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Importance of Teaching Agricultural Mechanics by Certification Type

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Abstract

Traditional agricultural education teacher preparation programs face dilemmas in shifting licensure requirements, challenges in recruiting preservice teachers for a career in school-based agricultural education (SBAE), and an absence of diverse teacher candidates resulting in a serious teacher shortage (Smith et al., 2022). To meet the need for teachers, many states have implemented alternative routes to licensure to fill the demand. With an outpouring of alternatively certified teachers entering the profession and research supporting better teaching performance from traditionally certified teachers (Lublin, 2022; Nakai & Turley, 2003), concern for the retention of these teachers exists. Since SBAE teachers are typically expected to teach agricultural mechanics coursework, it is vital that appropriate training is received (Granberry et al., 2023; Wells et al., 2013). Further, Floyd (2020) posited one of the reasons agricultural education teachers leave the profession is lack of preparation. The purpose of this study was to identify traditionally and alternatively certified Iowa SBAE teachers' perceived level of importance to teach agricultural mechanics. Ajzens (1991) Theory of Planned Behavior guided this study. Viewed through the lens of the theory of planned behavior, the findings from this study conceptualize how SBAE teachers' attitudes toward a specified behaviors, subjective norms, and perceived behavioral control, together shape an individual's behavioral intentions and behaviors (Montano & Kasprzyk, 2015). Results of this study conclude that traditionally certified teachers identify all five agricultural mechanics constructs as more important than their alternatively certified peers. Additionally, approximately 91% of the alternatively certified teachers in Iowa had no post-secondary training in agricultural mechanics. We recommend that alternatively certified teachers be required to participate in agricultural mechanics professional development or complete specific coursework before receiving a teaching license.

Introduction

Teacher shortages have been a common issue for many years and have traditionally been attributed to fluctuations in educational financing, teacher migration, retirement age, and increasing student enrollment (Darling-Hammond et al., (2023); Ingersoll & Smith, 2003). With the current teacher shortfall, incentive programs have been designed to recruit new teachers to the profession to fill these unfilled positions. However, implementation of these efforts alone will not fix the staffing problems many schools currently face (Hirsch, et al., 2001). Due to the lack of teachers, many school systems have been forced to lower their hiring standards for teacher quality (Will, 2023).

The means of educating students in agricultural education programs has changed drastically over the past century. Traditional agricultural education teacher preparation programs currently face dilemmas in shifting licensure requirements, challenges in recruiting preservice teachers for a career in school-based agricultural education (SBAE), and an absence of diverse teacher candidates resulting in a serious teacher shortage (Smith, et al., 2022). To meet the growing needs for agricultural education teachers, states have resorted to alternative routes to teacher certification for the preparation of candidates as an option to fill an ever-increasing number of teaching vacancies (Povich, 2023). According to the most recent national Agricultural Education supply and demand study (Smith et al., 2022), 16.7% of the new SBAE teachers hired in 2022 had completed an alternative route to licensure. Non-traditional routes to entering the teaching profession can include professional experience, occupational competency, and the completion of a baccalaureate degree in a requisite subject area (Ruhland & Bremer, 2003). Rocca and Washburn (2006) suggested that alternatively certified agricultural education teachers tend to have more years of experience in the agricultural industry while at the same time are missing valuable teaching experience as noted by Knobloch and Whittington (2002).

Traditionally certified teachers are those who have completed a traditional post-secondary teacher preparation program. Traditionally certified teachers have been considered more successful and highly rated then those who entered the profession through alternative programs or without preparations (Darling-Hammond, et al., 2002). Specifically, traditionally certified teachers have been considered superior in almost every dimension of teaching including curriculum and assessment, classroom management, learning styles, awareness of learning styles, and knowledge of students (Darling-Hammond et al., 2002; Lublin, 2022; Nakai & Turley, 2003. Knobloch and Whittington (2002) found that new agricultural education teachers who completed a traditional teacher preparation program including student teaching were more confident than alternatively certified peers. However, Graham and Garton (2003) suggested that there was no direct difference between certification type and teaching performance among school based agricultural education (SBAE) teachers. With these recent changes in the types of certification required for state licensure, concerns exist regarding whether alternatively certified teachers are meeting the needs of their students (Rocca & Washburn, S, 2006)

