

**Laboratory Management Professional Development Needs of Iowa Secondary Agricultural Education Teachers**

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### Introduction

Agricultural laboratories offer a unique opportunity for agricultural education teachers to allow students with hands-on activities that reinforce both academic and vocational skills (Hubert, Ullrich, Lindner, & Murphy, 2003). McKim and Saucier (2011) stated that an agricultural mechanics laboratory is necessary component to have a quality agricultural education program. The incorporation of laboratory based experiences allows students to apply scientific inquiry and STEM based applications (Osborne & Dyer, 2000). Since students learn various psychomotor skills in an agricultural mechanics curriculum there is a lot of time spent inside an agricultural mechanics laboratory (Johnson, Schumacher, & Stewart, 1990; McKim & Saucier, 2011).

According to numerous studies, laboratory management is the most important aspect of teaching in any agricultural education laboratory (Blackburn, Robinson, & Field, 2003; Johnson et al., 1990; McKim & Saucier, 2011; Saucier, Terry, & Schumacher, 2009; Saucier & McKim, 2011). Agricultural education teachers must be able to complete various tasks when managing a laboratory such as maintaining a safe working environment, providing safety instruction, and identifying safety hazards (Phipps, Osborne, Dyer, & Ball, 2008). Harper (1984) posited that students are more conscious of safety practices when the teacher exhibits safe behavior and follows proper safety procedures. Bruening, Hoover, and Radhakrishna (1991) stated that the physical safety of students must come first out of all the other duties that an agricultural education teacher has when working in a laboratory. Past studies have stated that strategies are needed to help ensure that pre-service and in-service teachers develop technical competence in regards to laboratory management (Blackburn et al., 2003; Johnson et al., 1990; McKim & Saucier, 2011; Saucier et al., 2009; Saucier & McKim, 2011).

### Conceptual/Theoretical Framework

The theoretical foundation that guided this study was Bandura's theory of self-efficacy (1997). To further align this theory with this study we explored the beliefs and one's capabilities to organize and execute the course of action to manage an agricultural mechanics laboratory. If a teacher is incompetent and unknowledgeable in regards to laboratory management then the agricultural laboratory can quickly become an unsafe and unused (Hubert et al., 2003). According to Hubert et al. (2003) incompetence of laboratory management could stem from inadequate instruction in pre-service preparation programs. McKim and Saucier (2013) found over a 20 year period that agricultural education instructors were receiving less training in agricultural mechanics, students had less working space, and an increased student enrollment. Furthermore, Dyer and Andreasen (1999) stated that new agricultural education teachers were ill-equipped in safety. With this decline in agricultural mechanics courses in pre-service programs more in-service professional development opportunities must be held in order for beginning agricultural education teachers to become competent. Further investigation is needed to determine the specific laboratory management needs of agricultural education teachers is necessary. This is help ensure beginning and in-service teachers are more competent and knowledgeable about creating safe learning environment in agricultural education laboratories.

### **Methodology**

The research objectives for this study were: (1) Determine selected personal, professional, and program demographic characteristics of Iowa secondary agriculture teachers who instruct in and manage agricultural mechanics programs; (2) Determine the self-perceived importance levels and ability levels that Iowa secondary agriculture teachers place on agricultural mechanics laboratory management competencies, and; (3) Determine the professional development needs of Iowa secondary agriculture teachers regarding agricultural mechanics laboratory management competencies. The data collection instrument developed by Johnson, Schumacher, and Stewart (1990), and later modified by Saucier, et al. (2009), was used for data collection in this study. A two-section instrument was utilized to address the research questions of this study. The first section of the instrument consisted of a 70 statements with double-matrix response scales. The double-matrix required subjects to respond to each statement twice. One scale was designed to rate the perceived importance of each skill competency (1 = No Importance, 2 = Below Average Importance, 3 = Average Importance, 4 = Above Average Importance, 5 = Utmost Importance), while the other scale was designed to rate the individual's ability to perform the skill competency (1 = No Ability, 2 = Below Average Ability, 3 = Average Ability, 4 = Above Average Ability, 5 = Exceptional Ability). The second section of the instrument was used to identify personal, professional, and program characteristics of the respondents and the agricultural education programs in which they taught. Dillman's (2007) electronic data collection protocol was followed for this study. After five points of contact, a response rate of 49% (n = 72) was obtained. Non-response error was a relevant concern; therefore, procedures for handling non-respondents were followed as outlined as Method 1 in Lindner, Murphy, and Biers (2001).

### **Results/Findings**

Results of the Mean Weighted Discrepancy Scores (MWDS) indicated that teachers had the greatest in-service needs revolve around hazardous materials. The competencies ranked the highest include correcting hazardous laboratory conditions, safely disposing of hazardous materials, properly installing and maintaining safety devices and emergency equipment, safely handling hazardous materials, and safely storing hazardous materials. The competencies that ranked lowest include conducting an agricultural mechanics public relations program, maintaining a file of educational projects/activities for students, planning student recruitment activities for the agricultural mechanics program, and maintaining computer based student academic records.

### **Conclusions/ Implications/Recommendations/Impact on Profession**

There are a few conclusions that can be drawn from the results of this study. First, agricultural education teachers need professional development in the realm of hazardous materials. Working with hazardous materials is a critical competency that agricultural educators must have when working in any type of lab. Secondly, laboratory maintenance competence is another area in which agricultural educators need more instruction. If an agricultural educator cannot maintain a safe laboratory environment students can get injured, which could lead to the teacher being dismissed. Lastly, teachers believe that agricultural mechanics programs do not need recruitment or public relations activities. If recruitment and public relation programs are done correctly can help enhance the program by incorporating community support.

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