Content Taught in Agricultural Mechanics Courses, 1980 to 2021: A Survey of Nine 1862 Land-Grant Universities

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Introduction and Purpose

Courses in vocational agriculture mechanics at the collegiate level were offered at some institutions before the Smith-Hughes Act of 1917. The courses have historically ranged from metal fabrication to electricity to structures (Burris et al., 2005; Byrd et al., 2015; Hubert, 1996). Prior studies, however, identified discrepancies in the average number of courses required for teacher education degree completion in agricultural education with regards to agricultural mechanics (Hubert, 1996; McKim & Saucier, 2013). This study's purpose was to identify the agricultural mechanics topics taught in offered or, in some cases, required courses from 1980 to 2021 at select land-grant universities to prepare agricultural education teachers. The year 1980 was chosen for the beginning of data collection due to the 1980s being a decade of great upheaval and change in vocational education with the 1983 *A Nation at Risk* report, as well as enactment of the Carl D. Perkins Vocational Education Act in 1984 (Bell, 1983; Carl D. Perkins Vocational Education Act, 1984). This study aligns with research priority five of the *American Association for Agricultural Education (AAAE) National Research Agenda*, i.e., Efficient and Effective Agricultural Education Programs (Roberts et al., 2016).

Methods

We used historical research methods to collect and analyze our data (McDowell, 2002). This involved accessing online databases and search engines, exchanging personal communications with teacher educators, and reviewing institutional library resources. The study's sample was identified through systematic sampling of 1862 Land-Grant Universities. The three AAAE regions were used as a sampling frame: 1) North-Central, 2) Southern, and 3) Western. Each region had its 1862 Land-Grant Universities alphabetized; such were numbered based on that alphabetical order and a random number generator was used to select three institutions from the respective regions. We created a digital database to organize findings, including detailing all documents received and examining such for accuracy and authenticity (McDowell, 2002), i.e., internal criticism and external criticism were conducted (Johnson & Christensen, 2012).

Findings

An analysis of agricultural mechanics courses required for degree completion leading to certification to teach agriculture found that different topics were taught in the courses offered by the nine universities. However, a common trend were courses involving 1) hot and cold metal working (welding), 2) the teaching of agricultural mechanics topics (pedagogy), 3) agricultural structures, and 4) small gasoline engines content (see Table 1).

Table 1

Topics Taught in Agricultural Mechanics Courses for Degree Completion in Agricultural Education, Teacher Education, 1980 to 2021, at Nine 1862 Land-Grant Universities

Years	ND State Univ.	Purdue Univ.	WV Univ.	Univ. of AZ	Univ. of ID	WA State Univ.	LA State Univ.	Auburn Univ.	Univ. of KY
1980 –1984	[b]	1, 4, 9	[b]	2, 4, 9	[b]	1, 2, 3, 8, 9	1, 4	[b]	[a]

1985 –1989	[b]	1, 4, 9	[b]	1, 2, 3, 4, 9	[b]	1, 2, 3, 4, 8, 9	1, 4 [a]	[b]	[a]
1990 –1994	2, 4, 8	1, 4	[b]	1, 2, 3, 4, 9	[b]	1, 2, 3, 4, 8, 9	[a] [b]	[b]	[a]
1995 –1999	2, 4, 8	1, 4	6, 8, 9	1, 2, 3, 4, 9	1, 2, 3	1, 2, 9	[b]	1, 4	[a]
2000 –2004	2, 4, 8	1, 4	6, 8, 9	1, 2, 3, 4, 9	1, 2, 3	1, 2, 9	[b]	1, 2, 4	1, [a]
2005 –2009	2, 4, 8	1, 4	2, 4, 8	1, 2, 3, 4, 9	1, 2, 3	1, 2, 9	[b]	1, 2, 4	1, [a]
2010 –2014	2, 4, 8	2, 4	1, 4, 5, 9	1, 2, 3, 4	1, 2, 3	2, 9	[b]	1, 2, 4	1, [a]
2015 –2021	2, 4, 8	2, 4	1, 4, 5, 9	1, 2, 3, 4	1, 2, 3	2, 9	[b]	1, 2, 4	1, [a]

Note. 1 = Intro. to Ag Mechanics; 2 = Welding; 3 = Small Gasoline Eng./Ag Power; 4 = Construction/Structures; 5 = Electricity; 6 = Plumbing/Irrigation; 7 = Ag Computer Systems; 8 = Electives, 9 = Teaching Ag Mechanics. [a]Indicates course(s) was/were not specified and subject to advisor approval. [b]Indicates information not found for required courses' topic(s).

Washington State University and West Virginia University experienced the greatest change in the topics taught in agricultural mechanics courses from 1980 to 2021 (see Table 1). Prior to 1995, West Virginia University required courses that included six of the nine identified course topics, the most of any institution. Louisiana State University, with one, had the fewest specified courses, which included one of the nine topics, with the expectation that students would complete one or more related elective courses pending their advisor's approval (see Table 1).

Conclusions, Implications, and Recommendations

Five of the nine universities experienced changes in course topics from 1980 to 2021, with four modifications the most. Six universities had zero to one course topic change in their agricultural mechanics courses during the period studied. This may imply that the universities found these course topics to be of high importance to their teacher preparation programs, and by extension to their states' school-based agricultural education (SBAE) curricula. However, congruence with relevant industry standards or expectations for entry-level employees was unclear, and that may also warrant investigation. Implications from this study may support the need for professional development on topics not taught in the institutions' agricultural mechanics courses, e.g., drone technology, maintenance, and repair, or advanced sensors and controls. We recommend that universities also identify topics comprising other agricultural courses required for degree completion in agricultural education, teacher education to assess whether the content taught supports SBAE instructors' preparation to teach their states' curricula and how that may have changed over time.

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