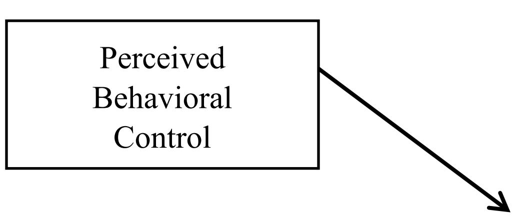
Research has also indicated that an adequate pre-service preparation program and support of novice teachers are very important in improving teacher quality, competency, and retention of teachers (Granberry et al., 2023; Ruhland & Bremer, 2003). The lack of adequate pre-service preparation programs, especially for alternative certifications programs, has led to a decrease in teacher quality and competency (Feistritzer & Haar, 2008). Alternatively certified teachers vary widely in the amount preparation received prior to entering the classroom. These individuals may possess little experience and require higher levels of support in order to become successful teachers (Hainline & Wells, 2024; Ruhland & Bremer, 2003). Ford, et al. (2008) established that alternatively certified teachers were least competent in agricultural mechanics when compared to other courses taught in the high school agricultural education curriculum. The lack of preparation to teach agricultural mechanics has driven away many young teachers from teaching agricultural mechanics content (Dyer & Andreason, 1999). Research has also indicated that more training for both traditional and alternatively certified teachers is necessary in order to adequately prepare them for teaching agricultural mechanics (Buriak & Harper, 2001; Clark et al., 2021).

Increased exposure received in agricultural mechanics at the secondary level can lead to an increased number of agricultural mechanics courses and skills being taught when those students become teachers (Wells, et al., 2013). Since school-based agricultural education teachers are typically expected to teach agricultural mechanics coursework, it is vital that appropriate training at the post-secondary level is received (Byrd et al., 2015; Wells et al., 2013). Previous research has indicated that experience in a specific content area can also create a higher level of self-confidence for teachers regarding a given subject (Burris, et al., 2010; Granberry et al., 2022; Stripling & Roberts, 2012). Increased formal exposure to agricultural mechanics content can allow for the increased development of skills and an increased desire by teachers to teach that content (Wells et al., 2013).

Theoretical Framework

Ajzens (1991) Theory of Planned Behavior states that attitude toward a specified behavior, subjective norms, and perceived behavioral control, together shape an individual's behavioral intentions and behaviors (Montano & Kasprzyk, 2015). The specific considerations drive the theory: behavioral beliefs (attitude), perceived behavioral control, and subjective norms. In respect to each of these aspects, behavioral beliefs produce the favorable or unfavorable attitude to the behavior Ajzens (1991) When one's belief about a task or behavior is unfavorable, that person's attitude toward that task will lead to a lower level of performance. Ajzen's theory (1991) also considers subjective norms as a representation of the perceived social pressures on the individual to perform certain tasks. Subjective norms impact how an individual views the importance of a particular task. Perceived behavioral control refers to the extent to which teachers view themselves as being capable of teaching the curriculum. Often the perceived behavioral control reflects an individual's past experiences and anticipated obstacles (Ajzen, 2002). Teachers who are not confident in their own ability to perform needed skills may feel uncomfortable teaching the associated task (Saucier & Krysher, 2014).

Figure 1 depicts the relationship between the three main considerations within the Ajzen's (2002) Theory of Planned Behavior: perceived behavioral control, behavioral beliefs (attitude), and subjective norms. Subjective norms and normative beliefs are associated with an individual's decision to approve or disapprove a particular behavior, often weighted by the person's motivation and attitude (Saucier & Krysher, 2014). Attitude is determined by the individual's beliefs of the outcomes of performing the learned behavior. A person who holds a strong belief that is positively valued, will perform the behavior with a positive attitude.



