. Seven pre-service agriculture teachers agreed to assist with the project.

On the evening of October 25, 2023, the lead author, the second author, the seven pre-service agriculture teachers, and one in-service agriculture teacher personally invited by the lead author met at the A. Carman Pavilion Animal Health Technology Facility on the MSU campus. The facility contains classrooms and laboratory spaces for instruction in veterinary technology and medicine. Before initiating the simulator model construction process, the second author provided background information about cattle palpation and an overview of the simulator models and materials. Afterward, the second author distributed the project materials and supervised the project construction process, circulating between the small groups and answering technical questions as-needed. Over a timeframe of approximately 45 minutes, the pre-service and in-service agriculture teachers constructed and tested six simulator models.

Implications

From the authors' perspectives, this collaborative effort yielded the intended outcomes: (1) the authors leveraged their respective resources to prepare learning resources for Veterinary Technology and Pre-veterinary Medicine students and (2) pre-service and in-service agriculture teachers received hands-on instruction on procedures for constructing low-cost simulator models to teach technical agriculture skills to students. From the perspective of engagement, the authors observed that the pre-service and in-service agriculture teachers were highly interested in the functionality and utility of the simulator models and verbally indicated that they each intended to construct and use models when introducing cattle palpation techniques to their own students.

Future Plans and Advice to Others

Based on the feedback that resulted from this collaborative effort, the authors plan to expand the scope of this learning opportunity via a half-day professional development (PD) workshop for pre-service and in-service agriculture teachers. This forthcoming PD workshop will be offered during the Summer 2025 semester and will dive deeper into animal science-related subject matter and yield simulator models that participants can take with them upon the conclusion of the PD workshop. When possible and appropriate, the authors suggest that other agricultural teacher educators consider partnering with technical agriculture faculty at their respective institutions to provide similar learning opportunities for the pre-service and in-service agriculture teachers they serve.

Costs

The materials for all six simulator models cost approximately \$50.00. Beyond the materials expenditures, the authors used approximately three hours of their time to gather materials, solicit project construction participants, and construct and test the simulator models.

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