

The Teaching Techniques of Alabama's Traditionally and Alternatively Certified School-Based Agricultural Education Instructors

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Abstract

Numerous techniques and methods are used in School-Based Agricultural Education. These techniques are vital to the goal of educating a diverse and expansive population that exist within secondary agricultural science courses. Agricultural educators, both traditionally and alternatively certified, know and understand the value of using multiple techniques to differentiate one's instruction. It has also been previously identified that, while there are some similarities, these two certification groups do have unique professional development needs. This study sought to identify the techniques Alabama's agriculture instructors had been taught and are using. Through the identification of these techniques, key differences between traditionally and alternatively certified instructors can be identified. Based on the findings of this study, techniques that had a higher average of training received were more likely to be used by both certifications. Between traditionally and alternatively certified instructors, an increase in training received and decrease in utilization was seen across most of the specific techniques for alternatively certified instructors. Individual techniques also called to question the over-training or underutilization of that technique. While there are key differences across the certification types, the findings indicate more training may be needed in an effort to promote the use of different techniques in agricultural education.

Introduction

For School-Based Agricultural Education (SBAE) instructors, the techniques used to teach students about agriculture depend on the objectives of the lesson and shape how instructors deliver content and facilitate students' learning (Newcomb et al., 2003; Phipps et al., 2007; Talbert et al., 2014). Even with the various levels of professional development on teaching techniques, SBAE instructors still primarily use lecture and lecture-based instructional techniques (Boyle, 2011; Smith et al., 2015). Several studies have identified the limited use of other teaching techniques such as cooperative learning, demonstrations, inquiry-based learning, various forms of experiential learning, and to a limited extent, service-learning (Bradford et al., 2019; Roberts et al., 2019; Roberts & Edwards, 2018; Sallee et al., 2013; Skelton et al., 2018; Voges et al., 2020). The reported lack of utilization and reported limited use of non-lecture-based methods begs the question of why teachers over rely on lectures or under rely on others. To determine if the SBAE teachers over rely

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on the comfortable or are underprepared in techniques, two main questions arose. What teaching techniques are being taught to agricultural science teachers? Do the teachers use techniques based on the training they received?

When entering the classroom, SBAE teachers are likely to have had training on various subjects to increase their preparedness; such subjects can center on classroom management, curriculum development, and instructional methods (Boone, 1990; Dyer & Osbourne, 1996a, 1996b; Parr & Edwards, 2004; Roberts & Dyer, 2004; Sallee et al, 2013; Smith et al., 2015). Through exposure to these theories and techniques, instructors can rely on their training to provide guidance and help them make more informed decisions on which methods to use in their classroom. Within SBAE, instructors are traditionally certified and alternatively certified. With the teacher shortage caused by the retirement of the baby boomer generation, natural attrition rates, and increase in the number or size of secondary agriculture programs, the supply of teachers from traditionally certifying institutions is not meeting the demand (Lawver et al, 2016).

As acceptance rates across the largest land grant institutions decrease, it is also unlikely that traditionally certified instructors will meet the rising annual demand (Sutcher et al., 2016). Alternatively certified, emergency certified, or other forms of less formal certification have been seen as a potential answer to the shortage in SBAE (National Research Council, 2010). However, Touchstone (2015) specifically indicates that the alternatively certified instructors have an increased need for curriculum development, and a lack of pedagogical knowledge to fully implement engaging lessons within their classroom. Coleman et al. (2020) stated alternatively certified instructors reported their highest professional development needs included differentiation of instruction, instructional content development, and curricula resource identification. Roberts and Dyer (2004) argued that alternatively certified instructors lack professional knowledge and are potentially limited to a narrower scope of instructional methodology within SBAE. Previous studies have noted a sharp increase in those lacking basic pedagogical knowledge and learning management skills (Bowling & Ball, 2018; Coleman et al., 2020; Roberts & Dyer, 2004). This difference between traditionally and alternatively certified instructors has been identified throughout literature, and when sat alongside the questions relating to technique instruction and use, a narrative of potential knowledge gaps is introduced that needs to be addressed.