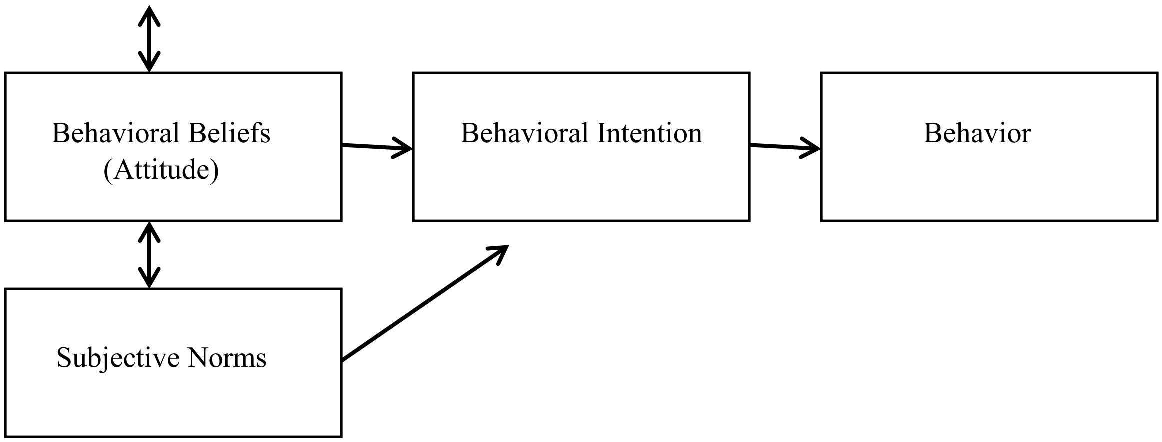


Figure 1. Theory of Planned Behavior

Perceived behavioral control considers situations where the individual may not have control over that particular behavior. The perceived behavioral control considers the subjective norms, normative beliefs, and behavioral beliefs (attitude) of the individual, to describe a behavior that should occur (Saucier & Krysher, 2014). An individual that believes in certain subjective norms to a behavior should perform that behavior when motivated and will then hold a positive normative belief. The relationship between these three factors controls a person's behavioral intention. Since a person's behavioral intention is a combination of attitude, self-efficacy, norms, and perceived control, therefore positive behavioral intention will support the performance of the new behavior. However, if the behavioral intention is negative a person's attitude, self-efficacy, and perceived control will inhibit the person from wanting to perform a task and not learn that new behavior. A lack of continuity in any of these three factors inhibits the person from reaching the behavioral intention and then implementing such learned behavior.

Agricultural mechanics has often been associated with high levels of stress and anxiety for many agricultural education teachers (Foster, 1986; Granberry, 2021). Attitude is often deemed as the most important underlying piece to a person's behavioral intention and then learned behavior. Seemingly low levels of attitude to perform tasks in agricultural mechanics have drawn teachers to avoid teaching agricultural mechanics or leaving the profession altogether (Walker, et al., 2004). Walker et al., (2004) identified the level of like or dislike in performing certain responsibilities in agricultural education between three groups movers, leavers, and stayers. Leavers had the lowest enjoyment levels in agricultural mechanics, and it was the most disliked and least taught construct (Walker et al., 2004). Conceptualized for this study, low levels of behavioral beliefs (attitude), subjective norms, and perceived behavioral control regarding agricultural mechanics curricular content could indicate a decreased likeliness that an individual will have a positive intention to teach that particular curriculum or skill.

Purpose and Objectives

Considering the critical need stated by the American Association for Agricultural Educators Research Priority Area 3: "Sufficient Scientific and Professional Workforce that address the Challenges of the 21st Century" (Stripling & Ricketts, 2016, p. 29), the purpose of this study was to identify traditionally and alternatively certified secondary agricultural education teachers' perceived importance to teach agricultural mechanics. As the agricultural industry grows, the desire for basic education from students in the principles of agricultural mechanics will continue to grow. Agricultural education teachers are responsible for providing the needed training in this content area to their SBAE students (Ramsey & Edwards, 2011). Providing training in a technology-rich field, like agricultural mechanics, will help to prepare students for the rigors, needs, and challenges of the real world (Roberts, et al., 2016). This study aligns with the American Association for Agricultural Education's National Research Value: Increasing Prosperity through innovation in Agricultural, Food, and Natural Resource Systems by connecting STEM content aligned to agricultural mechanics curriculum (AAAE, 2023). The following objectives emerged from the purpose of this study:

1. Describe selected characteristics of traditional and alternatively certified teachers and their agricultural education programs; and
2. Compare traditional and alternatively certified teachers' perceived importance to teach agricultural mechanic within five agricultural mechanics constructs.

