Determining Early-career Georgia Agriculture Teachers' Agricultural Mechanics Professional Development Needs

Christopher C. Crump, Ed.D.
Banks County High School
Homer, Georgia 30547
christopher.crump@banks.k12.ga.us

Trent Wells, Ph.D.
Murray State University
Hutson School of Agriculture
206 South Oakley Applied Science Building
Murray, KY 42071
kwells23@murraystate.edu

Determining Early-career Georgia Agriculture Teachers' Agricultural Mechanics Professional Development Needs

Introduction and Theoretical Framework

To be considered effective, agriculture teachers need to be skilled and knowledgeable in a variety of agricultural subject matter (Eck et al., 2019), such as agricultural mechanics. Agricultural mechanics is commonly taught in Agricultural Education programs across the United States. Moreover, agricultural mechanics courses are popular with students and are frequently in demand (Valdez & Johnson, 2020). Consequently, agriculture teachers must be adequately prepared to facilitate learning in agricultural mechanics for their students. Agricultural mechanics subject matter is broad and includes, but is not limited to, structures construction, metal fabrication, and power mechanics (Granberry et al., 2023).

Professional development (PD) is an appropriate avenue through which to improve agriculture teachers' confidence and competence in teaching agricultural subject matter (Grieman, 2010). Wells and Hainline (2021) indicated that agriculture teachers across the United States have substantial needs regarding agricultural mechanics-focused PD. PD can be leveraged to help develop individual agriculture teachers' capacities to deliver impactful, effective learning opportunities for their students (Grieman, 2010). In the context of our study, we operationalized human capital theory (Becker, 1993) as our undergirding theoretical framework. Human capital theory (Becker, 1993) indicates that investment in an individual's knowledge and skills, such as agriculture teachers engaging in agricultural mechanics-focused PD sessions, contributes to the ability of an individual to provide greater, beneficial returns on investment, such as improved competence to teach students enrolled in agricultural mechanics courses.

Purpose

In their national study examining agriculture teachers' agricultural mechanics PD needs, Wells and Hainline (2021) sought to provide a detailed, granular investigation of the topic. However, no recent, similarly-scoped studies have been undertaken in Georgia. To help address this gap in the literature, the purpose of our study was to assess early-career Georgia agriculture teachers' agricultural mechanics PD needs. Our study aligns with Research Priority 3 of the American Association for Agricultural Education National Research Agenda: Sufficient Scientific and Professional Workforce that Addresses the Challenges of the 21st Century (Stripling & Ricketts, 2016).

Methods

Our study was a direct replication of Wells and Hainline's (2021) investigation, *Examining Teachers' Agricultural Mechanics Professional Development Needs: A National Study*. We used their valid and reliable instrument to conduct our study during the Fall 2023 semester. Out of 73 items, 65 addressed various agricultural mechanics topics. Similar to Wells and Hainline (2021), our instrument was framed using Borich's (1980) needs assessment model (i.e., an *Importance* scale and a *Competence* scale). After we received Murray State University Institutional Review Board approval, we contacted a Georgia Agricultural Education state staff

member (A. Claxton, personal communication, September 8, 2023) to obtain the school e-mail addresses for all Georgia agriculture teachers with five or fewer years of experience teaching Agricultural Education (N = 253). Afterward, we used five points of contact (Dillman et al., 2014) to electronically invite and remind agriculture teachers to participate in our study. Ten e-mails bounced, reducing our population to 243 agriculture teachers. To incentivize participation, we offered participants the chance to win one of five $20.00 gift cards. Seventy-six teachers provided usable data, yielding a 31.3% response rate. To identify non-response error (Lindner et al., 2001), we used Microsoft Excel to conduct an independent samples *t*-test to compare early and late responders' responses on the *Competence* scale items. We did not identify any statistically significant differences (t(74) = .24, p =.81) between the two groups. We used McKim and Saucier's (2011) Excel-Based MWDS [mean weighted discrepancy score] Calculator to identify and rank our responders' agricultural mechanics PD needs.

Results, Conclusions, and Recommendations

As indicated by their positive MWDS (McKim & Saucier, 2011), early-career Georgia agriculture teachers have PD needs in all 65 agricultural mechanics topics detailed in our instrument. The top five agricultural mechanics topics are presented in Table 1 (below).

