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Utilizing Authentic Assessment Strategies in a Methods of Teaching Agricultural Mechanics Course to Develop Preservice Agricultural Education Teachers' Laboratory Management Competencies

Introduction

Agricultural mechanics remains an ever-important content area in school-based agricultural education (Anderson et al., 2014; Burris et al., 2005). The popularity of such coursework helps to ensure its continued offering in modern school-based programs (Hubert and Leising, 2000; Wells et al., 2013). Further, high-quality agricultural mechanics content can help secondary students to better connect with and understand academic coursework (e.g., mathematics) through hands-on learning situations (agricultural mechanics) that help to engage them cognitively and cohesively, thereby helping to solidify the educational process (Parr et al., 2006).

Because agricultural mechanics remains a diverse and important content area, it is vital that beginning agricultural education teachers be prepared to teach the subject matter (Burris et al., 2010). Teachers must be prepared to implement a wide range of learning activities using various technologies to accomplish the purposes of mechanics laboratory instruction. To this end, laboratory management remains an important skill development area for new teachers as well (Saucier and McKim, 2011). In order to properly manage the agricultural mechanics laboratory and its assets, teachers must possess a broad knowledge and skill base that is up-to-date regarding equipment and facilities, organized in its approach, and comprehensive in its nature (Saucier and McKim, 2011).

Based upon these revelations, we have pondered upon the notion of developing pre-service agriculture teachers' agricultural mechanics laboratory management competencies. This notion was guided by specific competencies detailed by Saucier and McKim (2011). Specifically, as the Methods of Teaching Agricultural Mechanics (AGEDS 488) course is designed to address preservice teachers' professional competency needs in the aforementioned content area, it was determined that laboratory management needs should be addressed in the course through an authentic assessment approach.

How it Works

In order to more fully develop an authentic format for students' intellectual and professional development, several activities were utilized that would reflect vital components necessary to high-quality agricultural mechanics laboratory instruction. Because authentic assessment is a useful tool for measuring students' abilities and content mastery (Newmann and Associates, 1996), such a method naturally reflected upon the use of the preceding course

activities. Agricultural education teachers are often challenged to provide learning activities that are comprehensive in nature, depth, and scope, and reflect occurrences that happen within the real world, i.e., authentic settings and assessments (Phipps et al., 2008). Additionally, as laboratory management remains a high concern of pre-service teachers (Saucier and McKim, 2011), we believed that such authentic assessment principles could be used realistically within the course to better prepare future teachers to implement their agricultural mechanics laboratory management strategies and ideas, all the while granting them the opportunity for peer and instructor assessment of their work.

The laboratory management activities included the development of safety rules for an agricultural mechanics laboratory, the creation of a shop clean-up roster and rotation, project grading rubric development, mechanics laboratory layout specifications, and lesson development and planning. Each activity was designed to provide much-needed practice in cognitively assessing needs for the given facilities. Additionally, each activity was chosen based on selected literature pertinent to effective agricultural mechanics laboratory management (Johnson and Schumacher, 1989; McKim and Saucier, 2011). As each assignment was presented during the semester, students based their work upon pre-existing students, lessons, projects, and facilities within the agricultural mechanics teaching laboratory at Iowa State University. For example, the project grading rubric was developed based upon students completing an actual woodworking project during the course, while the laboratory layout plan was based upon the facilities used within the class. Also, students could present their work to their peers and course instructor for additional feedback. As a result, students could complete various laboratory management-related activities within the context of a university agricultural mechanics course and facility, thereby increasing the authentic feel of the experience.

Implications

Throughout the Fall 2016 semester, many productive and useful discussion points emerged between us and the students regarding the implemented laboratory management strategies. Most students expressed support for the use of these activities and the authentic context through which they were developed. For example, many students enjoyed the opportunity to create their own laboratory rules and have them critiqued by peers, as they reported a deeper understanding of the cognitive strategies behind such activity development. Most students reported a heightened awareness regarding the importance of appropriate laboratory management strategies and the role they play in ensuring a smooth flow of activities in the laboratory environment.

Future Plans & Advice to Others

Based upon the success that was witnessed within the course during the Fall 2016 semester, we recommend that these activities be used within future offerings of the course. These activities, based upon students' responses, made some impact regarding the importance of developing and maintaining effective laboratory management strategies. To this end, other agricultural education teacher preparation institutions should consider a similar approach in addressing preservice teachers' laboratory management competencies.

Costs

The additional time needed to facilitate the authentic learning process comes with a cost to the students, as some sacrifice of instructional time did occur. No other costs were incurred.

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