Methods

This descriptive study was conducted as part of a larger study in agricultural mechanics education and utilized survey research methods to summarize characteristics, attitudes, and opinions to accurately describe a norm (Ary, et al., 2006). A paper-based questionnaire was used to address the objectives of this study. Three sections, which included 54 skills relating to agricultural mechanics, formed the instrument. The 54 skills were separated into five constructs within the subject area of agricultural mechanics and included: Mechanic Skills, Structures/Construction, Electrical Skills, Power and Machinery, and Soil and Water. Respondents were asked to use a five-point summated scale to rate their perceived importance to teach all 54 skills in agricultural mechanics. Section two consisted of 15 demographic questions relating to the teacher, and section three included nine questions about the agricultural education program and various school characteristics.

Content validity was reviewed by a team of five university faculty members with expertise in the fields of agricultural mechanics and agricultural education. An initial electronic version of the instrument was pretested through a pilot study with a group of 12 agricultural education teachers in a nearby state following the recommendations of Dillman, et al. (2009). Suggestions from this pilot study led us to adopt a paper-based, rather than electronic, instrument. *Post-hoc* reliability was estimated following the suggestions of Gliem and Gliem (2003) and resulted in reliability coefficients for importance. Reliability coefficients for perceived importance to teach within each construct were calculated as follows: Mechanic Skills ($\alpha = .966$), Structures/Construction ($\alpha = .976$), Electrical Skills ($\alpha = .960$), Power and Machinery ($\alpha = .971$), and Soil and Water Skills ($\alpha = .907$).

Table 1

Reliability Coefficients of Instrument Constructs- Cronbach's Alpha

Construct	*Number of Items*	*a**
Structures and Construction	9	.976

Agricultural Mechanics	19	.966
Electricity	6	.960
Soil and Water	5	.907
Power and Machinery	15	.971

Note. *Cronbach's alpha. > .9 = Excellent, >.8 = Good, >.7 = Acceptable, >.6 = Questionable, >. 5 = Poor, and <.5 = Unacceptable (George & Mallery, 2003).

A convenience sample guidelines and data were collected from attendees during the Iowa agricultural education teachers' conference. The purpose behind targeting this sample was based on the likelihood for them to be involved in additional professional development activities in the future. A questionnaire was distributed to each secondary teacher (*N* = 130) in attendance and asked that it be completed by the end of the conference. Participants were offered a power tool institute safety curriculum as incentive to complete and return the questionnaire. Instruments were returned from 103 of the 130 attendees, yielding a 79.2% response rate. No additional efforts were made to obtain data from non-respondents. Non-response errors were addressed following the suggestions of Miller and Smith (1983) by comparing respondents' personal and program demographic data to data from the Iowa Department of Education (2010). No significant differences $(p < 0.05)$ for gender, age, highest degrees held, years of teaching experience, or size of school community between respondents and the general population of agricultural education teachers in Iowa based on a Pearson's χ^2 analysis. Data were coded and analyzed using SPSS 24.0. In this study, we use descriptive statistics to provide baseline data regarding the importance of agricultural mechanics skills as perceived by traditionally and alternatively certified SBAE teachers in Iowa. Due to the purposively selected sample, findings from this study should be interpreted with care and not extrapolated beyond the target population.

Results

Objective one sought to describe selected characteristics of traditional and alternatively certified teachers and their agricultural education programs. Table 2 provides a summary of the respondent's demographics. Of sixty-eight traditionally certified teachers, 51 were male and 17 female, while thirty-three of the alternatively certified teachers included 17 male and 16 female teachers. The highest percentage of the traditionally (*n*=41, 60%) and alternatively (*n*= 22, 67%) certified teachers possessed a bachelor's degree while 27 (40%) of the traditionally certified teachers and 11 (33%) of alternatively certified teachers reported receiving a master's degree. Approximately one-third of traditionally (*n*=20, 30%) and alternatively (*n*=11, 33.4%) certified teachers in our study reported completing 0-5 years of teaching. It can also be noted that a great disparity existed between traditionally certified teachers with 30 or more years of experience (*n* = 14, 20.6%) and alternatively certified teachers (*n* = 2, 6.1%).