Theoretical Framework

Bandura's (1986) Social Cognitive Theory (SCT) was used as the theoretical framework for this study. Through this framework we can begin to determine the relationship between the training SBAE teachers receive and the actual teaching techniques they decide to use in their own classroom. According to SCT, motivations and actions stem from internal and external factors (Bandura, 1986). While decisions can be influenced by current physical barriers and environments, SCT asserts that decisions are ultimately guided by the combination of past experiences (cognitive factors), where a behavior was observed (behavioral factors), and the social settings of an experience (environmental factors). The reciprocal triadic relationship between these points of understanding gives an individual the opportunity to replicate a behavior or action for themselves in future experiences. SCT was operationalized in this study through a postulation that teachers who have been trained in certain techniques are more likely to use those techniques in their own instruction. Additionally, self-efficacy is another facet to this theory. If the repeated behaviors have

positive reinforcement and are accompanied by a feeling of success or accomplishment, one is more likely to continue to repeat the behavior, simultaneously boosting their own self-confidence in this behavior (Stajkovic & Luthans, 1998).

Bandura (1997) explored the sources of self-efficacy, which are: enactive mastery, vicarious experiences, verbal persuasion, and physiological and affective states. First, enactive mastery depends upon the successful performance of an action with repeated successes following that action. For example, if a teacher successfully uses inquiry-based learning in their class, according to Bandura's theory one could assume the teacher will continue to use that technique in the future. Second, vicarious experiences produce the need to compare skills and decide one's own capability through the act of observation. In other words, a part of preservice teachers' self-efficacy can stem from watching mentor, cooperating, or peer teachers perform techniques and comparing their own performance when they have the chance to implement a lesson plan. Third, verbal persuasion can look like an administrator giving constructive feedback on a lesson, with positive references to the technique used; the teacher who receives this feedback is more likely to feel more confident using this technique again. Lastly, physiological and affective states, or how people react to situations, is an internal measure for self-efficacy. For instance, if a teacher experiences elevated levels of stress while performing an activity, they may associate lower levels of capability with that method. The opposite can also be true; a positive affective state can result in a higher sense of self-efficacy with regard to that experience or method. While each of these sources of self-efficacy are distinct in their own ways, Bandura (1997) notes that each source cannot perform as the lone main indicator or progenitor of self-efficacy.

Purpose/Objectives

The purpose of this study was to determine which teaching techniques were being trained on and which teaching techniques were being utilized by traditionally and alternatively certified SBAE instructors. The following objectives guided this study:

- 1) Identify common techniques taught to Alabama SBAE instructors,
- 2) Determine commonly used techniques in Alabama SBAE,
- 3) Establish if connections between SBAE teacher certifications, techniques taught, and/or techniques used exist.

Methods/Procedures

To establish the instrumentation for this study, an in-depth review of texts and articles commonly used in Methodology of Teaching Courses was conducted (Eggen & Kauchak, 2020; Kolb, 1984; Newcomb et al., 2003; Phipps et al., 2007; Plass et al., 2015; Smith et al., 2015; Talbert et al., 2013). Utilizing these texts, the research team identified 20 teaching techniques and developed a commonly held naming convention for each method found through the different established definitions common in SBAE (Table 1). This naming convention was then reviewed by two faculty and two doctoral students, all former secondary teachers, who regularly teach the pre-service teachers in Alabama for face validity. In the conducting of the methods determination, it was recognized that the terms "teaching methods" and "teaching techniques" are used interchangeably throughout these texts. For the sake of consistency, this study uses the term "teaching techniques" when referring to these forms of teaching and instruction no matter the original text usage of "methods" or "techniques."

