**Research**

# Professional Development Needs of Texas Agricultural, Food, and Natural Resource (AFNR) Teachers who Supervised Students Competing in the 2018 San Antonio Junior Agricultural Mechanics Project Show

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## Introduction

According to the National Research Agenda for Agricultural Education and Communication 2016-2020 (Roberts, Harder, & Brashears, 2016), there is a need for a scientific and professional workforce in agriculture whom have a diverse background as well as have broad cognitive and affective skills. With a "shortage of qualified agriculture teachers [being one of] the greatest challenges facing FFA and agricultural education" (National FFA Organization, 2010, para. 2), it is imperative that teachers are provided with the education and skills to teach all aspects of agriculture – including agricultural mechanics. Furthermore, agricultural mechanics coursework has historically been considered an important and necessary construct of the secondary agricultural education curriculum (Wells, Perry, Anderson, Shultz, & Paulsen, 2013). Agricultural education teachers must be well prepared in agricultural mechanics curriculum and skills and can "safely and effectively guide agricultural education students in the development of practical, hands-on skills" (McKim & Saucier, 2011). Therefore, robust secondary and post-secondary programs must be present to prepare the next generation of agricultural education teachers in a wide variety of ways (Phipps, Osborne, Dyer, & Ball, 2008).

## Conceptual Framework

The Borich Needs Assessment Model (Borich, 1980) was used to guide this study. Borich (1980) described a needs assessment model based on a discrepancy score derived from a respondent-determined level of importance and level of performance for the specific competency being assessed (Barrick, Ladewig, and Hedges, 1983). Borich (1980) classified three components of the needs assessment model…..from these results, a Mean Weighted Discrepancy Score (MWDS) is calculated to provide further information regarding teacher training across three competences – *Knowledge*, *Performance*, and *Consequence*. In this particular study, the model was used to determine the specific agricultural mechanics skill areas in which teachers required professional development across all three consequences.

## Purpose and Research Questions

The purpose of this census was to determine the perceived agricultural mechanics professional development needs of Texas AFNR teachers who supervised students who competed in the 2018 San Antonio Junior Agricultural Mechanics Project Show and their personal, professional, and program demographics. The following research questions influenced this study: (1) What are the personal, professional, and program demographic characteristics of Texas Agricultural, Food, and Natural Resource teachers, who supervised students who competed in the 2018 San Antonio Junior Agricultural Mechanics Project Show? (2) What are the perceived professional development needs of those teachers regarding agricultural mechanics skill areas?

## Methodology

The population for this study were all Texas AFNR teachers who supervised students who competed in the 2018 San Antonio Junior Agricultural Mechanics Project Show and who

attended a show meeting. Prior to this show, a panel of experts ($n$ = 5) with experience in agricultural education and agricultural mechanics, were used to evaluate the instrument for face and content validity. Based upon their suggestions, the instrument was revised and a pilot test ($n$ = 17) was then conducted to ensure reliability. A reliability analysis (Cronbach's alpha coefficient) of the scales of measurement was conducted (Importance = .916, Ability to Perform = .936, & Ability to Teach = .937) and the instrument was deemed reliable (Ary, Jacobs, & Sorenson, 2010). All teachers present at the show meeting were presented with this booklet style questionnaire and 120 usable responses were collected. However, results from this study should be limited to only the participants who provided data.

## Results

Teachers indicated that they taught with an overall average departmental budget of $25,689.80 (SD = 29,401.83), had an average agricultural mechanics budget of $10,009.78 (SD = 12,733.08), and taught in a laboratory that was approximately 4,500 ft² ($M$ = 4,477.39 ft²; SD = 5,476.35) in size with the majority of these laboratories being older than 16 years ($f$ = 62; 51.7%). Furthermore, these teachers have taught for over 10 years ($M$ = 10.46; SD = 10.20) with the greatest amount of respondents earning a salary between $56,000 - $60,000 per year. Additionally, the majority of teachers were male ($f$ = 96; 80.0%), of white ethnicity ($f$ = 103; 85.8%), had an average age of 37 years ($M$ = 37.10; SD = 11.61).

Within the *Knowledge Competence*, the top three agricultural mechanics skill areas in which professional development were needed were: *Hydraulics* (MWDS = 2.21), *Pneumatics* (MWDS = 1.99), and *Modern Machinery Technology* (MWDS = 1.92). The bottom three agricultural mechanics skill areas needed for professional development were: *Oxygen/Fuel Welding* (MWDS = 0.07), *Concrete* (MWDS = -0.06), and *Fencing* (MWDS = -0.77). Furthermore, teachers also indicated professional development needs in the *Performance Competence*. The top three agricultural mechanics skills indicated were: *Hydraulics* (MWDS = 2.59), *Gas Tungsten Arc Welding* (MWDS = 2.31), and *Pneumatics* (MWDS = 2.28). The lowest three areas of professional development were: *Concrete* (MWDS = 0.07), *Hand Tools* (MWDS = -0.08), and *Fencing* (MWDS = -0.89). Finally, teachers also possessed agricultural mechanics professional development needs in the *Consequence Competence*. The top three agricultural mechanics skill areas in need of professional development were: *Hydraulics* (MWDS = 2.58), *Gas Tungsten Arc Welding* (MWDS = 2.48), and *Modern Machinery Technology* (MWDS = 2.47). The bottom three professional development need areas were: *Concrete* (MWDS = 0.16), *Carpentry* (MWDS = 0.15), and *Fencing* (MWDS = -0.61).

## Conclusions, Implications, and Recommendations

Respondents were mostly male, white, middle-aged, and mid-career who taught in older agricultural mechanics laboratories with ample teaching budgets. Overwhelmingly, teachers indicated that they had professional development needs, across all competences, primarily in Hydraulics, Gas Tungsten Arc Welding, Pneumatics, and Modern Machinery Technology. Implications of this study indicate that mid-career agricultural mechanics teachers have a need for professional development and could question the effectiveness of the professional development program in Texas and nationally, for existing teachers. Furthermore, this study provides some insight into the professional development needs of mid-career agricultural

mechanics teachers and may provide some mid-echelon base line data to further develop teacher knowledge and skill levels and enhance recruitment and retention efforts through training.

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