Table 2

Summary of Respondents' Demographic Characteristics

	Traditionally Certified		Alternatively Certified	
	f	%	*f*	%
Gender				
Male	51	75.0	17	51.5
Female	17	25.0	16	48.5
Highest Level of Education				
Bachelor's Degree	41	60.0	22	67.0
Master's Degree	27	40.0	11	33.0
Years of Teaching				
0-5	20	30.0	11	33.4
6-10	11	16.0	10	30.3
11-15	6	8.9	5	15.2
16-20	6	8.9	1	3.0
21-25	3	4.5	2	6.0
26-30	8	11.8	3	9.1
More than 30	14	20.6	2	6.1

Table 3 provides a summary comparison of program demographics by route to certification. Although not collected from respondents in this study, we used population parameters from a study completed by Shultz, et al. (2014) which described the respondents at the time of the study. The majority of agricultural education teachers were located in rural locations (n=55), followed by small urban areas (n=19), and urban (n=2). The majority of schools had one agricultural education teacher (89.7%). Additionally, over half of the alternative certified teachers in this study had not completed agricultural mechanics coursework at the secondary or post-secondary levels.

Table 3

Summary of Program Demographics

	Traditionally		Alternatively Certified	
	f	%	*f*	%
Campus Location Designation				
Rural (Population less than 5,000)	53	79.1	25	78.1
Small Urban (Population between 5,000 and 20,000)	13	19.4	6	18.8
Urban (Population greater than 20,000)	1	1.5	1	3.1
Number of Agricultural Science Teachers				
1 Teacher	61	89.7	27	90.0
2 Teacher	4	5.9	3	10
3 Teacher	2	2.9	0	0

4 Teacher	1	1.5	0	0
Number of Secondary Agricultural Mechanics Courses Completed				
0	24	36.4	19	59.4
1-2	28	42.4	10	31.2
More than 3	14	21.2	3	9.4
Number of Post-Secondary Agricultural Mechanics Courses Completed				
0	21	31.3	16	51.6
1-2	27	40.3	9	29.1
More than 3	19	28.4	6	19.3

Table 4 displays the grand means of both traditionally and alternatively certified teachers' perceived importance to teach agricultural mechanics by construct area. Traditionally certified teachers had higher grand means in all five of the construct areas. Within those five construct areas the *Structures and Construction* construct had the highest grand mean for both traditional (GM=3.76) and alternative certification teachers (GM=2.78). Finally, *Soil and Water* had the lowest grand mean (M=2.85) for traditionally certified teachers, while *Electricity* had the lowest grand mean (GM=2.07) for alternatively certified teachers.

Table 4

Respondent Reported Perceived Importance to Teach Agricultural Mechanics by Construct Area and Certification Route

			Traditionally Certified			Alternatively Certified	
Construct	Skill	*n*	*M*	*SD*	*N*	*M*	*SD*
Structures and Construction	9	57	3.76	0.97	30	2.78	1.24
Power and Machinery	15	49	3.50	1.04	31	2.27	1.23
Mechanics	19	50	3.15	1.02	28	2.28	1.06
Electricity	6	52	3.04	1.08	30	2.07	1.13
Soil and Water	5	48	2.85	0.95	30	2.38	1.11

Note: The Importance scale, 1 = not important, 2= some importance, 3= moderately important, 4= strong importance, 5 = very strong importance

Table 5 reports mean, and standard deviations of respondents perceived importance to teach specific skills within the *Mechanics* construct by certification type. The grand mean for the mechanics skills construct was (M = 3.15) for traditionally certified and (M = 2.28) for alternatively certified teachers (Table 4). Traditionally certified respondents reported welding safety as the most important competency to teach, *(M*=4.72) followed by SMAW Welding (Arc) (*M*=4.36). Traditionally certified teachers also reported GMAW Welding (MIG) as an important competency to teach in mechanics (*M*=4.30). Alternatively certified teachers had a slightly different perception of the competencies that should be of importance to teach in the *Mechanics* construct. Alternatively certified teachers reported Welding Safety as the most important competency area to teach (*M*=4.67). They also reported Mechanical Safety (*M*=4.34*)* and Plasma Cutting (*M*=4.30) as being highly important to teach in the mechanical skills construct.