Table 1*Definitions of Specific Teaching Techniques and Their Sources*

Teaching Technique	Definition
Case Studies ¹	Actual or hypothetical scenarios that requires decision(s) or action(s) on behalf of the students
Demonstrations ^{1,2,3,4}	Teacher-led step-by-step explanation of hands-on procedures or practice
Direct Instruction ^{1,5}	Teacher-centered strategy that uses explanations and modeling alongside student practice to teach concepts and skills
Discussions ^{1,2,3,4}	A process that involves students sharing information through questions and answers, offering their opinions, or debating
Experiments ^{1,2,3,4}	An investigation or trial using the scientific method conducted by students to determine the effects of a procedure or device
Experiential Learning ^{1,2,3,6}	Learning experiences built on active experimentation, concrete experience, reflective observation, and abstract conceptualization
Field Trips ^{1,2,3,4}	Firsthand observation and study of an off-site business, agency, enterprise, or other entity
Games ^{1,7}	Contests or experiences in which students compete toward specified learning outcomes while following outlined rules
Guided Practice ^{1,5}	Interaction and provided feedback as students practice new skills or techniques to increase their understanding
Independent Studies ^{1,2,3,4}	Experiences where students practice new skills or concepts under the supervision of the teacher, using teacher provided examples
Inquiry-Based Learning ^{1,5}	Process or activities designed to teach practices for answering questions and solving problems based on facts and observations
Learning Modules ²	Self-contained activities/lessons that students complete independently with instructor feedback
Lectures ^{1,2,3,4,5}	An oral presentation by the teacher or other individual used to disseminate information in a time-efficient manner
Lecture Discussion ^{1,5}	Teacher-led presentation of information with opportunities provided for student interaction with the presenter
Problem-Based Learning ¹	Approach that begins with a problem or question in which students seek answers or solutions with the teacher in a facilitating role
Project-Based Learning ^{1,2}	Activities focused on utilizing projects or plans to promote reflection and understanding on concepts or solutions to problems
Resource People ^{1,2,3,4}	Outside individuals invited to share special knowledge or skills to provide insights that the agricultural teacher may not have
Role Playing ^{1,2,3,4}	Performance of a scenario or situation by students pretending within the specified scope to illustrate information or concepts
Simulations ¹	Educational experiences where the scenarios that are presented are representations of something real
Supervised Studies ^{1,2,3,4,5}	Student-led independent examination of data using instructional resources, under teacher supervision, and following a prompt

Note. ¹Phipps et al. (2007), ²Talbert et al. (2022), ³Newcomb et al. (2003), ⁴Smith et al. (2015), ⁵ Eggen & Kauchak (2020), ⁶Kolb (1984), ⁷Plass et al. (2015)

To determine the different techniques educators employ in their classrooms, an instrument was built that asked participants which techniques they previously received training on and techniques they utilize in their course instruction. For each technique, participants were asked to check a box if they had “received any formal training during your teacher preparation relating to the following technique.” Participants were also asked with a check box if they used the technique in the classroom/laboratory. The data were then coded binary as *Received Training* for an affirmation of “I have received formal training” and as *Use in Instruction* for an affirmation of “I use this technique in the classroom,” “I use this technique in the laboratory,” or a combination thereof. Additional characteristic data were also captured. Using a convenience sample of teachers attending the 2022 Alabama Agricultural Science Teacher Conference, 30 participants were approached to participate, with 29 fully completing the instrument. There are just over 250 practicing SBAE instructors identified through publicly accessible Alabama directories, with a smaller portion of close to 150 participating in the annual conference; therefore, the sample population resulted in an 11.33% response rate of Alabama SBAE instructors. The target population was selected at the lower response rate due to the exploratory nature of the study. Due to the restrictions of the sample population, no generalizations should be made about SBAE as a whole; rather, this study aims to snapshot where Alabama SBAE may be to address the educational needs of pre- and in-service instructors while providing an opportunity for future explorations of the broad spectrum of teaching techniques.

Demographic characteristics of respondents are described in Table 2. The makeup of the teachers who responded were 51.72% male ($n = 15$) and 48.28% female ($n = 14$). The average age of respondents was 36.37 years ($SD = 11.30$). The majority of the respondents were traditionally certified ($n = 20$, 68.97%), all of which attended the 1862 Land-Grant institution (Auburn University) and completed their teacher certification during their time as an undergraduate student. For the purposes of this study, using the certification descriptions provided by Coleman et al. (2020) and Roberts and Dyer (2004), a traditionally certified instructor is defined as a teacher who completed student teaching and earned their teaching certification through an undergraduate or graduate agricultural science education program. Alternatively certified instructors are defined as those who earned their certification by other means, including those who were emergency certified or those who earned their certification in a different subject area through a traditional undergraduate or graduate program. Specifics for the method of certification of the alternatively certified instructors were not collected within this study.

Table 2

Participant Characteristics

Characteristic	<i>f</i>	%	<i>M</i>	<i>SD</i>
Gender				
Male	15	51.72		
Female	14	48.28		
Age			36.37	11.30
Teaching Experience by Category				
Beginning Teachers (0 – 5 years)	14	48.28		
Mid-Career Teachers (6 – 10 years)	6	20.69		
Veteran Teachers (11+ years)	9	31.03		
Type of Certification				
Traditional	20	68.97		
Alternative/Emergency	9	31.03		

Results/Findings

Techniques that were previously taught to and are being used by participants were identified first. Table 3 shows the response rate for all participants regarding each teaching technique. The average number of participants who indicated they received training on an individual technique is approximately 13 ($M = 13.15$, $SD = 3.47$). This average increased to approximately 21 participants ($M = 21.40$, $SD = 4.82$) as it relates to their use of a specific technique. The respondents had received the most training on Direct Instruction, Discussions, Experiments, and Lectures ($f = 17$, 58.62%) while receiving the least amount of training on Role Playing ($f = 6$, 20.69%). Demonstrations were used by the most respondents ($f = 28$, 96.55%) while Case Studies were used the least ($f = 11$, 37.93%).