Table 1

Early-career Georgia Agriculture Teachers' Agricultural Mechanics Professional Development Needs by MWDS

			Importance		Competence	
Item	*n*	*MWDS*	*M*	*SD*	*M*	*SD*
American Welding Society (AWS) standards for welding procedures	69	1	8.06	4.25	0.85	2.35
Procedures for structural welding	70	2	7.42	4.16	0.85	2.37
Principles of metallurgy (ex. identifying metals, proper use of metals, etc.)	69	3	7.32	4.17	0.82	2.42
Procedures for building metal projects (ex. trailers, barbecue pits, etc.)	70	4	7.29	4.11	0.81	2.34
Procedures for cold metalworking bending	70	5	7.27	3.94	0.85	2.10

Note. Importance Scale: 1 = Not important (NI), 2 = Of little importance (LI), 3 = Somewhat important (SI), 4 = Important (I), 5 = Very important (VI); Competence Scale: 1 = Not competent (NC), 2 = Little competence (LC), 3 = Somewhat competent (SC), 4 = Competent (C), 5 = Very competent (VC); MWDS = Mean weighted discrepancy score; M = Mean; SD = Standard deviation.

In particular, our findings indicate that priority should be given to providing PD in welding and metal fabrication-related topics. We recommend that Georgia Agricultural Education stakeholders explore opportunities to provide agricultural mechanics-focused PD specifically geared toward early-career agriculture teachers. However, agricultural teacher educators in Georgia should also consider exploring mid- and late-career Georgia agriculture teachers' agricultural mechanics PD needs. Doing so would help to expand the profession's knowledge and capacity to directly address agriculture teachers' human capital development needs, thereby helping to impact learning opportunities for students.

References

Becker, G. S. (1993). *Human capital: A theoretical and empirical analysis with special reference to education* (3rd ed.). The University of Chicago Press.

Borich, G. (1980). A needs assessment model for conducting follow-up studies. *Journal of Teacher Education, 31*(3), 39-42. doi:10.1177/002248718003100310

Dillman, D. A., Smyth, J. D., & Christian, L. M. (2014). *Internet, phone, mail, and mixed-mode surveys: The tailored design method* (4th ed.). Hoboken, NJ: John Wiley & Sons, Inc.

Eck, C. J., Robinson, J. S., Ramsey, J. W., & Cole, K. L. (2019). Identifying the characteristics of an effective agricultural education teacher: A national study. *Journal of Agricultural Education, 60*(4), 1-18. https://doi.org/10.5032/jae.2019.04001

Granberry, T., Blackburn, J. J., & Roberts, R. (2023). The state of agricultural mechanics in the preparation of school-based agricultural education teachers. *Journal of Agricultural Education, 64*(4), 144-158. https://doi.org/10.5032/jae.v64i4.160

Grieman, B. C. (2010). Continuing professional development. In R. M. Torres, T. Kitchel, A. L. Ball (Eds.) *Preparing and advancing teachers in agricultural education* (pp. 180-201). The Ohio State University.

Lindner, J. R., Murphy, T. H., & Briers, G. E. (2001). Handling nonresponse in social science research. *Journal of Agricultural Education, 42*(4), 43-53. https://doi.org/10.5032/jae.2001.04043

McKim, B. R., & Saucier, P. R. (2011). An Excel-based mean weighted discrepancy score calculator. *The Journal of Extension, 49*(2). https://www.joe.org/joe/2011april/pdf/JOE_v49_2tt8.pdf

Stripling, C. T., & Ricketts, J. C. (2016). Research priority 3: Sufficient scientific and professional workforce that addresses the challenges of the 21st century. In T. G. Roberts, A. Harder, & M. T. Brashears. (Eds.), *American Association for Agricultural Education national research agenda: 2016-2020.* University of Florida Department of Agricultural Education and Communication.

Valdez, E. D., & Johnson, S. (2020). *Mismatch? Aligning secondary career and technical education with regional workforce demand*. Texas Public Policy Foundation. https://files.texaspolicy.com/uploads/2020/05/05112536/Valdez-Johnson-Workforce-Demand.pdf

Wells, T., & Hainline, M. S. (2021). Examining teachers' agricultural mechanics professional development needs: A national study. *Journal of Agricultural Education, 62*(2), 217-238. https://doi.org/10.5032/jae.2021.02217