Table 5

Respondent Reported Perceived Importance to Teach Mechanics Skills by Certification Type

	Traditionally Certified			Alternatively Certified		
Competency Area	*n*	*M*	*SD*	*n*	*M*	*SD*
Oxy-Acet. Welding	64	3.97	0.906	33	3.64	1.220
Metallurgy & Metal Work	55	3.27	1.113	30	3.03	1.033
SMAW Welding (Arc)	64	4.36	0.804	32	4.22	1.070
Oxy-Propylene Cutting	50	3.26	1.291	30	3.13	1.358
Welding Safety	64	4.72	0.654	33	4.67	1.021
Hot Metal Work	52	3.04	1.154	30	3.00	1.114
Oxy-Acet. Cutting	65	4.15	0.852	33	4.12	0.992
GMAW Welding (MIG)	61	4.30	0.843	32	4.28	1.085
Oxy-Acet. Brazing	61	3.34	1.078	31	3.32	1.249
Soldering	56	3.32	1.064	33	3.42	1.226
Cold Metal Work	52	3.02	1.180	30	3.13	1.106
Mechanical Safety	58	4.22	1.060	32	4.34	1.096
Computer-Aided Design	51	3.31	1.140	29	3.45	1.152
GTAW Welding (TIG)	55	3.62	0.991	28	3.79	1.315
Tool Conditioning	51	3.22	1.238	31	3.39	1.256
Pipe Cut. & Thread	52	3.10	1.192	29	3.28	1.192
Plasma Cutting	57	4.00	0.945	30	4.30	1.119
Fencing	52	3.12	1.308	29	3.66	1.096
Plumbing	54	3.33	1.229	30	3.53	1.074

Note: The Importance scale, 1 = not important, 2= some importance, 3= moderately important, 4= strong importance, 5 = very strong importance

Traditionally and alternatively certified teachers were asked to report their perceived level of importance to teach nine different competencies within the *Structures/Construction* construct. The grand mean for this construct was higher for traditional certified teachers (*GM*=3.76) than alternatively certified teachers (*GM*=2.78) (Table 4). Traditionally and alternatively certified teachers reported Construction and Shop Safety as the most important skill to teach (*M*=4.38 and *M*=4.59 respectively). Additionally, the Woodworking Power Tools skill indicated the highest mean scores for both traditionally (*M*=4.24) and alternatively (*M*=4.22) certified teachers.

Table 6

Respondent Reported Perceived Importance to Teach Structures/Construction Skills by Certification Type

	Traditionally Certified			Alternatively Certified		
Competency Area	*n*	*M*	*SD*	*n*	*M*	*SD*
Woodworking Hand Tools	62	4.06	0.827	32	3.94	1.134
Woodworking Power Tools	62	4.24	0.843	32	4.22	1.070
Construction Skills (Carpentry)	61	3.98	0.991	30	3.97	0.999
Bill of Materials	60	4.17	0.960	31	4.26	0.893
Concrete	57	3.61	1.031	30	3.77	1.006
Construction and Shop Safety	60	4.38	0.865	32	4.59	0.665
Drawing and Sketching	56	3.75	0.995	30	3.97	0.850
Selection of Materials	58	3.93	0.896	31	4.26	0.773
Fasteners	57	3.60	1.100	31	3.97	0.983

Note: The Importance scale, 1 = not important, 2= some importance, 3= moderately important, 4= strong importance, 5 = very strong importance

Table 7 depicts the perceived importance of teaching specific skills from the *Electricity* construct as reported by both traditionally and alternatively certified teachers in our study. Traditionally certified teachers indicated a moderate level of importance of the construct (*GM* = 3.04) while alternatively certified teachers indicated the construct held some importance (*GM* = 2.07) (Table 4). Both groups of teachers identified Electrical Safety as the highest among construct skills with a strong level of importance (*M*=4.21 and *M*=4.13 respectively).

Table 7

Respondent Reported Perceived Importance to Teach Electricity Skills by Certification Type

	Traditionally Certified			Alternatively Certified		
Competency Area	*n*	*M*	*SD*	*n*	*M*	*SD*
Electrical Safety	57	4.21	1.114	31	4.13	1.056
Wiring Skills	59	3.86	1.090	31	3.84	1.128
Electricity Controls	58	3.55	1.127	30	3.60	1.133
Electrician Tools	56	3.67	1.243	31	3.84	1.098
Type of Electrical Motors	56	3.27	1.243	30	3.50	1.167
Cleaning Motors	52	3.17	1.248	30	3.53	1.167

Note: The Importance scale, 1 = not important, 2= some importance, 3= moderately important, 4= strong importance, 5 = very strong importance

Table 8 depicts the perceived level of importance to teach each of the fifteen competency areas in the *Power & Machinery* construct by certification type. Traditionally certified teachers reported moderate importance (*GM*=3.50) while the alternatively certified teachers reported some importance (*GM*=2.27). Both groups identified a strong level of importance to teach Small Engine Safety, Small Engine Services-4 cycle, and tractor safety respectively.