Table 3

Frequency of Participants Who Received Training for and Used Each Teaching Technique in Instruction

Teaching Technique	Received Training ¹		Used in Instruction ²	
	<i>f</i>	%	<i>f</i>	%
Case Studies	16	55.17	11	37.93
Demonstrations	16	55.17	28	96.55
Direct Instruction	17	58.62	27	93.10
Discussions	17	58.62	27	93.10
Experiments	17	58.62	26	89.66
Experiential Learning	12	41.38	23	79.31
Field Trips	8	27.59	24	82.76
Games	9	31.03	25	86.21
Guided Practice	15	51.72	20	68.97
Independent Studies	14	48.28	21	72.41
Inquiry-Based Learning	13	44.83	19	65.52
Learning Modules	11	37.93	19	65.52

Lectures	17	58.62	25	86.21
Lecture Discussion	16	55.17	20	68.97
Problem-Based Learning	13	44.83	25	86.21
Project-Based Learning	16	55.17	26	89.66
Resource People	9	31.03	16	55.17
Role Playing	6	20.69	14	48.28
Simulations	8	27.59	17	58.62
Supervised Studies	13	44.83	15	51.72

Note. ¹M = 13.15, SD = 3.47; ²M = 21.40, SD = 4.82

When reviewing each participant’s *Received Training* and *Use in Instruction* response as it relates to the groups of teaching techniques, 13 respondents (44.83%) received training on less than five techniques and 22 respondents (75.86%) use between 11 and 19 of the teaching techniques. About nine (M = 9.07, SD = 1.09) techniques were taught to participants while almost 15 (M = 14.76, SD = 1.68) techniques are reportedly being used by the participants (Table 4).

Table 4

Frequency of Participants Who Received Training for and Used Each Teaching Technique in Instruction by Quantity of Techniques

Number of Techniques	Received Training		Use in Instruction	
	f	%	f	%
0	1	3.45%	0	0.00%
1 – 5	12	41.38%	1	3.45%
6 – 10	5	17.24%	3	10.34%
11 – 15	2	6.90%	12	41.38%
16 – 19	7	24.14%	10	34.48%
20	2	6.90%	3	10.34%

Note. ¹M = 9.07, SD = 1.09; ²M = 14.76, SD = 1.68

Potentially there could have been 580 positive responses for received training and 580 positive responses for utilized techniques in their classrooms. If all participants had received training and used the technique, there would be a discrepancy of zero between these. However, looking at the overall discrepancies between the use of teaching techniques and the rate at which they were taught them, 73.79% (f = 428) of the possible 580 responses for the use of the different techniques compared to 45.34% (f = 263) of the possible 580 responses of techniques that had been learned. Showing an overall discrepancy of 165 more instances of a teacher indicating that they had been trained to use a method than a method being used. Table 5 displays the differences between the use of each specific technique compared to the received training for it. Anomalies arose across the responses for Case Studies, Field Trips, and Games. For example, Case Studies were not used during instruction by 18 participants (62.07%) while being taught to 16 participants (55.17%). Field Trips and Games, while being used by 24 (82.76%) and 25 (86.21%) participants, were only taught to eight (27.59%) and nine (31.03%) participants, respectively. Lastly, Resource People, Role Playing, and Simulations all have low responses in received training and use and high responses in no training and no use, with Role Playing having the highest discrepancy of 5 (17.24%) and 14 (48.28%) participants, respectively.

