A Summary of Agricultural Mechanical Competencies after High School Matriculation

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Introduction

- Agricultural mechanics (AgMech) in school-based agricultural education (SBAE) programs continues to be an important topic related to teacher effectiveness (Swafford & Hagler, 2017).

- Due to its popularity at the secondary and post secondary levels, AgMech programs must continuously seek ways to ensure program effectiveness through teacher competency.

Introduction (continued)

- To ensure that agricultural education teachers are technically prepared to teach AgMech courses, *skill development* and *learner readiness* continues to remain the driving force.

- Although previous research has been impactful regarding the need for improving ag mech competence, more research is needed in what roles do postsecondary programs have in ag mech preparation.

The Challenge of Ag Mech Instruction

- In-service Level
  - Desire competent (ag mech) teachers
  - Possess transferable AgMech skills (Work-based) curriculum
- Pre-Service Level
  - Scope of AgMech courses
- This study examined the effect of secondary AgMech courses on teacher agricultural mechanical competence after high school.
- Specifically, what were the AgMech skill levels of participants before and after their high school matriculation?

Theoretical Framework

- Social cognitive and self-efficacy theories with a direct focus on teacher efficacy (Tschannen-Moran, Woolfolk Hoy, & Hoy, 1998).
- Teacher Efficacy:
  - A teacher's belief in their capability to organize and execute courses of action required to successfully accomplish a specific teaching task in a particular context (Tshannen-Moran et al., 1998).
- Little research teacher efficacy as it relates to an individuals' drive to persevere when faced with obstacles, and their desire to exert effort in acquiring the information needed to become successful (Whittington, McConnell, & Knobloch, 2006).

Methodology

- This study utilized descriptive explanatory research.
- Target population: high school agricultural education teachers in Areas V, VI, and VIII as identified by the Texas FFA Organization (N = 700).
- Using a sampling formula, researchers randomly selected 150 teachers (*n* = 150).
- The questionnaire was developed by the researchers with some questions being modeled after the Rice, LaVergne, & Gartin, (2011) study.

Methodology (continued)

- Questionnaire focused on assessing 10 agricultural mechanical competencies based on a 4-point Likert scale:
  - 1.00 -1.50 = *no skills*
  - 1.51-2.50 = *minimal skills*
  - 2.51-3.50 = *basic skills*
  - 3.51- 4.00 = *advanced skills*
- A panel of experts with agricultural mechanics teaching experience established content and face validity.
- Survey implementation and data collection methods followed Dillman's (2009) *Tailored Designed* Method.

Methodology (continued)

- Non-response error: early *vs* late respondents. No statistically significant differences were found.
- A response rate of 67% was attained (n = 101).
- To determine if a statistically significant (p <.05) relationships existed, paired-samples t-test was utilized.
- Effect sizes were calculated, interpreted, and reported (Cohen, 1988).

.01	Small Effect
.06	Medium Effect
.14	Large Effect

Findings (*n* =102)

	Ag Mech Skill	*M*	*SD*	*t*	*p*	Cohen's *d*
Pair 1	Agriculture Buildings & Structures	2.25 2.78	.79 .74	7.97	.001	.38
Pair 2	Cold Metal Work	1.87 2.57	.85 .94	9.48	.001	.47
Pair 3	Concrete & Masonry	1.96 2.35	.81 .80	5.61	.001	.24
Pair 4	Electrical Principles	1.73 2.37	.81 .83	8.13	.001	.40
Pair 5	Hydraulics	1.46 1.86	.75 .88	6.12	.001	.27
Pair 6	Metal Fabrication	1.91 2.75	.87 .85	10.38	.001	.52
Pair 7	Plumbing	2.05 2.53	.86 .83	7.08	.001	.33
Pair 8	Small Gas Engines	1.76 2.34	.80 .92	7.93	.001	.38
Pair 9	Welding	1.91 2.91	.95 .80	11.49	.001	.57
Pair 10	Woodworking	2.37 2.85	.84 .81	7.57	.001	.36

Conclusions/Implications

- A statistically significant increase across all agricultural mechanical competencies was observed.
- Implication: Enrolling in ag mech courses during high school = improved competency
- The eta squared statistic (Cohen's d) indicated a large effect size for each competency.
- Implication: Increases the probability that the observed change (magnitude) really exist.

Recommendations

- Teacher preparation programs should work closely with SBAE to promote AgMech course enrollment . Earlier the better.

- In terms of increasing participants' ag mech skills into another competency, future research should examine the perceived barriers of developing total competency.

Findings (*n* =102)

	Ag Mech Skill	*M*	*Competence Level*		
Pair 1	Agriculture Buildings & Structures	2.25 2.78	Minimal Basic		
Pair 2	Cold Metal Work	1.87 2.57	Minimal Basic		
Pair 3	Concrete & Masonry	1.96 2.35	Minimal Minimal		
Pair 4	Electrical Principles	1.73 2.37	Minimal Minimal		
Pair 5	Hydraulics	1.46 1.86	No Skill Minimal		
Pair 6	Metal Fabrication	1.91 2.75	Minimal Basic		
Pair 7	Plumbing	2.05 2.53	Minimal Basic		
Pair 8	Small Gas Engines	1.76 2.34	Minimal Minimal		
Pair 9	Welding	1.91 2.91	Minimal Basic		
Pair 10	Woodworking	2.37 2.85	Minimal Basic		

Recommendations

- Teacher preparation programs and SBAE should revisit their curriculums to promote similar content and competency development.
- Additional research focusing competency identification and clarification: " *What really is the difference between minimal and basic skills?* "

- Thank You!