Table 8

Respondent Reported Perceived Importance to Teach Power & Machinery Skills by Certification Type

	Traditionally Certified			Alternatively Certified		
Competency Area	*n*	*M*	*SD*	*n*	*M*	*SD*
Small Engine Services – 2 cycle	56	3.80	1.034	33	3.97	1.075
Small Engine Services – 4 cycle	56	4.00	0.953	33	4.00	1.118
Small Engine Overhaul	55	3.89	1.031	32	3.94	1.162
Small Engine Safety	56	4.34	0.859	33	4.24	0.902
Tractor Service	52	3.58	1.144	32	3.66	1.153
Tractor Maintenance	52	3.73	1.157	32	3.75	1.078
Tractor Overhaul	51	3.18	1.178	32	3.34	1.066
Tractor Selection	49	3.18	1.112	32	3.50	1.218
Tractor Operation	51	3.29	1.154	32	3.63	1.100
Tractor Safety	53	3.92	1.222	32	4.00	1.136
Tractor Driving	52	3.46	1.244	32	3.56	1.243
Service Machinery	52	3.50	1.094	32	3.59	1.103
Machinery Selection	51	3.39	1.078	32	3.53	1.107
Machinery Operation	53	3.43	1.152	31	3.55	1.080
Power & Machinery Safety	55	3.96	1.186	31	4.03	1.197

Note: The Importance scale, 1 = not important, 2= some importance, 3= moderately important, 4= strong importance, 5 = very strong importance

Table 9 depicts the perceived importance of teaching specific skills within the Soil and Water construct. Both groups identified the construct as having some importance (Table 4). Both certification groups identified Global Positioning Systems as having a strong level of importance in the agricultural education curriculum (Traditionally Certified - *M* = 4.23, Alternatively Certified – *M = 4.24)*. All other skill areas were identified as moderately important.

Table 9

Respondent Reported Perceived Importance to Soil and Water Skills by Certification Type

	Traditionally Certified			Alternatively Certified		
Competency Area	*n*	*M*	*SD*	*n*	*M*	*SD*
Global Positioning Systems	56	4.23	0.894	33	4.24	0.936
Legal Land Descriptions	59	3.98	0.974	32	3.91	1.118
Use of Survey Equipment	57	3.75	1.023	31	3.52	1.180
Differential Leveling	48	3.27	1.144	30	3.20	1.243
Profile Leveling	48	3.13	1.104	30	3.10	1.242

Note: The Importance scale, 1 = not important, 2= some importance, 3= moderately important, 4= strong importance, 5 = very strong importance

Conclusions

The purpose of this study was to identify traditionally and alternatively certified secondary agricultural education teachers' perceived level of importance to teach agricultural mechanics in the SBAE curriculum. The first objective sought to describe selected characteristics of traditionally and alternatively certified teachers and their agricultural education programs in Iowa. We conclude that alternatively certified agricultural education teachers in Iowa are an important subset of the teacher demographic and that their needs should be identified. Specifically, alternatively certified teachers made up approximately one-third of our study's respondents, significantly surpassing the 19.4% of new SBAE teachers (Smith, et al., 2022 and 15% of all teachers (United States Department of Education, 2015) who recently completed alternative routes to licensure in the United States. Additionally, as we consider the primary purpose of this study it is important to note that over one-half (n=51%) of the alternatively certified teachers had no post-secondary training in agricultural mechanics of any kind at the time of completing this study's questionnaire.

When considering previous research, Wells et al., (2013) found a positive relationship between training and intention to teach after completing a post-secondary agricultural mechanics course Roberts (2016) posited that experiential training allows for individuals to develop increased comprehensive skills. Krysher, et al. (2012) indicated that agricultural education teachers who participate in additional experiential learning activities (i.e., professional development in agricultural mechanics), gain a positive learning experience, which can have a positive influence on gravitating toward teaching particular levels of the content and therefore the importance they place upon those skills in the curriculum.