Table 5

Discrepancies between Received Training and Used Teaching Techniques

Teaching Technique	Trained to Use				Not Trained to Use			
	Use ¹		Do Not Use ²		Use ³		Do Not Use ⁴	
	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%
Case Studies	7	24.14	9	31.03	4	13.79	9	31.03
Demonstrations	16	55.17	0	0.00	12	41.38	1	3.45
Direct Instruction	16	55.17	1	3.45	11	37.93	1	3.45
Discussions	16	55.17	1	3.45	11	37.93	1	3.45
Experiments	16	55.17	1	3.45	10	34.48	2	6.90
Experiential Learning	12	41.38	0	0.00	11	37.93	6	20.69
Field Trips	7	24.14	1	3.45	17	58.62	4	13.79
Games	8	27.59	1	3.45	17	58.62	3	10.34
Guided Practice	11	37.93	4	13.79	9	31.03	5	17.24
Independent Studies	11	37.93	3	10.34	10	34.48	5	17.24
Inquiry-Based Learning	10	34.48	3	10.34	9	31.03	7	24.14
Learning Modules	8	27.59	3	10.34	11	37.93	7	24.14
Lectures	15	51.72	2	6.90	10	34.48	2	6.90
Lecture Discussion	14	48.28	2	6.90	6	20.69	7	24.14
Problem-Based Learning	12	41.38	1	3.45	13	44.83	3	10.34
Project-Based Learning	14	48.28	2	6.90	12	41.38	1	3.45
Resource People	6	20.69	3	10.34	10	34.48	10	34.48
Role Playing	5	17.24	1	3.45	9	31.03	14	48.28
Simulations	7	24.14	1	3.45	10	34.48	11	37.93
Supervised Studies	9	31.03	4	13.79	6	20.69	10	34.48
Total	220	37.93	43	7.41	208	35.86	109	18.79

Note. ¹*M* = 11.00, *SD* = 3.66; ²*M* = 2.15, *SD* = 1.96; ³*M* = 10.40, *SD* = 3.06; ⁴*M* = 5.45, *SD* = 3.76

To better identify which techniques are used and had been trained on as it relates to the different certifications, each technique was broken down by the participants indication of how they received their teaching certification. Table 6 shows the differences for traditionally certified teachers between their technique training received and their use in the classroom. Again, Case Studies stood out as 65% of the traditionally certified participants (*f* = 13) do not use the technique while 50% (*f* = 10) were trained to use the technique. Field Trips and Games also shared similarities across the larger group as 90% used each of the techniques while only 30% (Field trips) and 35% (Games) received training in the respective techniques. Role Playing also has an increased frequency of responses 55%, with participants having neither learned nor used the technique.

Table 6

Traditionally Certified Discrepancies for Teaching Techniques

Teaching Technique	Trained to Use				Not Trained to Use			
	Use ¹		Do Not Use ²		Use ³		Do Not Use ⁴	
	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%
Case Studies	3	15.00	7	35.00	4	20.00	6	30.00
Demonstrations	12	60.00	0	0.00	8	40.00	0	0.00
Direct Instruction	10	50.00	1	5.00	8	40.00	1	5.00
Discussions	11	55.00	1	5.00	8	40.00	0	0.00
Experiments	12	60.00	1	5.00	6	30.00	1	5.00
Experiential Learning	8	40.00	0	0.00	8	40.00	4	20.00
Field Trips	5	25.00	1	5.00	13	65.00	1	5.00
Games	6	30.00	1	5.00	12	60.00	1	5.00
Guided Practice	7	35.00	3	15.00	6	30.00	4	20.00
Independent Studies	9	45.00	2	10.00	6	30.00	3	15.00
Inquiry-Based Learning	7	35.00	3	15.00	6	30.00	4	20.00
Learning Modules	5	25.00	3	15.00	9	45.00	3	15.00
Lectures	10	50.00	2	10.00	8	40.00	0	0.00
Lecture Discussion	10	50.00	2	10.00	4	20.00	4	20.00
Problem-Based Learning	7	35.00	1	5.00	10	50.00	2	10.00
Project-Based Learning	8	40.00	2	10.00	9	45.00	1	5.00
Resource People	4	20.00	2	10.00	7	35.00	7	35.00
Role Playing	3	15.00	0	0.00	6	30.00	11	55.00
Simulations	5	25.00	0	0.00	6	30.00	9	45.00
Supervised Studies	5	25.00	3	15.00	3	15.00	9	45.00
Total	147	36.75	35	8.75	147	36.75	71	17.75

Note. ¹ $M=7.35$, $SD=2.78$; ² $M=1.75$, $SD=1.58$; ³ $M=7.35$, $SD=2.46$; ⁴ $M=3.22$, $SD=3.22$

Table 7 shows the differences for alternatively certified teachers between their technique training received and their use of techniques in the classroom. As with traditionally certified, the alternatively certified responses indicated that Case Studies are not used by 55.56% of the participants ($f=5$) while being learned by 66.67% ($f=6$). Field Trips and Games also were indicated to have been used 66.67% ($f=6$) and 77.78% ($f=7$) respectively while only being learned by 22.22% ($f=2$) of the participants. Both Direct Instruction and Project-Based Learning were used by all alternatively certified instructors; however, only 33.33% ($f=6$) of the respondents for each technique had received prior training.