In exploring objective two, we reported traditionally and alternatively certified teachers' perceived importance to teach agricultural mechanics. When considering the five primary constructs of agricultural mechanics education included in this study, traditionally certified teachers identified four of the five constructs as being moderately important for inclusion in their agricultural education program. Alternatively certified teachers, however, identified all five of the constructs as having some importance. Walker et al., (2004) suggested that teachers who left the profession indicated that agricultural mechanics was their lowest desired course to teach. Burris et al., (2010) also found that teachers felt less comfortable teaching agricultural mechanics, and if given the choice would stray from teaching agricultural mechanics in their own curriculum. We believe that is could be directly attributed to the lack of training and positive experiences received by alternatively certified SBAE teachers prior to entering the classroom.

Ajzen's (1991) Theory of Planned Behavior supports the notion that positive behavioral intentions on a skill or area leads to positive behaviors to teach the newly learned skill or area. The lack of positive learning experiences in agricultural mechanics at both the secondary and post-secondary levels may have negatively impacted alternatively certified teachers' competency and willingness to teach this important component of the agricultural education curriculum. It takes multiple influences on an individual's behavior and positive learning experiences to attain new skills. Stripling & Roberts (2012) and Burris et al. (2010) have both indicated that more experience in a particular content area (such as agricultural mechanics) creates a higher self-confidence in the curriculum area. More exposure received in agricultural mechanics at the post-secondary level can lead to an increased number of agricultural mechanics courses and skills being taught at the high school level (Wells et al., 2013).

Implications and Recommendations

When considering the lack of agricultural mechanics skills training required by alternatively certified SBAE teachers in Iowa, we recommend increased exposure to agricultural mechanics content and entry-level agricultural mechanics coursework to build foundational skills. Building foundational skills will perhaps lead to more positive behavioral intentions of traditional and alternatively certified teachers to teach agricultural mechanics at the secondary level. This has direct implications for traditional and alternative teacher licensure programs as well as the agricultural education profession.

Alternative licensure program coordinators and faculty should partner with traditional college and university program providers or develop relationships with community colleges or technical schools to provide critical skills training in agricultural mechanics. Additionally, alternative routes to SBAE licensure should integrate specific methods for teaching the critical skills identified in this study into the preparation program.

Alternatively certified teachers vary widely in the amount of teacher preparation courses at the post-secondary level. Therefore, with the expectations of agricultural mechanics to be taught at the secondary level, it is imperative that agricultural education teachers receive training in agricultural mechanics (Wells et al., 2013). Ford, et al. (2008) concluded that agricultural mechanics was the course in which alternatively certified teachers are least competent. Requiring alternatively certified teachers to receive training in agricultural mechanics before being licensed to teach will allow for increased competency and willingness to teach this important curricular content.

We also recommend that traditional and alternatively certified teachers have more opportunity for professional development in agricultural mechanics. Even though this study did not specifically look at the in-service needs of traditional and alternatively certified teachers, it is alarming how many chose to deem agricultural mechanics skills as less important to other courses in agricultural education in previous research (Walker et al., 2004). The in-service needs of traditional and alternatively certified teachers can be vastly different. However, in respect to agricultural mechanics curriculum both traditional and alternatively certified could use more professional development in this curriculum area. With agriculture continuously changing and advancing, teachers must be prepared to teach and keep up to date with these new innovations (Doerfert, 2011). By providing additional training and professional development for traditionally and alternatively certified teachers in various agricultural mechanics skills, SBAE teachers will gain the necessary skills and competencies to teach agricultural mechanics at the secondary level.

Additional research should be conducted to determine if early career teacher perceptions can be influenced by completing high quality, relevant professional development. Burris et al., (2013) contended professional development could help with teacher retention. This line of research could help program coordinators and faculty determine best practices for future professional development which should lead to a more positive perception of agricultural mechanics in SBAE. Retention of alternatively certified teachers is critical to help combat the huge teacher shortage problem. With an ever-increasing number of alternatively certified teachers entering SBAE, the time to act is now!

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