Table 7

Alternatively Certified Discrepancies for Teaching Techniques

Teaching Technique	Trained to Use				Not Trained to Use			
	Use ¹		Do Not Use ²		Use ³		Do Not Use ⁴	
	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%
Case Studies	4	44.44	2	22.22	0	0.00	3	33.33
Demonstrations	4	44.44	0	0.00	4	44.44	1	11.11
Direct Instruction	6	66.67	0	0.00	3	33.33	0	0.00
Discussions	5	55.56	0	0.00	3	33.33	1	11.11
Experiments	4	44.44	0	0.00	4	44.44	1	11.11
Experiential Learning	4	44.44	0	0.00	3	33.33	2	22.22
Field Trips	2	22.22	0	0.00	4	44.44	3	33.33
Games	2	22.22	0	0.00	5	55.56	2	22.22
Guided Practice	4	44.44	1	11.11	3	33.33	1	11.11
Independent Studies	2	22.22	1	11.11	4	44.44	2	22.22
Inquiry-Based Learning	3	33.33	0	0.00	3	33.33	3	33.33
Learning Modules	3	33.33	0	0.00	2	22.22	4	44.44
Lectures	5	55.56	0	0.00	2	22.22	2	22.22
Lecture Discussion	4	44.44	0	0.00	2	22.22	3	33.33
Problem-Based Learning	5	55.56	0	0.00	3	33.33	1	11.11
Project-Based Learning	6	66.67	0	0.00	3	33.33	0	0.00
Resource People	2	22.22	1	11.11	3	33.33	3	33.33
Role Playing	2	22.22	1	11.11	3	33.33	3	33.33
Simulations	2	22.22	1	11.11	4	44.44	2	22.22
Supervised Studies	4	44.44	1	11.11	3	33.33	1	11.11
Total	73	40.56	8	4.44	61	33.89	38	2.11

Note. ¹ $M = 3.65$, $SD = 1.31$; ² $M = 0.40$, $SD = 0.58$; ³ $M = 3.05$, $SD = 1.02$; ⁴ $M = 1.90$, $SD = 1.09$

When comparing the data of traditionally and alternatively certified instructors, there are many previously mentioned similarities, although key differences do arise. When looking at the averages across each individual technique, between 15.00% and 65.00% ($M = 45.50\%$, $SD = 13.31\%$) of the traditionally certified instructors responded they had received training and between 35.00% and 100.00% ($M = 73.50\%$, $SD = 18.85\%$) of the instructors had used the specific technique. Only slightly off, individual techniques were taught to between 22.22% and 66.67% ($M = 45.00\%$, $SD = 13.82\%$) of the alternatively certified instructors and used by 44.44% and 100.00% ($M = 74.44\%$, $SD = 14.95\%$) of the same population.

The key differences arise in the discrepancy averages between the different certifications regarding specific techniques. Demonstrations, Experiments, Independent Studies, Inquiry-Based Learning, and Lecture Discussion are all learned outside the discrepancy average ($M = 0.05\%$, $SD = 13.42$) in favor of traditionally certified instructors. Conversely, the discrepancies for the training received on Case Studies, Problem-Based Learning, Project-Based Learning, Role Playing, and Supervised Studies were all in favor of alternatively certified instructors. When looking at the use of technique in instruction, Field Trips and Learning Modules are used more by traditionally

certified instructors when compared to the discrepancy average ($M = -0.94\%$, $SD = 13.33$) while alternatively certified instructors report using Project-Based Learning and Supervised Studies more often.

When looking more into the four identified categories, clearer divides begin to show across each of the techniques. Table 8 shows the standardized scores for each technique across each category. By comparing the response percentages for each certification group, a differential rate was identified. By looking at the response differential, responses that fall under the *Trained to Use and Use* and *Not Trained to Use and Do Not Use* categories trended higher across more techniques with alternatively certified instructors, while responses associated with the *Trained to Use but Do Not Use* and *Not Trained to Use but Use* trended higher across more techniques with traditionally certified instructors.

Table 8

Z Score of Difference between Traditionally and Alternatively Certified Instructors

Teaching Technique	Trained to Use		Not Trained to Use	
	Use ¹	Do Not Use ²	Use ³	Do Not Use ⁴
	<i>z</i>	<i>z</i>	<i>z</i>	<i>z</i>
Case Studies	-1.87*	1.22	1.38	0.00*
Demonstrations	1.14	-0.62	-0.59*	0.48*
Direct Instruction	-0.94*	0.10	0.31	0.52
Discussions	0.24*	0.10	0.31	-0.48*
Experiments	1.14	0.10	-1.39*	-0.17*
Experiential Learning	-0.05*	-0.62	0.31	0.07*
Field Trips	0.48	0.10	1.43	-1.55*
Games	0.85	0.10	0.13	-0.86*
Guided Practice	-0.41*	-0.06	-0.50*	0.76
Independent Studies	1.94	-0.78*	-1.39*	-0.24*
Inquiry-Based Learning	0.40	1.53	-0.50*	-0.62*
Learning Modules	-0.33*	1.53	1.60	-1.62*
Lectures	-0.13*	0.82	1.20	-1.17*
Lecture Discussion	0.68	0.82	-0.41*	-0.62*
Problem-Based Learning	-1.22*	0.10	1.11	0.14*
Project-Based Learning	-1.67*	0.82	0.71	0.52
Resource People	0.12*	-0.78*	-0.10	0.31
Role Playing	-1.22*	-2.21*	-0.50*	1.55
Simulations	-1.67	-2.21*	-1.39*	1.62
Supervised Studies	0.12*	-0.06	-1.71*	2.31

Note. *Negative Percent Change Indicating Higher Alternatively Certified Response;

¹ $M = -3.81\%$, $SD = 13.69\%$; ² $M = 4.31\%$, $SD = 6.97\%$; ³ $M = 2.86\%$, $SD = 12.42\%$;
⁴ $M = -3.36\%$, $SD = 16.14\%$

Looking at the *Z* Scores, only seven of the techniques (Direct Instruction, Discussion, Experiential Learning, Games, Guided Practice, Lecture Discussion, and Resource People) scored within the 1 to -1 boundaries across all of the four categories. Five techniques (Demonstration,

Guided Practice, Independent Studies, Role Playing, and Supervised Studies) scored lower than the discrepancy average, while seven techniques (Case Study, Direct Instruction, Discussion, Field Trips, Games, Problem Based Learning, and Project Based Learning) scored higher than the discrepancy average in three of the four categories. How often each of the techniques were taught to or used by the separate groups were comparable as a whole, but there are distinct differences between which specific techniques were more likely to be learned or used by the different certifications as seen through the discrepancies and standardization thereof. The only techniques to show any relative consistency across each of the categories are Discussion, Experiential Learning, and Resource People with the standard deviation for the Z-score averages coming out to 0.36, 0.38, and 0.47 respectively.

Conclusions/ Implications/Recommendations

Reflecting upon the purpose of this study, determining which teaching techniques were being trained on and which teaching techniques were being utilized by traditionally and alternatively certified SBAE instructors, the data shows that the techniques that had a higher average of received training were used by participants more often in their instruction as most theorists and researchers would suggest (Newcomb et al., 2003; Phipps et al., 2007; Talbert et al., 2014). The Direct Instruction, Discussion, Demonstration, Experiment, Lecture, and Project-Based Learning techniques were the top techniques both used and learned, while the Learning Modules, Supervised Studies, Resource People, Simulations, and Role-Playing techniques were consistently in the lower half for each category. This echoes the themes presented in Bandura's (1986) SCT, as the "Environmental" and "Behavioral" aspects of prior experience play a key role in the influence of the personal determinants (i.e., self-efficacy) for use. While the response rate for each of the individual techniques supports SCT, the data potentially presents an alternative outlook. The average number of techniques learned is markedly lower than the number used by participants across both traditional and alternatively certified, meaning that teachers are using more teaching techniques than they are receiving training on. This could be due to the need for differentiation of instruction or the time constraints to properly instruct on each of the different techniques in a limited number of courses or contact hours.

To further explore these potential differences in data, the breakdown of received training and use for each technique was necessary. The most frequent category across all techniques was "Receive Training and Being Used"; however, the category that closely followed was "No Training but Being Used." If a participant did not use a technique, it was over twice as likely that the participant had not received any training on the technique. This leads to the trend that instructors are more likely to not use a technique if they have not received training. The finding of high responses for "No Training but Being Used" may be due to the appropriateness of the technique rather than the perceived ability of the instructor to use that technique.

While there are numerous factors at play, the external factors presented through the environmental and behavioral aspects that Bandura (1986, 1997) presents can be seen by reviewing the relationship between the training responses regarding the individual "No Use" response. Additionally, by looking at each individual technique, the data shows strong connections between the average of *Received Training* and *Use in Instruction*. The responses for Demonstrations, Direct Instruction, Discussions, Experiments, and Lecture techniques were higher than both the *Received*

Training and Use in Instruction overall averages, while the Resource People, Role Playing, and Simulation techniques were indicated less. This again echoes the ideas presented by Bandura (1986, 1997) that the external factors of the previous training received play a significant role in the internal drive to utilize the technique in one's instruction.

There were multiple outliers when reviewing the responses. The Case Study technique appears to have a tendency toward being over trained, underutilized, or both. The average instance of reporting having received training was above and the use in instruction average was below the overall average for the techniques. On the other hand, the Field Trips and Games techniques tended toward being utilized more or under trained as the averages for being used are above and received training are significantly below the overall averages. Lastly, the Supervised Studies technique was close to average for training received yet was noticeably below the overall average for use in instruction while Lecture Discussion was inverted. These anomalies may be due to underutilization and/or over training of the respective techniques. With these anomalies identified, there is a clear need for a more thorough approach to the training and utilization expectation of these techniques. This data is unable to show if there is overtraining or overuse in instruction of these techniques, which would help indicate where the emphasis during SBAE education is being placed. However, there is still an imbalance that needs to be addressed through proper training either through pre-service or in-service development.

To further explore the differences of certification types in relation to SCT, the changes must be identified. For traditionally certified instructors, there were numerous similarities across the individual technique training and use categories, which strengthens the connection to the external aspects of SCT due to the training received through teacher education. With this being said, there were some noticeable outliers when comparing individual techniques to the overall averages for "training received" or "use in the classroom" categories. The Demonstrations, Discussion, Experiments, Lecture, and Lecture Discussion techniques were noticeably more likely to be trained on compared to the overall average across all techniques while the Case Studies, Role Playing, and Supervised Studies techniques were noticeably less likely to be trained on.

The Demonstrations, Experiments, Independent Studies, Inquiry-Based Learning, Lecture, and Discussion techniques were also higher or at the overall average for use in the classroom, showing that training may play a key role in use decisions. Field Trips and Learning Modules were noticeably more likely to be utilized in instruction than the average with slightly elevated averages for training received, but Project-Based Learning and Supervised Studies were noticeably below the average for both training received and use in instruction. These connections further echo the external to internal drive connection.

Considerable differences were noted when reviewing the alternatively certified instructor data compared to traditionally certified. For the overall averages across all techniques, there was an increase in training received and decrease for utilization. For the specific techniques, Direct Instruction, Problem-Based Learning, and Project-Based Learning show noticeable increases in training, yet all have decrease in the use of the technique in the classroom compared to the overall average. However, these three techniques, and Discussions, are the most trained on and used techniques for alternatively certified instructors. Games, alongside Demonstrations and Field Trips, had noticeable increases for training received, yet they also had the most noticeable

decreases in utilization. Case Studies and Supervised Studies both had increases in use of instruction with Case Studies increasing the most substantially, but Case Studies was the only technique to decrease across all averages for training received, an anomaly that potentially needs to be further explored due to its imbalance from the remaining techniques.

With the changes seen across the two certification categories, it calls into question the type of training received or, more likely, the perceived training received for each of the techniques. The research team acknowledges the restraints of the data to extrapolate out to a larger population due to the nature of the sample and size of the population. However, it is the understanding of the research team that this data highlights potential opportunities for better engagement of all SBAE instructors for better instruction on teaching techniques to promote external determinates for future educators.

This study emphasizes that educators should be aware of the different techniques they could use in their course instruction. Even within these 20 techniques that were identified, there are still opportunities to better define and identify the “tools” SBAE instructors use. Teacher education should provide, at minimum, an overview and explanation of all the common techniques used in the classroom and laboratory to best promote differentiation of instruction. Future studies should expand on this study to best identify a common set of teaching techniques. Other studies should also focus on different instructional designs of teacher preparation courses to best provide the wide range of teaching techniques within agricultural education. Lastly, with an increase of alternatively certified SBAE instructors, it is important to continue best practice instruction beyond the traditional certification pathway. This research shows that there is a visible gap between the two certification pathways, and future research and outreach opportunities should be approached.

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